CHAPTER

1

Patterns in Mathematics

Assignment 1.1

1. Square Number
2. True
3. (b) 1, 3, 6, 10 15 (This is a sequence of triangular numbers.)
4. 
5. This is a sequence of cube numbers :

   1^3 1, 2^3 8, 3^3 27, 4^3 64,

   5^3 125, 6^3 216, 7^3 343

   Next number : 343
6. This is a sequence of square numbers :

   1^2 1, 2^2 4, 3^2 9, 4^2 16, 5^2 25

   So, P 16
7. This sequence decreases by 3.1 each time

   29.9 3.1 26.8

   26.8 3.1 23.7

   23.7 3.1 20.6

   20.6 3.1 17.5

   Missing number : 20.6
8. Here each number increases by 6 :

   11 6 17, 17 6 23, 23 6 29,
   29 6 35, 35 6 41

   So, D 35
9. This is a consecutive prime gaps sequence of a special mathemtical sequence.
10. This is a reverse square number sequence

    14^2 196

    13^2 169

    12^2 144

    11^2 121

    10^2 100 (Incorrect number is 80)
11. Each number is divided by 3

    189 3 63

    63 3 21

    21 3 7

    7 3 2.23 (which is not an integer, meaning the sequence may end)
12. 1 $\boxed{2}$ 3 4 3 2 1 $(4)^2$ 16

Assignment 1.2

1. Repeating
2. True
3. 1, 3, 5, 7, 9; square form : 1 + 3, 1 + 3 + 5, 1 + 3 + 5 + 7, 1 + 3 + 5 + 7 + 9
4. By optimizing arrangements, predicting outcomes and efficiently using space in areas like design consturction and planning.
5. $AZ, 2_4$, $BY, 6_8$, $\boxed{CX}$, $\boxed{10_{12}}$

   ($\because$ 10 6 4,
   12 8 4)
6.

21 – 10 = 11	8 + 10 = 18
15 – 10 = 5	10 + 10 = 20
17 – 10 = 7	9 + 10 = (19)

Thus, missing number is 19.

7. 15 lines (as 3   5)
8. 61 as 1, 7, 19, 37 and then 61.
9. Each row consists of 2 triangles.
   For 10 rows :
   10   2   20 triangles will be needed.
10. Months form August to January;

Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Total
85	6	6	6	6	6	115
42	7	7	7	7	7	77

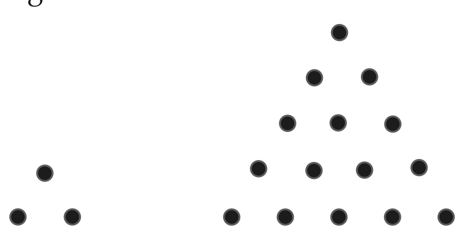
Required Difference   115   77   38

TEXTBOOK EXERCISES

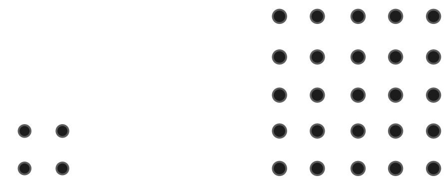
Exercise 1.1

1. Numbers 1, 3, 6, 10, 15, ... are called triangular numbers because they can be represented by dots arranged in the shape of an equilateral triangle.

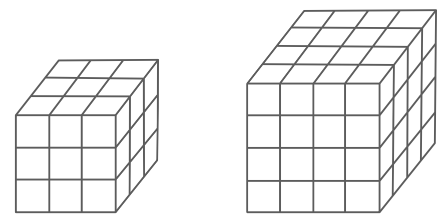
   For example : 3, dots form a triangle with two at the bottom and one at the top. As well 15 dots can be arranged as an equilateral triangle. Five at the bottom and above them respectively four, three, two and one. Look at the figures.



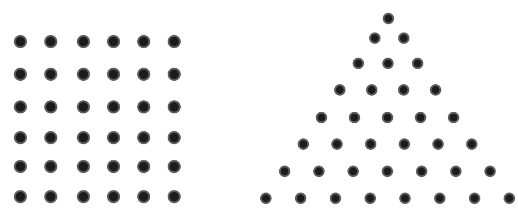
The numbers 1, 4, 9, 16, 25, ... are called squares because they can be arranged in a square grid, like 4 dots forming 2 × 2 square and 25 dots form a grid of 5 × 5.



The numbers 1, 8, 27, 64, 125, ... represent the small cubes that fit into a larger cube with each number being the cube of an integer like 3 × 3 × 3 for 27 and 5   5   5 for 125.

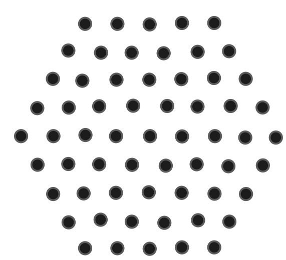


2.



Square   Equilateral triangle

3.



61

4. (i) Yes, the pictorial ways to visualise the sequence of powers of 2 is a tower black.

   2^0 ⟶ □ (1 block)

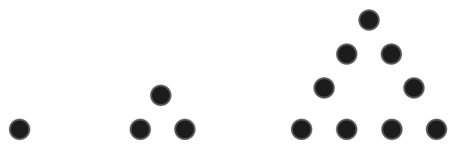
   2^1 ⟶ □ □ (2 block)

   2^2 ⟶ □ □ □ □ (4 block)

   2^3 ⟶ □ □ □ □ □ □ □ □ (8 block)

Similarly, we can move for more.

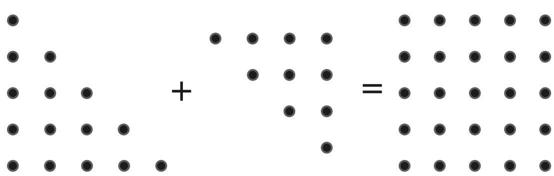
(ii) Yes, the sequence of powers of 3 can be visualises triangular numbers represent power of 3 ($3^0, 3^1, 3^2$ ......) using triangular arrays of dots or blocks with each triangle's area growing exponentially.



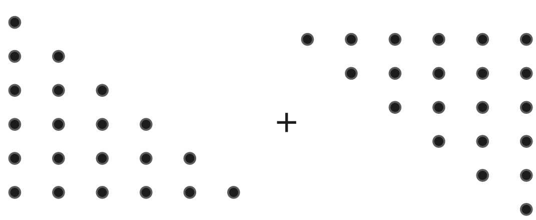
3^0 3^1 3^2

5. We place two triangular shapes obtained by adding upwards and downwards together. We get a square shape *i.e.,*

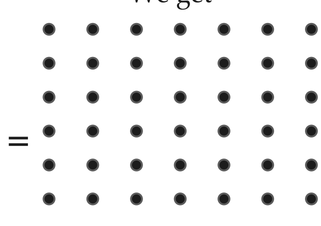
1 2 3 4 5 and 4 3 2 1



Similarly, we can see another example,



We get



6. In this sequence, numbers up to 100 are first added upwards and then downwards. We know that if counting numbers are added in this method, the result is always the square of the number.

So, 1 2 3 ...... 99 100 99 ......

3 2 1 $(100)^2$ 100 100 10000

7. **1. Adding the all 1's sequence up :** When it is started adding the all 1's sequence up (*i.e.,* 1, 1, 1, 1, 1, ... taking partial sums of the sequence), we get

- Sum of the first term: 1
- Sum of the first two terms: 1 1 2
- Sum of the first three terms: 1 1 1 3

And so on,

So the sequence of partial sum is 1, 2, 3, 4, ...

which is the sequence of positive integers.

2. Adding the all 1's sequence up and down : When it is started alternate adding and subtracting the all 1's sequence (*i.e.,* 1, 1,1, 1,1, 1, ...) the partial sums will be

- The sum of first term: 1
- The sum of first two terms: 1 (1) 0
- The sum of first three terms 1 (1) 1 1
- The sum of first four terms: 1 (1) 1 (1) 0

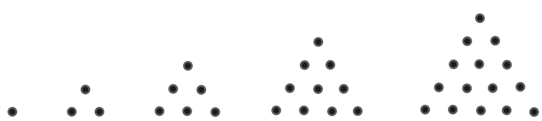
And so on.

So the sequence of partial sums alternates between 1 and 0

1, 0, 1, 0 .....

8. When we start to add the counting numbers up, we get the sequence of triangular numbers. The nth triangular number is the sum of the first n natural numbers. The sequence of triangular numbers starts as 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, ……… . The nth triangular can be calculated using the formula, $T_n \quad \frac{n(n \quad 1)}{2}$. Triangular numbers can be visualised as the number of dots in an equilateral triangle uniformly filled with dots.

Pictorially, these numbers represent the number of dots in progressively larger equilateral triangles.



1 3 6 10 15

9. When we add up pairs of consecutive triangular numbers, then we obtain a sequence of perfect square $(2^2, 3^2, 4^2, ...)$

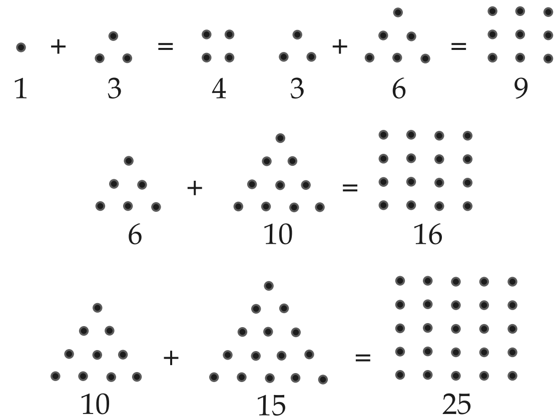
Explanation : Identify the pairs of consecutive triangular numbers

1 1,	1 3 4
3 6 9,	6 10 16
10 15 25,	15 21 36

The obtained results 1, 4, 9, 16, 25, 36 are the respectively perfect squares of $(1)^2, (2)^2, (3)^{2,} (4)^2, (5)^2, (6)^2$ conclude that the sum of pairs consecutive triangular numbers results in perfect squares.

It can be explained with the help of pictures the triangular numbers are 1, 3, 6, 10, 15, 21, 28, 36, …… .

Now,



10. Let us start to add up powers of 2 starting with 1.

1 1,

1 2 3

1 2 4 7,

1 2 4 8 15

1 2 4 8 16 31,

1 2 4 8 16 32 63

So, the series 1, 3, 7, 15, 31, 63, …… .

We can see the difference of two consecutive terms in the series is power of 2.

$3 \quad 1 \quad 2 \quad 2^1$

$7 \quad 3 \quad 4 \quad 2^2$

$15 \quad 7 \quad 8 \quad 2^3$

$31 \quad 15 \quad 16 \quad 2^4$

$63 \quad 31 \quad 32 \quad 2^5$

Now, Let's add up 1 to each of the term of the above series.

$1 \quad 1 \quad 2 \quad 2^1$

$3 \quad 1 \quad 4 \quad 2^2$

$7 \quad 1 \quad 8 \quad 2^3$

$15 \quad 1 \quad 16 \quad 2^4$

$31 \quad 1 \quad 32 \quad 2^5$

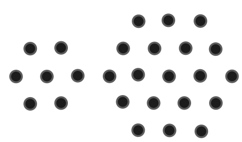
$63 \quad 1 \quad 64 \quad 2^6$

This happens because we are adding 1 to the every term of the series. So, adding 1, the power 2 is increased.

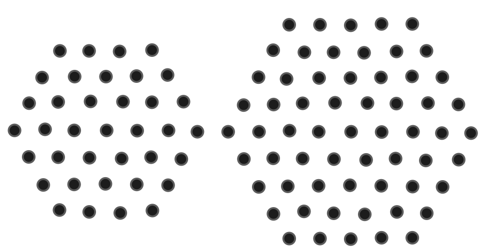
11. The triangular numbers are 1, 3, 6, 10, 15, 21, 28, ...

Now, multiplying each term of the sequence by 6 and adding 1 to it, we get $7, 19, 37, 61, 91, 127, 169, \ldots$

Conclude: We get an increase of multiple of 6 respectively. As shown above. Also numbers obtained so are the hexagonal numbers 7, 19, 37, 61, 91, ……… are the hexagonal numbers, that can be represented through a regular hexagone.



7 19



37 61

12. The hexagonal numbers are 1, 7, 19, 37, 61, 91, ……… .

Adding 1 to them we get :

1 $(1)^3$

1 7 8 $(2)^3$

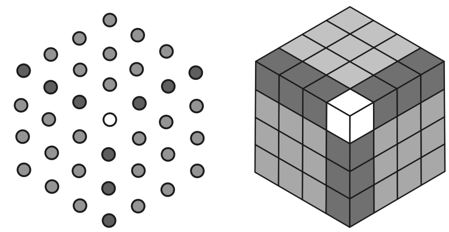
1 7 19 27 $(3)^3$

1 7 19 37 64 $(4)^3$

1 7 19 37 61 125 $(5)^3$

1 7 19 37 61 91 216 $(6)^3$

Concludes : It is clear that when hexagonal numbers are added up we get a number of power of 3 respectively.



13. The following patterns of numbers can be obtained:

(i) 2, 2, 2, 2, 2, … All 2's.

(ii) 3, 6, 9, 12, … The multiples of 3.

(iii) 2, 4, 6, 8, 10, … The sequence of even numbers.

(iv) 5, 10, 15, 20, 25, … The multiples of 5.

(v) 0, 1, 8, 21, 40, 65, … The octagonal number.

(vi) 1, 5, 25, 125, 625, … The powers of 5, ($i.e., 5^0, 5^1, 5^2, 5^3, 5^4, \ldots$)

Exercise 1.2

1. **(a) Regular polygons :** Triangle, quadrilateral, pentagon, hexagon, heptagon, Octagon, and decagon.

(b) Complete graphs : In the given figure number of lines are triangular number sequence.

(c) Stacked squares : The given sequence formed a square number sequence.

(d) Stacked Triangles : The given sequence is a square number sequence represented by triangles.

(e) Koch snowflake : The pattern shows that every consecutive term or figure has four times sides more than that of previous one.

2.

Polygon	No. of sides	No. of corners or vertices
Equilateral triangle	3	3
Square	4	4
Regular Pentagon	5	5
Regular Hexagon	6	6
Regular Heptagon	7	7
Regular Octagon	8	8
Regular Nonagon	9	9

Sequence of sides : 3, 4, 5, 6, 7, 8, 9, …

Sequence of corners : 3, 4, 5, 6, 7, 8, 9 …

It is clear that both the sequences are same because in a regular polygon number of sides is equal to the number of vertices.

3.

Graph	(a)	(b)	(c)	(d)	(e)
No. of Lines	1	3	6	10	15

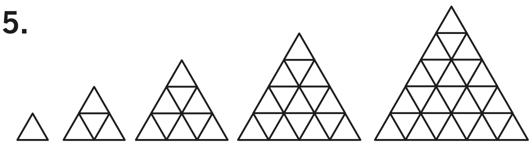
Hence, we get the sequence 1, 3, 6, 10, 15, 21, ... It is triangular number sequences.
The obtained terms of sequence can be arranged as an equilateral triangles.

4.

No. of rows of small squares	1	2	3	4	5
Total no. of small squares	1	4	9	16	25

The sequence that we get is 1, 4, 9, 16, 25 .... Every term of the sequence is the perfect square of respectively 1, 2, 3, 4, 5 .... and the sequence is a square number.

5.



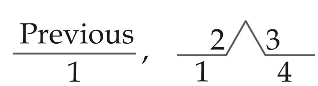
No. of rows of small triangles	1	2	3	4	5	6
Total no. of small triangles	1	4	9	16	25	36

We get the sequence of 1, 4, 9, 16, 25. This is a sequence of square numbers. The next number in the square sequence will come 36.

6.

Koch Snowflake	(a)	(b)	(c)	(d)	(e)
No. of Lines	3	12	48	192	768

In this way we get a sequence 3, 12, 48, 192, 768, 3072, ……… . The first term is 3. After that each term has been obtained by multiplying the previous term by 4. It should also be noted that in the next Koch Snowflake, for each line of the previous shape, 4 lines have been added in the next one.

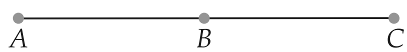


CHAPTER

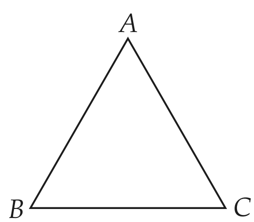
2 Lines and Angles

Assignment 2.1

1. (a) If three points are collinear, a single line segment can be drawn joining them

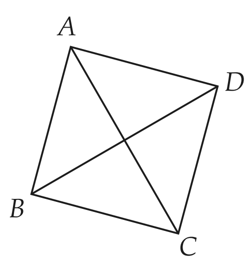


If three points are non-collinear, three line segments can be drawn. Since, three non-collinear points are used to form a triangle.



Line segments AB, BC, CA.

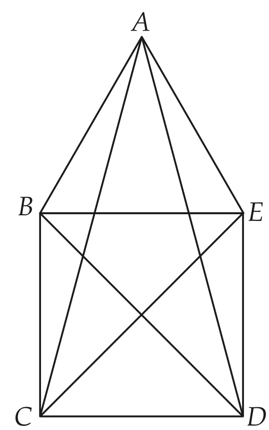
(b) 6 line segments can be formed joining four points in which three points are non-collinear.



Line segments are *AB, BC, CD, DA, AC* and *BD*.

(c) A line segment consists always of 2 points. Thus, the total number of line segments that can be drawn joining 5 points are 10.

Or The formula for calculating the number of line, that can be drawn through n collinear points. (Here $n \quad 5$).



Number of lines $\frac{n\,(n \quad 1)}{2}$

$\frac{5\,(5 \quad 1)}{2}$ 10 line segment.

Line segments are

$AB, BC, CD, DE, EA, AC, AD, BD, BE, CE$.

2. As initial point is O. Hence, rays are OA, OB, OC and OD.

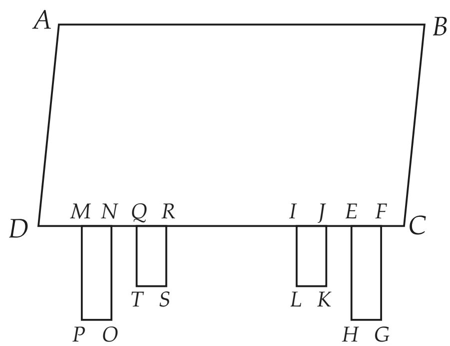
3. Since, points A, B, C are collinear, therefore line segments will be $\overline{AB}, \overline{AC}, \overline{BC}$. The line will be AC.

The rays depends on the initial point, so rays will be AC (if A consider as initial point), BC (if B consider as initial point), CA (if C consider starting point) and BA (if B consider starting point).

4. In the figure, O is the initial point, so rays are OA, OB, OC, OD, OE, OF.

5. Arrows of length of AC and BD show that their lengths are infinite, so lines in the figure are $\overline{AC}$ and $\overline{BD}$ and line segments are $\overline{AB}, \overline{CD}, \overline{AD}, \overline{BC}$.

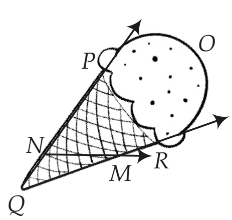
6. The name of line segments given in the figure are



$\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}, \overline{DM}, \overline{DN}, \overline{DQ}, \overline{DR}, \overline{MN}, \overline{MQ}, \overline{MR}, \overline{NQ}, \overline{NR}, \overline{QR}, \overline{PO}, \overline{MP}, \overline{NO}, \overline{QT}, \overline{TS}, \overline{RS}, \overline{CE}, \overline{CF}, \overline{CJ}, \overline{CI}, \overline{EF}, \overline{EJ}, \overline{EI}, \overline{FJ}, \overline{FI}, \overline{IJ}, \overline{IL}, \overline{LK}, \overline{JK}, \overline{EH}, \overline{HG}, \overline{FG}$.

Assignment 2.2

1. (a)

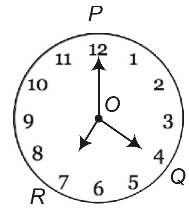


Vertices : Q and N.

Arms : PQ, QR, QN, MN.

Angles : PQR, MNQ.

(b)

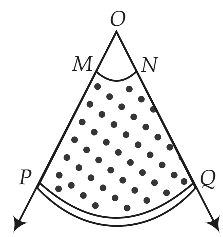


Vertex : O.

Arms : OP, OR, OQ.

Angles : ROQ, POR.

(c)

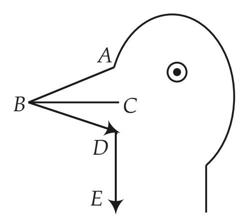


Vertex : O.

Arms : OM, ON, OP, OQ.

Angles : MON, POQ.

(d)

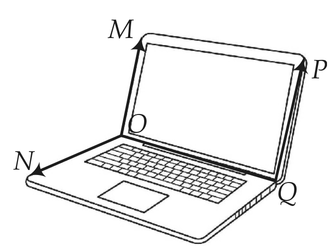


Vertices : B and D.

Arms : AB, BD, DE.

Angles : ABD, BDE.

(e)

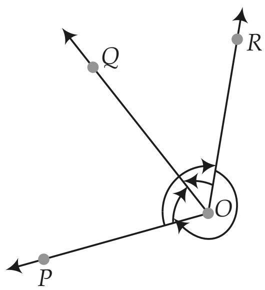


Vertices : O, Q.

Arms : OM, ON, OQ, PQ.

Angles : MON, PQO.

2.



POQ, *QOR*, *POR* refer *ROP*

3. At point *O*, there are three different angles. *O* may be *MON* or *NOQ* or *MOQ*. We cannot label three different angles with same vertex. So to identify these angles we have to name them as *MON* or *NOQ* or *MOQ*. It should be noted that only one point can never for an angle.

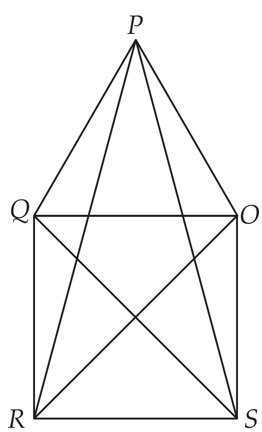
4. *AOB*, *COB*, *COD*, *AOD*.

5. Line segments : *AB*, *EB*, *DB*, *CB*.

Angles formed :

ABE, *EBD*, *DBC*, *ABD*, *ABC*, *EBC*.

6.



Total 10 line segment :

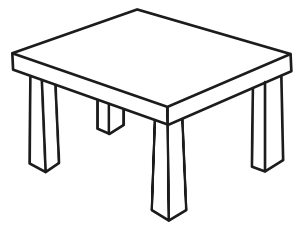
$\overline{OP}, \overline{PQ}, \overline{QR}, \overline{RS}, \overline{SO}, \overline{PR}, \overline{PS}, \overline{QO}, \overline{OR}, \overline{QS}$.

Total 24 angles :

OPQ, *PQR*, *QRS*, *RSO*, *SOP*, *POQ*, *PSO*, *PQO*, *RSQ*, *QOR*, *ROS*, *RQS*, *OQS*, *PQS*, *POR*, *RPS*, *QPR*, *OPS*, *PRQ*, *PRO*, *ORS*, *PQS*, *PSQ*, *ROS*.

Assignment 2.3

1.

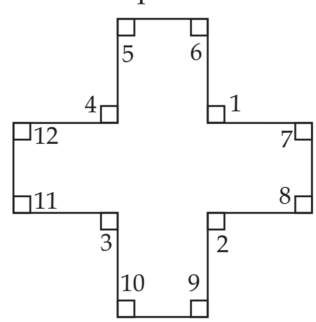


Four right angles at the square or rectangular shaped top-board and 8 right angles are made by four legs with board.

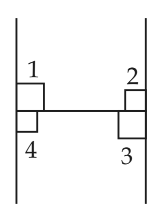
Hence, total right angles 4 8 12.

No, there is no smaller or larger angle than a right angle in it.

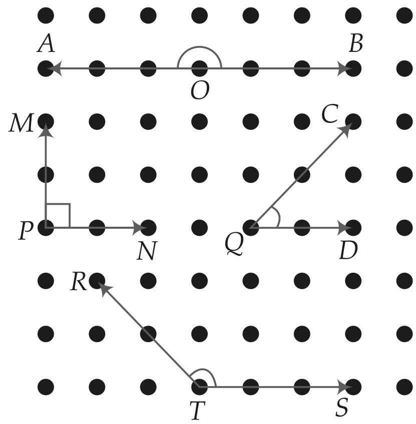
2. There are 12 right angles in total, 4 outside the shape and 8 inside it.



3. The letter H has four right angles.



4. A right angle forms, when two lines are perpendicular to each other. It's measurement is of 90 .

5. 

Name the angles

AOB, *MPN*, *CQD*, *RTS*.

6. Letters *E*, *F*, *H*, *L*, *P* and *T* have right angles.

Assignment 2.4

1. *ABC* 10 , *DEF* 20 , *GHI* 30 ,

JKL 40 , *MNO* 50 , *PQR* 60 .

2. The four corners of bed and it's legs indicate angle of 90 .

Four corners of study table and its legs make angle of 90°.

The corners of books and notebooks make the angle of 90°.

Corners of the gates and windows make the angle of 90°.

Four corners of the calender hanging on the wall make the angle of 90°.

Corners of tiles on the floor make the angle of 90°.

3. Here,

ABC 43 , *DEF* 39 , *GHI* 111 ,

MNO 89 , *JKL* 34 .

None of these angles can be measured by self made protractor as no degree measure of angles divide 360° without leaving a remainder.

4. *BOD* 45 , *COB* 45 ,

DOA 135 , *AOC* 135 .

5. *TQR* 150 , *PQT* 30 ,

SQR 65 , *TQS* 150 65 85 .

6. (a) Here, *A* 90 , *B* 90 , *C* 90 and *D* 90 .

Sum of four angles

A *B* *C* *D*

90 90 90 90 360

(b) Here, *A* 75 , *B* 105 , *C* 75 *C* 75 and *D* 105 .

Sum of four angles

A *B* *C* *D*

75 105 75 105 360

Conclusion : We get a fact that the sum of four internal angles of a quadrilateral is 360 .

7. *PQR* 40 , *PQS* 105 , *PQT* 135 and *RQS* 50 .

We know that a full turn makes an angle of 360 .

Here, *TQP* is the reflex. The sum of all four angles *PQT* + reflex angle *TOP* 360 .

Hence, reflex angle

TQP 360 135 225 .

8. (a) 40° (acute angle);

(b) 83° (acute angle)

(c) 95° (obtuse angle)

(d) 40° (acute angle)

(e) 120° (obtuse angle)

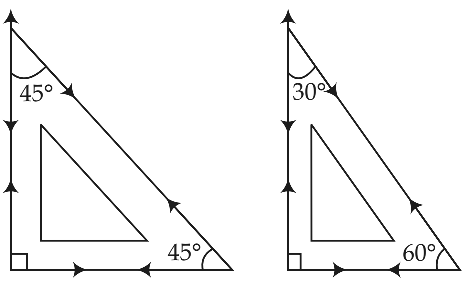
(f) 90° (right angle)

(g) 80° (acute angle);

(h) 132° (obtuse angle)

Assignment 2.5

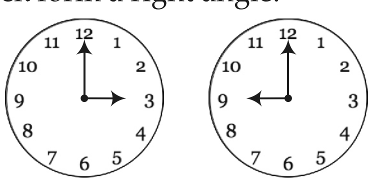
1. There are two set squares in the geometrical box. One of them has two equal sides, so it forms 90°, 45°, 45° angles and second form an 90°, 30°, 60° angles, as it's one side is double to the another.



There are six angles in two figures.

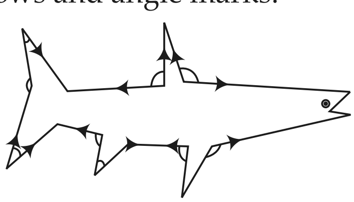
Both the set squares form two sets of angles of same size.

2. A right angle is formed four times in a clock. Twice during the day and twice at night. Whenever the time 3 o'clock or 9 o'clock, both the hands of the clock form a right angle.



3. At both the times of 0 o'clock and 12 o'clock hands of the clock are at 12. In this position hands may form an angle of 0° or 360 . In starting, the angle will be called 0° and when it is twelve the angle will be 360°.

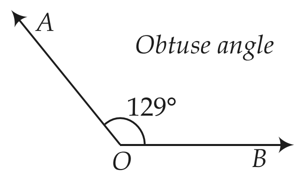
4. In the figure angles formed in the body of the fish are highlighted by arrows and angle marks.



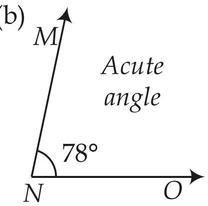
Assignment 2.6

1.

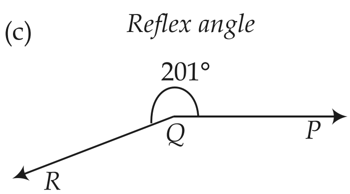
(a)



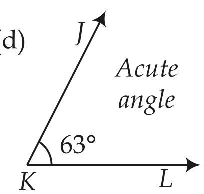
(b)



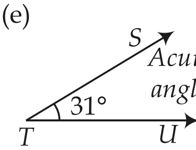
(c)



(d)



(e)



Steps for construction for angle :

Step I. Draw a line segment *OB* with the help of base line of protractor.

Step II. Place the centre point of the protractor at *O* and align *OB* to the *O* line.

Step III. Now starting *O*, count degrees upto 129 on the protractor. Mark point *A* at the label 129 .

Step IV. Using a rule join point *A* to point *O*.

So, *AOB* 129

Similarly, write steps for other angles.

2. (a) *a* 50 (Acute angle)

(b) *b* 183 (Reflex angle)

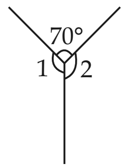
(c) *c* 215 (Reflex angle)

(d) *d* 135 (Obtuse angle)

(e) *e* 20 (Acute angle)

(f) *f* 101 (Obtuse angle)

3. A full turn forms an angle of 360°.



1 2 70 360

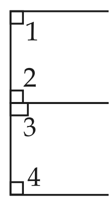
1 2 360 70 290

Since, third vertical line bisects the angle 290°.

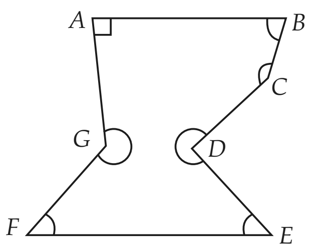
So, 1 2 2 1 $\frac{290}{2}$ 145

Yes, they are equal.

4. There are four right angles in the letter E.



5.



BAG is right angle, *ABC*, *DEF* and *GFE* are acute angles, *BCD* is obtuse angle *AGF* and *CDE* are reflex angles.

6. (a) 360 18 20°.

So, angle between two consecutive spokes 20 .

(b) 360 24 15 (c) 360 36 10

(d) 360 72 5 .

7. (a) No, since degree measure of obtuse angle is more than 90° and less than 180°. So, the sum of degree measures of two obtuse angles will be more than 180°.

(b) No, as degree measure of acute angle of an acute angle is always less than 90°.

Hence, the sum of degree meausres of two acute angle can never be 180°.

(c) Yes, the degree measure of a right angle is 90°.

Hence, the sum of degree measures of two right angles is always 180°.

(d) Yes, if we divide a straight angle into two angles, then obtained angles will be either a pair of right angles or an acute angle and an obtuse angle.

TEXTBOOK EXERCISES

Exercise 2.1

1. (a) Infinite (b) Only one unique line

2. Line segments are $\overline{LM}$, $\overline{MP}$, $\overline{PQ}$ and $\overline{QR}$.

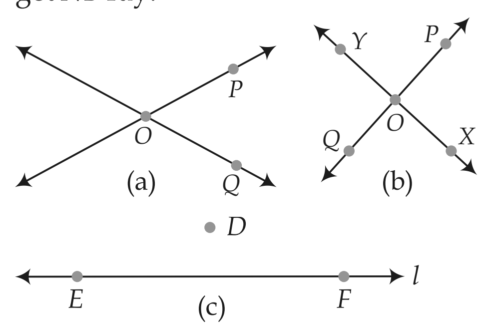
The points are *L*, *M*, *P*, *Q* and *R*.

Point *M*, *P* and *Q* are on two of the line segments $\overline{LM}$, $\overline{MP}$, $\overline{PQ}$ and $\overline{QR}$.

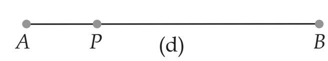
3. Since, starting point of each of these ray is *T*, so two rays are there *TA* and *TB* with this initial point another ray is also *TN*.

If we consider *N* as initial point, we get *NB* ray.

4.



(d) Point *P* lines on *AB*.



5. (a) Five points are *B*, *C*, *D*, *E* and O.

(b) *DB* is a line.

(c) Four rays are *OB*, *OC*, *OD*, *OE*, *EB*.

(d) Five line segments are *DE, EO, OB, OC, DO*.

6. (a) Yes, we can name it as ray *OB* because starting point and the direction remain same.

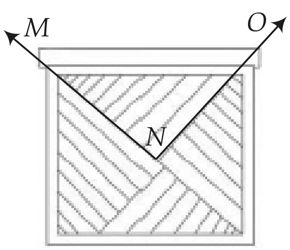
(b) We can not write ray *OA* as *AO* because starting point of the ray is *O*, not *A*. Also direction of the ray will be changed.

Exercise 2.2

1. (a) *ADB*, *BDC* and vertex *D*.

(b) *MNO*, Vertex; *N*

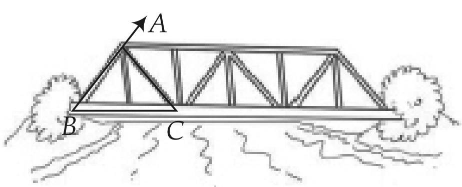
(c) *LMN*, vertex *M*.



(b)

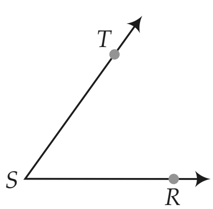
(c)

(d) *ABC*, vertex; *B*



(d)

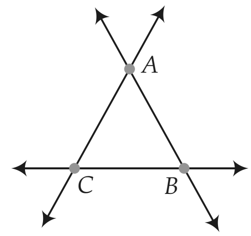
2.



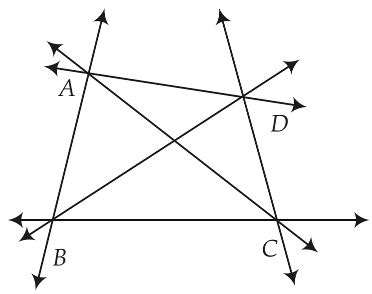
3. At point *P* there are three different angles. *P* may be meant *APB* or *APC* or *BPC*. To identify, we have to name them as *APC* or *APB* or *BPC*.

4. Angles given in the figure are : angle 1 is *RTP* and angle 2 is *RTQ*.

5. Through three points *A*, *B* and *C* we get three lines, as *AB*, *BC* and *AC*. We obtained three angles using *A*, *B*, *C* as *ABC*, *CAB* and *ACB*.



6. There are six possible lines going through pairs of four points in which no three of them are collinear..



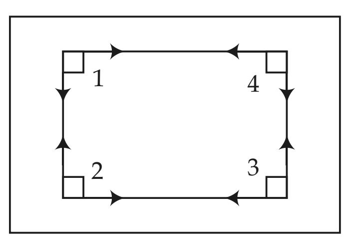
These lines are *AB*, *BC*, *CD*, *DA*, *AC* and *BD*. Also, we get twelve angles.

These angles are

ABC, *BCD*, *CDA*, *DAB*, *BAC*, *CAD*, *ADB*, *BDC*, *ACB*, *ACD*, *CBD*, *ABD*.

Exercise 2.3

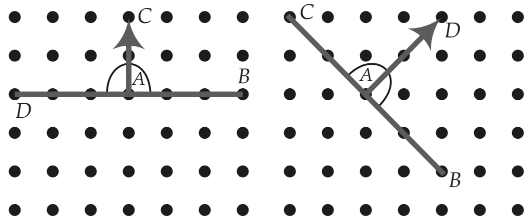
1.



A window has four right angles *i.e.*, 1, 2, 3 and 4.

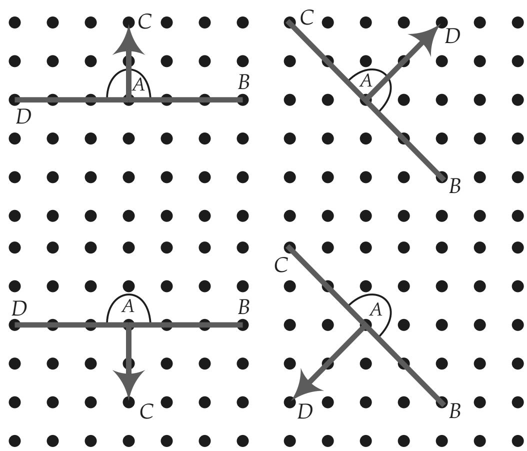
Yes, we see many other right angles at corners of the door, at corners of the greenboard, at corners of the classrooms, etc.

2.

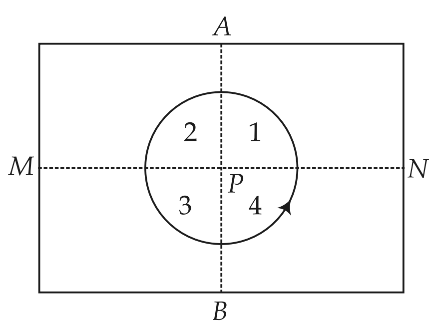


This can be done in only one way.

3.



4. (a) Let AB the given crease on the paper and another crease be that is perpendicular to the stating crease be MN. Let the intersecting point of two creases be P as shown in the figure :



Since, two creases are perpendicular lines meeting at P.

Hence, all four angles are right angles.

(b) **Step I.** Take a piece of rectangular paper and fold it.

Step II. Crease the fold.

Step III. Now, again fold the paper so that two parts of the crease coincide.

Step IV. Crease the fold.

Step V. Unfold both the crease.

We get two perpendicular lines and four right angles as shown above.

Exercise 2.4

1. On measuring, we get the following measures

(a) IHJ 47 , (b) IHJ 24 ,

(c) IHJ 110 .

2. Angles of each corners of greenboard 90

Angles of each corners of desk 90

Angles of each corners of classroom 90

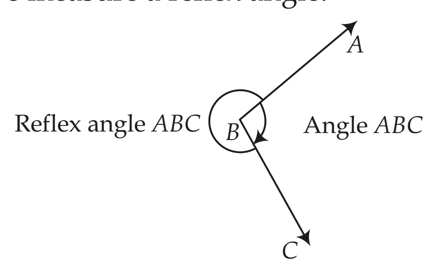
Angles of each corners of door 90

Angles of each corners of window 90

3. (a) IHJ 42 , (b) IHJ 116 .

Paper protractor made by the students can not be asked here.

4. We measure a reflex angle.



For this measure the smaller angle ABC 103 . We know a turn makes an angle of 360 .

Reflex ABC 360 smallest ABC

Reflex ABC 360 103 257 .

5. (a) 80 , (b) 120 (c) 60 , (d) 130 , (e) 130 , (f) 60 .

6. (a) BXE 115 , (b) CXE 85 ,

   (c) AXB 65 ,

   (d) BXC AXC AXB
   95 65 30 .

7. PQR 45 , PQS 100 ,

   PQT 150 .

8. Students should do it themselves with the help of their teachers or parents or class-mates.

9. For figure (a),

   A 43 , B 65 , C 72

   A B C

   43 65 72 180 .

   For figure (b),

   A 54 , B 65 , C 61

   A B C = 54 65 61 180

   For figure (c),

   A 30 , B 50 , C 100

   A B C 30 50 100 180

   Conclusion : The sum of three internal angles of a triangle is 180 .

Exercise 2.5

1. (a) Numbers 1 to 12 are written along the circumference of a clock at equal distance and the angle of the circle is always 360°. So, 360 12 30 .

   Hence, angle between two consecutive numbers is 30°.

   At 1 o'clock two hands of the clock are at two consecutive numbers 12 (0) and 1.

   Hence, at 1 o'clock, angle between these two numbers is 30°.

   (b) We know that the angle between two consecutive numbers at the face of a clock is 30°.

   Hence, angle between hands at 2 o'clock

   2 30 60 .

   Angle between hands at 4 o'clock

   4 30 120 .

   Angle between hands at 6 o'clock

   6 30 180 .

   (c) Angle between hands at 3 o'clock

   3 30 90 .

   Angle between hands at 5 o'clock

   5 30 150 .

   Angle between hands at 7 o'clock

   7 30 210 .

   Angle between hands at 8 o'clock

   8 30 240 .

   Angle between hands at 9 o'clock

   9 30 270 .

   Angle between hands at 10 o'clock

   10 30 300 .

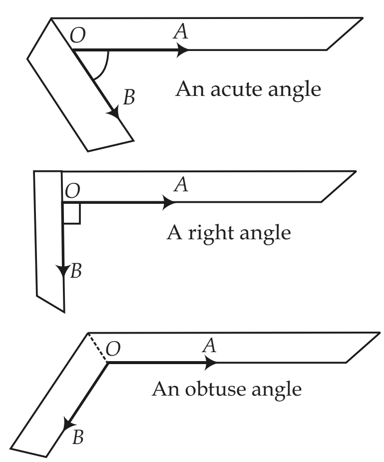
   Angle between hands at 11 o'clock

   11 30 330 .

   and angle between hands at 12 o'clock

   12 30 0 or 360°.

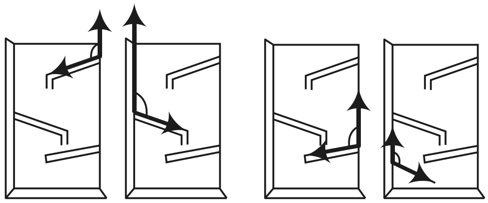
2. Yes, it is possible.



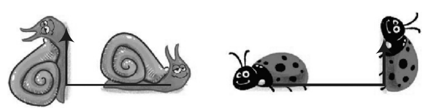
Here, vertex is O and arms are OA and OB.

3. Yes, an angle can be seen by us.
4. The angle is as great as the slope. Greater the angle, greater the slope.

   For each angle one arm is a vertical side and other arm is the slope. There are four slops, therefore four angles can be formed with the side.

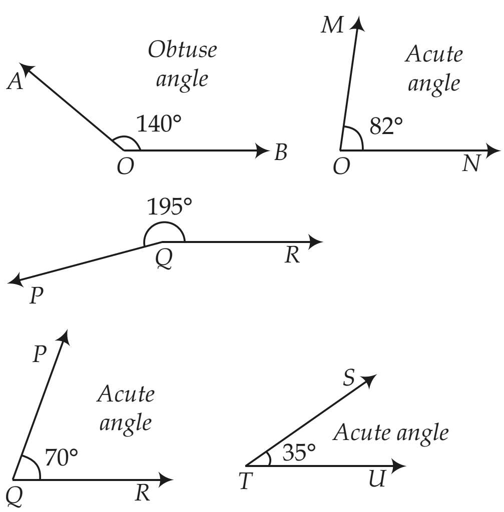


5. Both the insects are being rotated at an angle of 90 clockwise.



Exercise 2.6

1.



2. (a) 43 , on meaning we get, 45° (acute angle)

   (b) 159 , on meaning we get, 165° (obtuse angle)

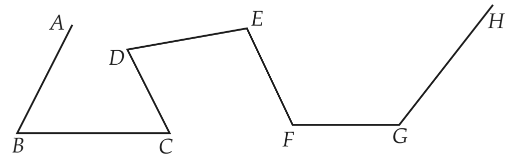
   (c) 121 , on meaning we get, 120° (obtuse angle)

   (d) 33 , on meaning we get, 30° (acute angle)

   (e) 92 , on meaning we get, 95° (obtuse angle)

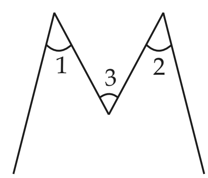
   (f) 355 , on meaning we get, 350° (reflex angle)

3.



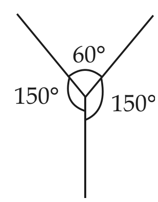
Acute angles *ABC*, *DCB*, *EDC*,
Right angle *DEF*,
Obtuse angles *EFG*, *HGF*.

4.



Here, 1 40 , 2 40 and 3 60 .

5.



Here, 1 150 , 2 60 and 3 150 .

6. Angles between two consecutive spokes 360 24 15 .

   The largest acute angle formed between two spokes 5 15 75 .

7. Let the degree measure of the angle be *A*, then 5*A* 90 but 4*A* 90 .

   or $\frac{90}{5}$ *A* and $\frac{90}{4}$ *A*

   Hence, *A* 18 but *A* $22\frac{1}{2}$.

   Hence, degree measure of the angle may be 19° or 20° or 21°.

CHAPTER 3

Number Play

Assignment 3.1

1. We use the formula $\frac{n \quad 1}{2}$, where n is odd number and expresses total number of cells in the table.

Number of supercells

$$\frac{57 \quad 1}{2} \quad \frac{58}{2} \quad 29.$$

2. Here, n 66 an even number.

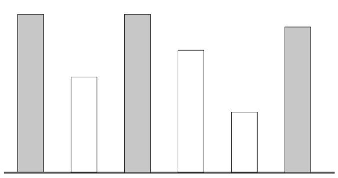
Hence, maximum number of supercells in the table $\frac{n}{2}$ $\frac{66}{2}$ 33.

3.

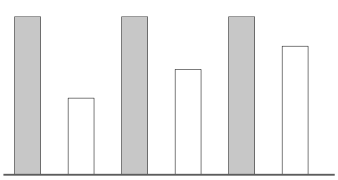
5681	4979	2455	7321	5642	8341	7101	6000

4. The two arrengements are as follows :

(a)



(b)



5. '0'. Because supercell is a number in the table that is larger than all of it's neighbouring numbers, but here all players have equal heights. So no player is taller.

6. In two cases whether it is asending or descending order, the largest number will lie at the corner.

So only one supercell will be there in the table.

7. Let the different numbers be 1, 2, 3, 4, 5, 6, 7, 8. If we arrange them in the following manner, then there will be only one supercell.

1	2	3	7	8	6	5	4

The supercells activity can be done with more rows of cells.

Assignment 3.2

1. Two digits, three digits, four digits and five digits have numbers respectively 99 9 90, 999 99 900, 9999 999 9000 and 99999 9999 90000.

2.

Number	2568	3657	7545	8922	9741	7734
Sum of digits	21	21	21	21	21	21

3.

Number	1234	2345	3456	4567	5678	6789
Sum of digits	10	14	18	22	26	30

Number	9876	8765	7654	6543	5432	4321
Sum of digits	30	26	22	18	14	10

If the digits are taken in ascending order, then six numbers can be formed.

When the digits are taken in descending order other six numbers are formed.

Hence total numbers formed

6 6 12

Yes, there is a pattern, the difference between two consecutive sums is 4.

Assignment 3.3

1. The largest numebr formed using the digits 1, 2, 3, 4, 7   74321

and the smallest number   12347

(a) The sum of these two numbers

74321   12347   86668   99999

No, the number 86668 is a palindrome numbers.

(b) The difference   74321   12347

61974   11111

Yes, number 61974 is not a palindrome

(c) Sum of the numbers   86668

Difference   61947

Sum   148615

Not a palindromic number

(d) Diffrence   86668

61947

24721

Not a palindromic number.

(e) Only (a) is palindrome numbers, others are not.

2. If the numbers are formed with same digit. Then,

The largest number   999999

And the smallest number   111111

The difference   999999   111111

888888 (a palindrome)

If the digits are different then

The largest number   987789

The difference   987789   123321

864468 (a palindromic)

3. It is time now   01 : 10

next palindromic time   02 : 20

So, 2 : 20   1 : 10   70 minutes or after 1 hour 10 minuts.

4. The largest number formed   9865

The smallest number formed   5689

Round I	Round II
9865	7641
– 5689	– 1467
4176	6174 The Kaprekar constant.

Hence, in two rounds number 8965 will reach kaprekar constant.

5. The largest number   8654

The smallest number   4568

Round I	Round II	Round III	Round IV
8654	8640	8721	7443
– 4568	– 0468	– 1278	– 3447
4086	8172	7443	3996

Round V	Round VI	Round VII	Round VIII
9963	7642	7551	9954
– 3699	– 2467	– 1557	– 4599
6274	5175	5994	5355

Round IX	Round X	Round XI	Round XII
5553	9981	8820	8532
– 3555	– 1899	– 0288	– 2358
1998	8082	8532	6174

Hence, after 12th round we shall get the Kaprekar constant.

Assignment 3.4

1. (a) 23,000   800   800   24,600

(b) 26,000   1200   1200   28,400

(c) 50,000   800   1200   52,000

(d) 1200   800   800   2,800

(e) 50000   23000   1200   28,200

(f) 50000   26000   23000   53000

(g) 23,000   800   1200   25000

(h) 50,000   23,000   1200   800   75,000

2. (a) Half of 85,231 $\frac{85,231}{2}$ 42615.5

Hence,   42,615   (5-digit)

43,616   (5-digit)

86,231

(b) The largest digit is 9 and

9   9   18 (2-digit)

It is impossible to get 3-digit number.

(c) Half of 8, 74,65 4,37,32.5

Hence, 51733 (5-digit)

+ 35432 (5-digit)

87,165 (5-digit)

(d) The smallest 5-digit number is 10,000

Hence, 10,000 (5 digit)

10,000 (5-digit)

20,000 (5-digit)

It is impossible to get 17,000 as a sum.

(e) 999 (3-digit)

999 (3-digit)

1998 (4-digit)

It is impossible to get a 5-digit number.

(f) 61308 (5-digit)

21212 (5-digit)

40096

(g) 109344 (6-digit)

99346 (5-digit)

9898 (4-digit)

(h) This number is close to the largest 5-digit number 99999. So, the difference of two 5-digit numbers cannot be 93,856.

(i) 35648 (5-digit)

– 35616 (5-digit)

32 (2-digit)

(j) 10369 (5-digit)

– 4846 (4-digit)

5523 (4-digit)

3. (a) The largest digit is 9, so, 9 9 18 (a 2-digit number).

Hence, 1-digit number 1 digit number is always gives a 2-digit number because sum of two digits is 10 to 19.

(b) (i) 5685 (4-digit number)

7843 (4-digit number)

13528 (5-digit number)

(ii) 2564 (4-digit number)

3857 (4-digit number)

6421 (4-digit number)

Hence, 4-digit number 4 digit number sometimes gives 5-digit number. If two numbers are closed to largest number then sum is a fine digit number.

(c) 999 (largest 3-digit number)

9999 (largetst 4-digit number)

10998 (5-digit number)

Hence, 3 digit number 4-digit number *never* gives a 6-digit number.

(d) 68680 (5-digit number)

68578 (5-digit number)

102 (3-digit number)

Hence, 5-digit number 5-digit number *sometimes* gives 3-digit number.

(e) 246825 (6-digit number)

246825 (6-digit number)

0

Hence 6-digit numbers 6 digit number *always* gives zero, if two numbers are equal.

Assignment 3.5

1. If we interchange the first and last digits of the central number, 64,171, we will get the required result.

After make this interchange the grid will be as follows :

17,500	40,644	31,065
24,909	14,176	45,606
20,681	51,619	39,708

Supercells are, 24,909, 40,644, 45,606 and 51,619.

2. Reshma's mother's birth year is 1989

The largest number formed with these digits 9981

The smallest number formed 1899

Round I 9981
1899
8082

Round II 8820 (The largest number)
0288 (The smallest number)
8532

Round III 8532 (The largest number)
2358 (The smallest number)
6174

And that the Kaprekar constant.

Hence, it took 3 rounds to reach the Kaprekar constant from 1989.

3. The even digits are 0, 2, 4, 6, 8 and the odd digits are 1, 3, 5, 7, 9.

(a) The largest number formed with odd digits 79531

The largest number formed with even digits 84620

It is clear that; 84620 79531

(b) The smallest number formed with odd digits 31579

The smallest number formed with even digits 26840

It is clear that; 31579 26840

(c) (i) The number formed with odd digits closer to 50000 51379

And number formed with even digits 48620

The difference between 50000 and 51379 51379 50000 1379

and the difference between 50000 and 48620 50000 48620 1380

Now, 1380 1379.

Hence, The group formed with odd numbers to closerer to 50000.

(ii) If the digits might the repeated.

Then first number 51111 and second number 48888

For Ist group difference between 51111 and 50000

51111 50000 1111

For IInd group difference between 50000 and 48888

50000 48888 1112

1112 1111

Hence, in this case group formed with odd digits is closer to 50000.

4. If you use approximately 20 litres of water every day as a common man do, then the estimated amount of water to supply 25 200 5000 litres.

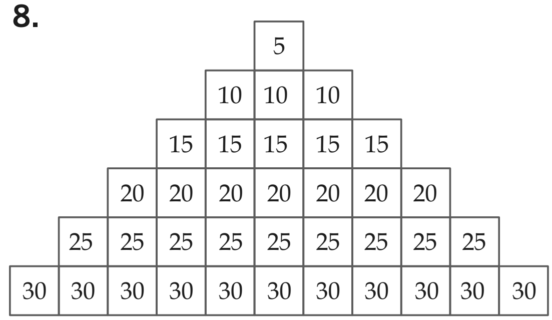
5. The students whose age group is 10 13 years and the height of a normal student in this age is generally 135 cm to 155 centimetres

Hence, their average age might be 11 years and 6 months and their average height might be 145 cm.

7.

5-digit number	80824
4-digit number	5683
3-digit number	735
3-digit number	345
Sum of all numbers	87587

8.



Sum of 5	1 5	5
Sum of 10	3 10	30
Sum of 15	5 15	75
Sum of 20	7 20	140
Sum of 25	9 25	225
Sum of 30	11 30	330
Total		805

8. First hexagonal numbers are 1, 6, 15, 28, 45, 66, ……… .

Here, number 6 is an even number

6 is divided by 2 3 (an odd number)

3 is multiplied by 3 and adding 1 10 (an even number)

10 is divided by 2 5 (an odd number)

5 is multiplied by 3 and adding 1 16 (an even number)

16 is divided by 2 8 (an even number)

8 is divided by 2 4 (an even number)

4 is divided by 2 2 (an even number)

2 is divided by 2 1

15 is an odd number

15 is multiplied by 3 and adding 1 46 (an even number)

46 is divided by 2 23 (an odd number)

23 is multiplied by 3 and adding 1 70 (an even number)

70 is divided by 2 35 (an odd number)

35 is multiplied by 3 and adding 1 106 (an even number)

106 is divided by 2 53 (an odd number)

53 is mulitplied by 3 and adding 1 160 (an even number)

160 is divided by 2 80 (an even number)

80 is divided by 2 40 (an even number)

40 is divided by 2 20 (an even number)

20 is divided by 2 10 (an even number)

10 is divided by 2 5 (an odd number)

5 is multiplied by 3 and adding 1 16 (an even number)

16 is divided by 2 8 (an even numer)

8 is divided by 2 4 (an even number)

4 is divided by 2 2 (an even number)

2 is divided by 2 1

Hence, Collatz conjecture is correct for all hexagonal numbers sequence.

9. 31 is round down to 30 and 59 is round up to 60.

Thus, estimation 30 60 1800

But actual answer 31 59 1829

The difference 1829 1800 29.

It is very small.

10. India got independence in 1947.

Now, the digits of number in 1947 is 1, 4, 7 and 9.

Round I The largest number 9741
The smallest number 1479
Difference 8262

Round II The largest number 8622
The smallest number 2268
Difference 6354

Round III The largest number 6543
The smallest number 3456
Difference 3087

Round IV The largest number 8730
The smallest number 0378
Difference 8352

Round V The largest number 8532
The smallest number 2358
Difference 6174

Number 1947 reaches the Kaprekar constant after 5 rounds.

TEXTBOOK EXERCISES

Exercise 3.1

1.

6828	670	9435	3780	7308	8000	5583	52

2.

5346	6348	1212	1258	1221	1008	6843	9635	9754

3.

987	473	649	632	699	589	743	717	888

4. Out of 9 numbers, there are 5 supercells in the table above (see question 3) and these are 987, 649, 699, 743 and 888.

5. If number of cells in the table be n, an odd number, then the number of supercells $\frac{n \quad 1}{2}$

and if n is an even number, then number of supercells $\frac{n}{2}$.

Yes, there is a pattern. Alternate cells in the table may be supercells.

Method to fill a given table to get the maximum number of supercells :

(a) Make first cell of the table a supercell. After that every alternate cell is to be made supercell.

(b) Except in case of 4 cells, No consecutive cells can be made supercells, because in that case first and fourth cell may be supercells.

6. No, it can not be possible to fill a supercell table without repeating numbers such that there are no supercell. As there may be two cases :

Case I : If we fill the cells in descending order then the first cell would be the supercell.

Case II : If we fill the cells in ascending order then the last cell would be the supercell.

If we do not follow any order, then there will be atleast one supercell.

7. Yes, the cell having the largest number in a table always be a supercell, because if it is a corner cell, adjacent to it (either second from beginning or second last cell) will be smaller than it. If it is situated between two cells, then being the largest number, it will be larger than both adjacent cells.

No, the cell having smallest number in a table can not be supercell because number of cells adjacent to it will always be larger than it.

8.

989	980	941	901	895	873	807	799	743

Here 980 is the second largest number but it is not a supercell as 989, situated left to it is larger than it.

9.

2961	2900	2856	2777	2748	2565	2813	2562	2010	2111

Here, 2900 is the second largest number in the table such that it is not a supercell because number 2961 adjacent to it is larger than it.

2111 is the second smallest number but the cell having 2111 is a supercell because adjacent to it number 2010 is smaller than it.

10. For other variations

(a) We shall make a table with prime numbers such that coloured cells are supercells.

199	151	197	157	191	163	179	173	193

(b) We shall make a table with odd numbers such that coloured cells are supercells.

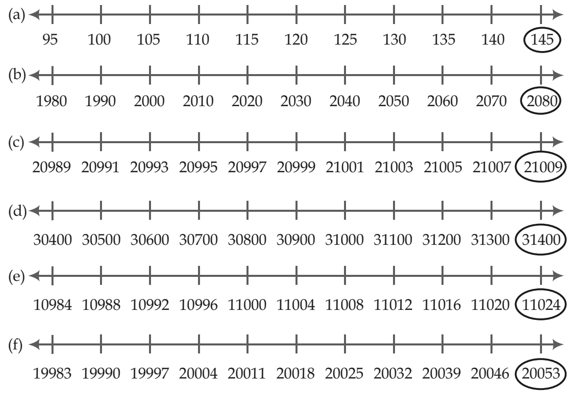
9997	8563	3563	9861	7427	8241	5555

(c) We shall make a table with even numbers such that coloured cells are supercells.

9428	3624	5242	3864	2002	5686	8208

Exercise 3.2

1.



2. Some numbers sum of whose digits is 14, are :

(a) 59, 77, 95, 248, 923, 2462, 5117, 6008.

(b) The smallest number whose digits sum is 14 59

(c) The largest 5-digit number whose digit sum is 14 95000

But zero is not considered as natural number so it can not be included here, then the largest five digit number whose sum of digits is 14 92111.

(d) A very big number having the digits sum 14 can be formed is 9500000000.

3. 4 0 4, 4 1 5, 4 2 6, …

Similarly perform till 70.

4.

Number	123	234	345	456	567	678	789
Sum of digits	6	9	12	15	18	21	24

If these numbers are formed reversing the digits, the sum of the digits will remain same.

Number	321	432	543	654	765	876	987
Sum of digits	6	9	12	15	18	21	24

Yes, there is a pattern

First number 1 3 3

Second number 2 3 6

Third number 3 3 9

Fourth number 4 3 12

Yes, this pattern will continue.

Exercise 3.3

1. (a) The digit are 7, 9, 2, 8

The largest number 9872

The smallest number 2789

Difference 9872 2789 7083

7083 5085

(b) The digits are 6, 8, 5, 4

The largest number 8654

The smallest number 4568

Difference 8654 4568 4086

4086 5085

(c) The digits are 4, 5, 6, 7

The largest number 7654

The smallest number 4567

Sum 7654 4567 12221

12221 9779

(d) Digits are 5, 1, 8, 9

The largest number 9851

The smallest number 1589

Difference 9851 1589 8262

8262 9779

2. There may be 2 conditions.

Case I. If the digits are different then

The largest 5 digit palindrome number 98789

The smallest 5 digit palindrome number 12321

Sum 98789 12321 111110

Difference 98789 12321 86468

Case II. If five digits are same then

The largest 5-digit palindrome 99999

The smallest 5-digit palindrome

11111

Sum	99999	11111	111110
Difference	99999	11111	88888

In both cases, sum of greatest and smallest 5 digits are same.

3. Time now 10 : 01

Next palindrom 11 : 11

So, 11 : 11 10 : 01 70 minutes.

i.e., after 1 hour 10 minutes.

4. The largest number formed by using digits 5, 6, 8, 3 8653 and the smallest number 3568

Round I	Round II	Round III	Round IV	Round V
8653	8550	9972	7731	6543
− 3568	− 0558	− 2799	− 1377	− 3456
5085	7992	7173	6354	3087

Round VI	Round VII
8730	8532
− 0378	− 2358
8352	6174

Hence, after seventh round we will reach the Kaprekar constant 6174.

Exercise 3.4

1. Divide 90,250 by 2 $\frac{90,250}{2}$ 45,125

To obtain five digit number more than 90,250, at least one number or both numbers must be more than 45,125.

e.g.,

45,125	and	47,243
53,325		46,398
98,450		93,641

Hence, to get sum more than 90,250, at least one or both numbers must be more than 45,125.

(b) To get 6-digit sum by adding 5-digit number and a 3-digit numbers, the five digit number should be 99001 or more than it.

99001	99002	99856
+ 999	+ 999	+ 583
100000	100001	100439

and so on.

(c) Let's take minimum 4-digit number 1000 and add

1,000
+1,000
2,000

a four digit number

Now take a maximum 4-digit number 9999 and add

9999
+ 9999
19,998

a five digit number

Hence, it is impossible to get a six-digit number by adding two four-digit numbers.

(d) Take two 5-digit numbers and add them.

56873	99876
+ 62391	12341
119264	112217

It is clear that if we want to get a six digit number by adding two different five digit numbers, then both the number should be greater than 50,000. If one number is around the largest 5-digit number then the other might be around the smallest number.

(e) Half of the number $\frac{18,500}{2}$

9,250, which is a 4-digit number. If we take a 5-digit number then second will be 4-digit number.

So, it is impossible to get a sum of two 5-digit numbers as 18500.

(f) 5-digit number 5-digit number 86084 35,989 50095, gives a difference less than 56,503.

(g) 5-digit number 3-digit numer gives a 4-digit number

10385	(a 5-digit number)
968	(a 3-digit number)
9417	(a 4-digit number)

(h) 19346 (a 5-digit number)
9876 (a 4-digit number)
9470 (a 4-digit number)

(i) 72493 (a 5-digit number)
72143 (a 5-digit number)
350 (a 3-digit number)

(j) The smallest 5-digit number is 10,000 to get a difference of 91,500, the larger number must be 91,500 10,000 101500, a 6-digit number.

Hence, it can not be possible to obtain 91,500 as a result of difference of two 5-digits numbers.

2. (a) 5-digit number 5-digit number *sometimes* gives a 5-digit number and sometime not.

For example :

(i) 23,240
30,000
53,240 (5-digit number)

But 52000
63243
1,15,243 (6-digit number)

(b) 4-digit number 2-digit number *sometimes* gives a 4-digit number but sometimes not.

For example :

3568 (4-digit number)
+ 99 (2-digit number)
3667 (4-digit number)

9999 (4-digit number)
11 (2-digit number)
10,000 (5-digit number)

(c) 4-digit number 2-digit number *never* gives a 6-digit number.

For example :

8468 (4-digit number)
99 (2-digit number)
8567 (4 digit-number)

9999 (4-digit number)
99 (2-digit number)
10098 (5-digit number)

(d) 5-digit number 5-digit number gives some time 5-digit number some time not.

For example :

(i) 98,546 (5-digit number)
32,638 (5-digit number)
65,908 (5-digit number)

(ii) 40,907 (5 digit number)
38562 (5-digit number)
2,345 (4-digit number)

(iii) 85,996 (5-digit number)
85684 (5-digit number)
312 (3-digit number)

(e) 5-digit number 2-digit number *never* gives a 3-digit number.

For example :

(i) 23465 (5-digit number)
99 (2-digit number)
23,366 (5-digit number)

(ii) 10000 (5-digit number)
86 (2-digit number)
9914 (4-digit number)

Exercise 3.5

1. If we interchange the first and last digits of central number 62,871, we will get the required result.

16,200	39,344	29,765
23,609	12,876	45,306
19,381	50,319	38,408

Now, we have 4 supercells and they are 39,344, 50,319, 23,609 and 45,306.

2. If your year of birth is 2013.

Round I Now from the number digits are, 2, 1, 0, 3 2103

The largest number 3210
And the smallest number 0123
Then the difference 3087

Round II

The largest number 8730
The smllest number 0378
Difference 8352

Round III

The largest number 8532
The smallest number 2358
Difference 6174

And, that is the Kapraker constant.

Hence, it took 3 rounds to reach the Kaprekar constant of the number 2013.

3. The largest number with all odd digits between 35,000 and 75,000 is 73,951.

The largest numbers will all odd digits (repetitive) is 73,999.

The smallest number with all odd digits (non repetitive) between 35,000 and 75,000 is 35,179.

The smallest number will all odd digits (repetitive) is 35,111.

Closest to 50,000 (in case of non-repetition) 47,951.

Closest to 50,000 (in case of repetition) 51111

4. No definite number can be given in respect of holidays in schools, however there are 52 sundays in a year. Twenty holidays can be counte on festivals like Deepawali, Holi, Rakshabandhan, Eid, Barawafat, Chrismas Day etc. Apart from this about 40 days of summer vacations and fifteen days of winter vacation can be included.

Hence, an estimated number of holidays in the schools 52 20 40 15 127 approximately.

5. The capacity of mugs, buckets and tanks depends upon their size and shape. We all have them in different sizes in our homes. How ever a normal size mug can hold about 1 litre, a normal size bucket can hold 15 litres and tank can hold 500 litres of liquid.

Students should do this task of estimation in their homes and try to measure these with the help of their family members.

6. 5-digit number 18,000
First 3-digit number 334
Second 3-digit number 336
Sum 18,670

7.

			5			
		10	10	10		
	15	15	15	15	15	
20	20	20	20	20	20	20

Sum of 5 1 5 5
Sum of 10 3 10 30
Sum of 15 5 15 75
Sum of 20 7 20 140
Total 250

That lies between numbers 210 and 390.

8. The sequences of the power of 2 is
1, 2, 4, 8, 16, 32, 64, 128, 256 ………… .

Take the number 256, that is an even number

256 divided by 2 128 (an even number)
128 divided by 2 64 (an even number)
64 divided by 2 32 (an even number)
32 divided by 2 16 (an even number)

16 divided by 2 8 (an even number)
8 divided by 2 4 (an even number)
4 divided by 2 2 (an even number)
2 divided by 2 1
Hence, Collatz conjecture is correct in all numbers in sequence of power of 2.

9. Starting number 100 is an even
So, 100 divided by 2 50 (an even number)
50 divided by 2 25 (an odd number)
25 is multiplied by 3 and adding 1 76 (an even number)
76 is divided by 2 38 (an even number)
38 is divided by 2 19 (an odd number)
19 is multiplied by 3 and adding 1 58 (an even number)
58 is divided by 2 29 (an odd number)
29 is multiplied by 3 and adding 1 88 (an even number)
88 is divided by 2 44 (an even number)
44 is divided by 2 22 (an even number)
22 is divided by 2 11 (an odd number)
11 is multiplied by 3 and adding 1 34 (an even number)
34 is divided by 2 17 (an odd number)
17 is multiplied by 3 and adding 1 = 52 (an even number)
52 is divided by 2 26 (an even number)
26 is divided by 2 13 (an odd number)
13 is multiplied by 3 and adding 1 40 (an even number)
40 in divided by 2 20 (an even number)
20 is divided by 2 10 (an even number)
10 is divided by 2 5 (an odd number)
5 is multiplied by 3 and adding 1 16 (an even number)
16 is divided by 2 8 (an even number)
8 is divided by 2 4 (an even number)
4 is divided by 2 2 (an even number)
2 is divided by 2 1
Yes, The Collatz conjecture holds for the starting number 100.

10. Two players start from 0 and alternately add a number 1 or 2 or 3 to the sum. The player who reaches 22 wins. The winning strategy is to reach a number in which the digits are subsquent (e.g., 1, 2, 3) and control the game by jumping through all the numbers of this sequence. Once a player reaches 22, the opponent can only choose number 2 and the next answer can in any case be 21.

CHAPTER 4

Data Handling and Presentation

Assignment 4.1

1. (i) ✗, (ii) ✓, (iii) ✓, (iv) ✗, (v) ✓, (vi) ✓, (vii) ✓, (viii) ✓, (ix) ✗, (x) ✗
2. (a)

Class Name	No. of Absent Students	Tally Signs
Class I	15	𝍸 𝍸 𝍸
Class II	13	𝍸 𝍸 |||
Class III	7	𝍸 ||
Class IV	8	𝍸 |||
Class V	12	𝍸 𝍸 ||

(b) (i) 55 students, (ii) Class I, (iii) Class III, (iv) 12 students, (v) 13 students

3. (a) 9, 9, 9, 9, 9, 8, 8, 8, 8, 8, 7, 7, 7, 7, 7, 6, 6, 6, 6, 5, 5, 5, 5, 5, 5, 5, 4, 4, 4, 4, 4, 4, 4, 3, 3, 3, 3, 3, 3, 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1.

   (b)

Date of Birth	No. of Students	Tally Marks
1st	5	𝍸
2nd	6	𝍸 |
3rd	6	𝍸 |
4th	7	𝍸 ||
5th	7	𝍸 ||
6th	4	||||
7th	5	𝍸
8th	5	𝍸
9th	5	𝍸

   (c) It is 7. (d) It is 5 5 0

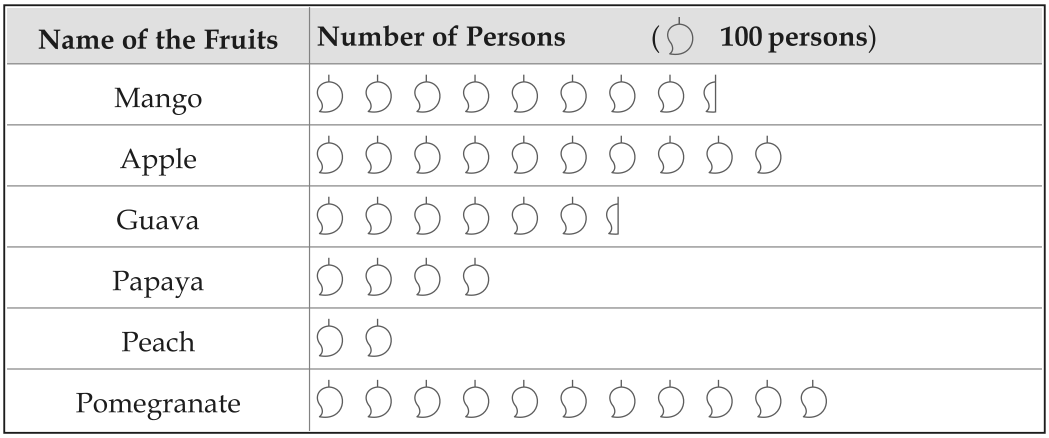
   (e) 7 4 5 5 21

4. (a) The most of students want to go to grandfather's village in their summer vacation.
   (b) Only 13 students like to stay home.
   (c) The least of the students want to go in hill station in summer vacation.
   (d) It is 14 13 1.
5. Do yourself.

Assignment 4.2

1. (a) It is hotdog.
   (b) Burger and Patties.
   (c) No of plates of pizza are sold by the restaurant 5 2 10
   (d) Number of plates sold by patties
   10 2 20,
   Number of plates sold by pastries
   6 2 12,
   Difference 20 12 8 Plates.
   (e) Total number of plates sold
   9 2 10 2 5 2 2 2 10 2
   6 2
   18 20 10 4 20 12
   84 plates.

2. The pictograph drawn may be as below :



(a) It is pomegranate.

(b) It is apple.

(c) 850 1000 650 400 200 1100 4200

(d) It will be peach.

3. Frequency distribution table.

Bill, (in rupees)	No. of houses	Tally marks
108	4	IIII
300	10	~~IIII~~ ~~IIII~~
320	6	~~IIII~~ I
450	10	~~IIII~~ ~~IIII~~
540	4	IIII
740	2	II
780	4	IIII

(a) The highest bill ₹780; The lowest bill ₹108; Difference ₹672

(b) 4 households pay ₹108 for electricity bill.

(c) It is 10 6 10 4 30

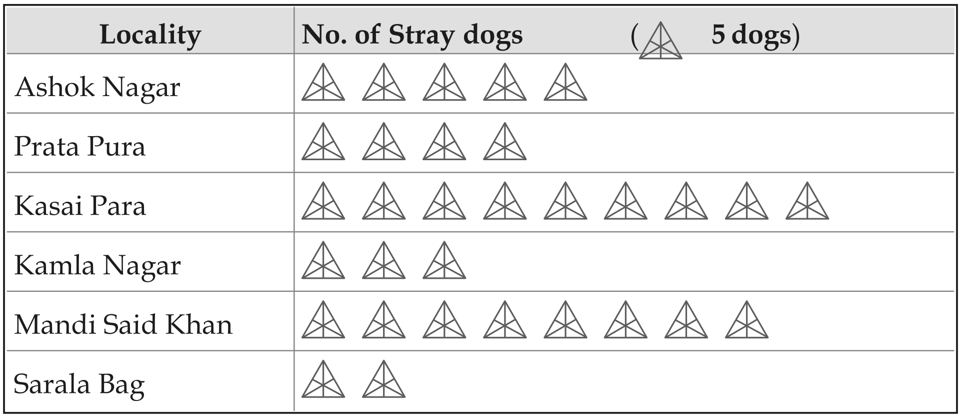
(d) It is 10 4 2 4 20

4. The frequency table for related data :

Temperature C	Tally marks	Number of days
29	~~IIII~~ IIII	9
30	~~IIII~~ II	7
31	~~IIII~~	5
32	III	3
33	IIII	4
34	III	3

(a) It was 29 C. (b) It was 34 C. (c) 34 29 5 C
(d) 3 days (e) 9 days.

5. Pictograph at the base of given data is given

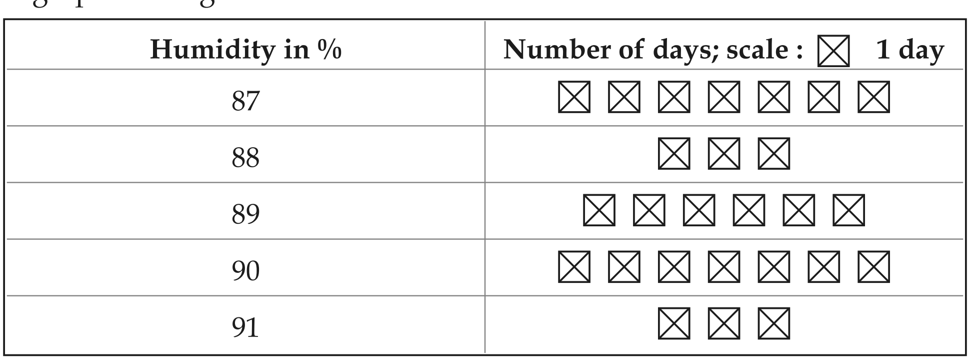


(a) It is Kasai Para. (b) It is Sarala Bag. (c) 20 stray dogs. (d) 25 10 15
(e) 25 20 45 15 40 10 155 stray dogs.

6. The frequency table based on these data is given below :

Humidity in %	Number of days	Tally marks
87	7	卌 ||
88	3	|||
89	6	卌 |
90	7	卌 ||
91	3	|||
92	2	||
93	3	|||

Pictograph of the given data



92	⊠ ⊠
93	⊠ ⊠ ⊠

7. (a) Frequency table as 3 teachers.

School	No. of Teachers	Tally Marks
A	3 3 9	𝍸 ǀǀǀǀ
B	3 2 6	𝍸 ǀ
C	3 5 15	𝍸 𝍸 𝍸
D	3 1 3	ǀǀǀ
E	3 4 12	𝍸 𝍸 ǀǀ
F	3 7 21	𝍸 𝍸 𝍸 𝍸 ǀ
G	3 3 9	𝍸 ǀǀǀǀ
H	3 8 24	𝍸 𝍸 𝍸 𝍸 ǀǀǀǀ

(b) school H. (c) It is 12. (d) School D

(e) Yes, Because teachers are appointed on the basis of the number of students studying in any school, then the number of teachers there will also be less.

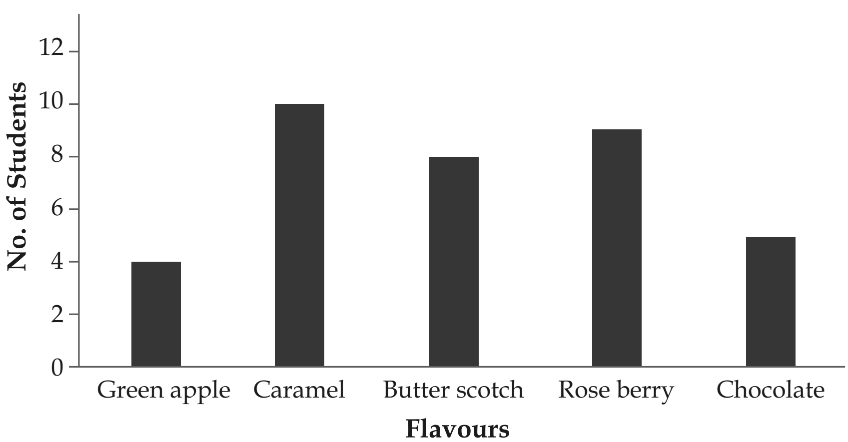
(f) 9 6 15 3 12 21 9 24 99 teachers.

8. (a) 0-10 means numbers greater than 0 and less than 10, similarly 10-20 means numbers greater than 10 and less than 20.

(b) No, no-worker could get regular work.

(c) 7 workers. (d) 5 people.

9.



(a) The flavour caramel is like most. (b) The flavour green apple is like least.

(c) 4 10 8 9 5 36 students. (d) 4 students.

10.

Name of the favourite games	No. of the playing students
Football	30
Baseball	5
Swimming	25
Basketball	4
Athletic	15
Total	**120**

(a) The form of the bars drawn here is horizontal. (b) 1 unit 5 students. (c) To show different games liked by the students in a school. (d) 45 students. (e) Baseball. (f) 25 students. (g) Since, cricket is a costly sport and needs many equipments.

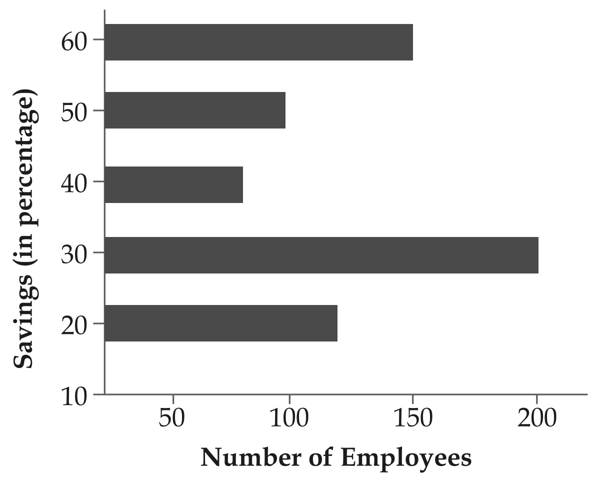
11. The errors made in bar graphs at the basis of given table are :

(a) The scale, 1 unit 100 employees is incorrect. It must be 1 unit 50 employees.

(b) The bar graph drawn for the number of employees who save 50% of their income, is wrong.

(c) The bar graph drawn for the number of employees who save 40% of their income, is wrong.

(d) The bar graph drawn for the number of employees who save 30% of their income, is wrong.



The correct bar graphs is given below.

(a) 75 employees. (b) 200 employees. (c) 75 employees.

(d) Yes, it can be assumed because only people with higher income are able to save more. People with lower income spend immediately.

12. (a) Total population of village 1050 600 520 20 2190

(b) The transgenders have the lowest number of population

(c) A family usually has one or two or three children and includes male and female children.

(d) No,

The number of children 1050

The number of men, women and transgenders 600 520 20 1140

1140 1050

13. The errors found in the table :

(a) Total number of students in the table 250 400 1000 1350 200 3200

But in fact total number of students in the school 1300

3200 1300, that is an error.

(b) By mistake for maths 1000 is written instead of 100.

(c) By mistake for science 1350 is written instead of 350.

So, the real table must be as follows.

Subject	Hindi	English	Maths	Science	Drawing
No. of Students	250	400	100	350	200

The errors found in the pictographs :

(a) Data for Hindi represents a number 200 not 250 as the scale is 1 unit 100 students.

(b) For science there must be 13 whole and one half faces instead of 7 faces.

(c) 4 faces represent the number 400 but only 200 students have special abilities in drawing.

The pictograph for the corrected table will be as follows :

Subject	**Number of Students** **(Scale ☺ 50 Students)**
Hindi	☺ ☺ ☺ ☺ ☺
English	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Maths	☺ ☺
Science	☺ ☺ ☺ ☺ ☺ ☺ ☺
Drawing	☺ ☺ ☺ ☺

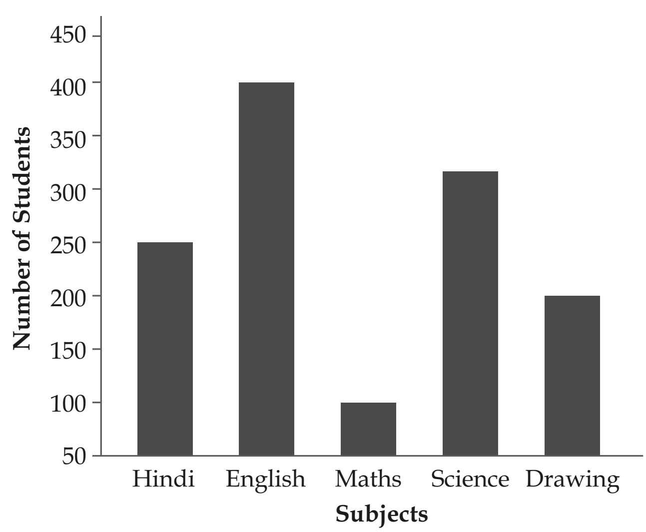
The errors found in the bar graphs :

(a) The bar for English to reach 500, it must be ended at the number 400.

(b) The bar for maths to reach 100, it must be ended at the number 100.

(c) The bar for science to reach to reach 800, it must be ended at the number 350.

Hence, the bar graph for the corrected table will be as follows :



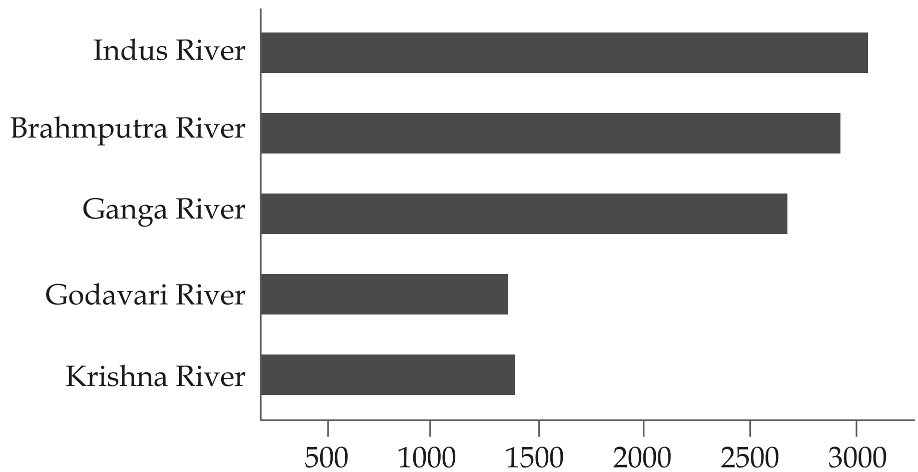
Assignment 4.3

1. I shall show them with the help of horizontal bars, because rivers flow on the ground horizontally.

It is also easy to compare them in one glance.

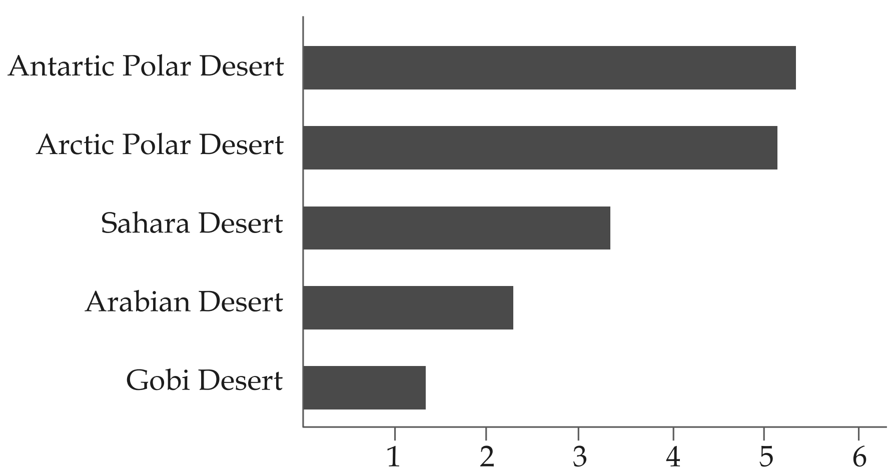
Rivers	Indus River	Brahmaputra River	Ganga River	Godavari River	Krishna River
Length (in km)	3180	2900	2525	1450	1400

Scale : 1 unit   500 km



2. We prefeer to make bar graphs, with horizontally bars because the deserts lie on the land horizontally.

Scale : 1 unit = 1 million mile^2



TEXTBOOK EXERCISES

Exercise 4.1

1. (a) The largest shoe size in the class is 7. (b) The smallest shoe size in the class is 3.

(c) There are 10 students who wear shoe size 5.

(d) There are 15 students who wear shoe size larger than 4.

2. The obtained data can be arranged either in ascending order or descending order. Ascending order of the data is 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 6, 6, 6, 6, 7 It becomes easier to answer questions by arranging numbers in ascending order.

Yes. The data can also be arranged in descending order. Another way to arrange data is frequency method. Above data can be arranged as.

Shoe Size	No. of Students (Frequency)	Tally Marks
3	3	|||
4	9	卌 ||||
5	10	卌 卌
6	4	||||
7	1	|

3. When I go to school from my home I saw many trees like : Peepal, Neem, Banyan, Tamarind, Champaka, Amaltash, Bel.

Trees	No. of Trees	Tally Marks
Peepal	12	卌 卌 ||
Neem	20	卌 卌 卌 卌
Banyan	7	卌 ||
Tamorind	11	卌 卌 |
Champaka	21	卌 卌 卌 卌 |
Amaltash	4	||||
Bel	5	卌

(a) Champaka tree was found in the greatest number.

(b) Amaltash tree was found in the smallest number.

(c) No, there were not any two trees found in the same numbers.

Note : Students should themselves find out the number of different trees while going somewhere and collect new data using this table as a sample.

4.

Letter	c	e	i	r	x
Number of times found in the news item	24	51	48	31	3

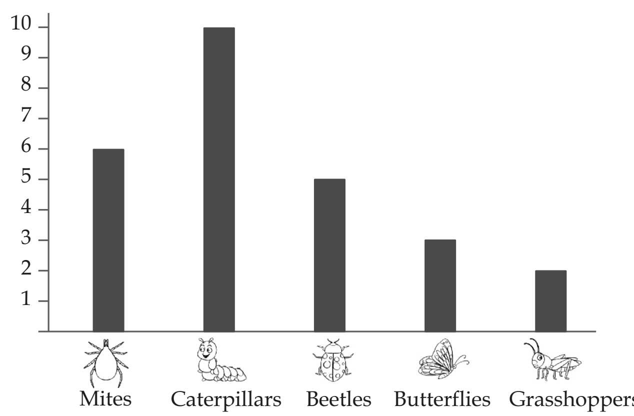
(a) The letter found the most number of times is ‘e’.
(b) The letter found the least number of times is ‘x’.
(c) List the five latter ‘c’, ‘e’, ‘i’, ‘r’ and ‘x’ in ascending order of the frequency.

Letter	x	c	r	i	e
Frequency	3	24	31	48	51

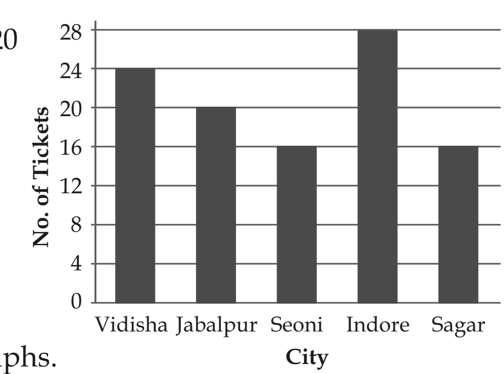
(d) To complete this task, we bought a newspaper name
‘Times of India’ and cut and posted the attached news have here. After this, We searched the given letters inside the news and wrote the numbers related to them.
(e) This comparision should be made by the students themselves
(f) If we do this task again, then we shall adopt same process.

Exercise 4.2

1. The bar graph below.



2. (a) The number of tickets sold for Vidisha 24
(b) The number of tickets sold for Jabalpur 20
(c) Since, 6 units 24 tickets,
Thus, 1 unit $\frac{24}{6}$ 4 tickets
Similarly, 5 units 20 tickets,
Thus, 1 unit $\frac{20}{5}$ 4 tickets
Hence, here scale is 1 unit 4 tickets.
(d) The bar graph for Sagar is given in bar graphs.

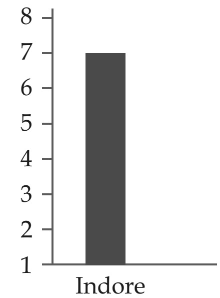


(e) The scale on the vertical line is given in above bar graph that is, 1 unit   4 tickets, 2 units   8, 3 units   12, ...

(f) The bar drawn for Seoni is correct but it is not correct for Indore because the scale 1 unit   4 tickets.

Hence, 28 tickets $\frac{28}{4}$ 7 units.

Hence, the length of the bar for Indore must reach to 7 units, as given here.



3. (a) Frequency distribution table for the given data :

Name of vehicles	Tallymarks	No. of vehicles
Bike	𝍸 𝍸 |||	13
Car	𝍸		6
Bicycle	𝍸 |||	8
Scooter	𝍸 ||||	9
Bus	||||	4
Bullock cart	||	2
Auto	𝍸 |||	8

(b) Bike

(c) If I was asked to collect this data, I would take the following steps :

(i) I would keep in mind and purpose of data collection.

(ii) After that I would gather the informations about the relevant field.

(iii) Then, I make a plan keeping the deadline in mind time limit.

(iv) Finally, I collect data either by direct observation or by asking questions.

4. Let the numbers obtained of 30 times roll of a die be

5, 2, 1, 2, 4, 2, 2, 5, 1, 2, 6, 3, 4, 1, 2, 1, 3, 2, 5, 1,   5, 3, 5, 4, 6, 3, 2, 1, 2, 1

The frequency table for this data is given below :

Number seen on the die	Tally Marks	Frequency
1	𝍸 ||	7
2	𝍸 ||||	9
3						4
4					3
5	𝍸	5
6				2

(a) It is 6. (b) It is 2.

(c) There are no numbers that appeared equal numbers of times.

5. (a) This table is giving the information how many times has Jaspreet Bumrah taken 0 to 7 wickets in last 30 cricket matches.

(b) Frequency distribution table indications the bowlings performance of Jaspreet Bumrah.

(c) Jaspreet Bumrah has taken 5 or more wickets 7 times.

(d) In 3 matches, Bumrah has taken 4 wickests.

(e) No, this calculation would have been correct, if Bumrah had taken one to seven wickets only once, but he has taken one or more wickets in multiple matches. For example, he has taken 5 wicket in five different matches.

(f) Total number of wickets taken by Jaspreet Bumrah can be calculated using the following method :

2 0 4 1 6 2 8 3 3 4 5 5 1 6 1 7

0 4 12 24 12 25 6 7 90

6. (a) Village D has the smallest number of tractors.

(b) Village C has the most number of tractors.

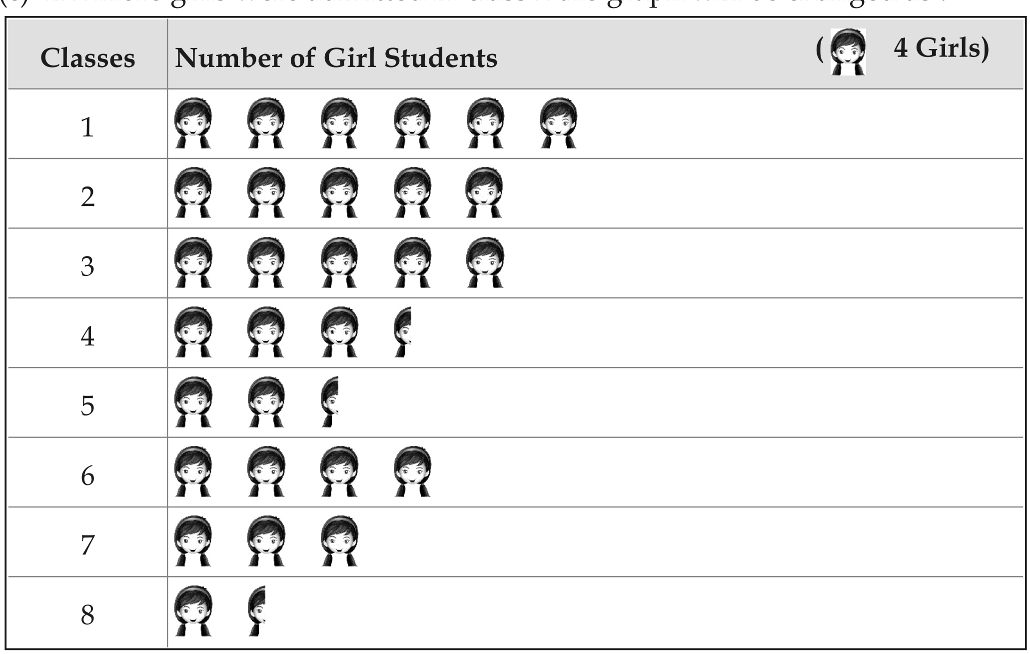
(c) Village C has 3 more tractors than that of Village B have.

(d) Yes, she is right.

7. (a) Class 8, has least number of girl students.

(b) Difference between class 5 and 6 4 4 2.5 4 16 10 6

(c) If 2 more girls were admitted in class 2 the graph will be changed as :



(d) There are (4 3) *i.e.,* 12 girls in class 7.

8. (a) Number of dogs in different villages are a multiples of 6. Hence, to draw a pictograph shall choose a scale 1 ⊠ 6 dogs.

Village	No. of dogs (⊠ 6 dogs)
A	⊠ ⊠ ⊠
B	⊠ ⊠ ⊠ ⊠ ⊠ ⊠
C	⊠ ⊠
D	⊠ ⊠ ⊠ ⊠ ⊠ ⊠ ⊠ ⊠
E	⊠ ⊠ ⊠
F	⊠ ⊠ ⊠ ⊠

(b) 6 symbols

(c) Yes, Total number of dogs in villages B and *D* 6 6 8 6 36 48 84

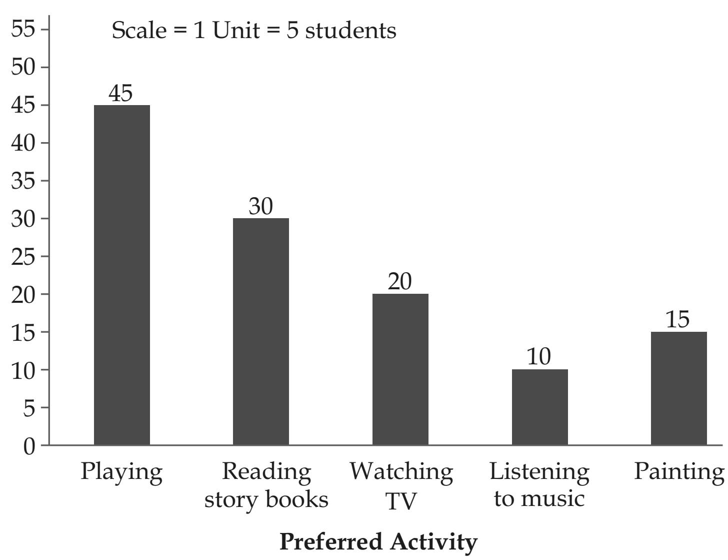
Total number dogs in 4 other villages

3 6 2 6 3 6 4 6

18 12 18 24 72

and 84 72.

9.



Reading story books is preferred by most students other than playing.

10. (a) The total number of saplings planted on wednesday and Thursday

30 40 70.

(b) The total number of saplings planted during the whole week

50 40 30 40 50 60 40 310

(c) Satruday and Wednesday. Number of student vary from Day 1 to Day 7

11. Yes, there are three mistakes in the graph.

(i) Number of tigers in 2006 is 1400, but it is shown in the graph less than 1000.

(ii) Number of tigers in 2014 is 2200, but it is shown in the graph more than 3000.

(iii) Number of tigers in 2018 is 3000, but it is shown in the graph less than 3000.

Exercise 4.3

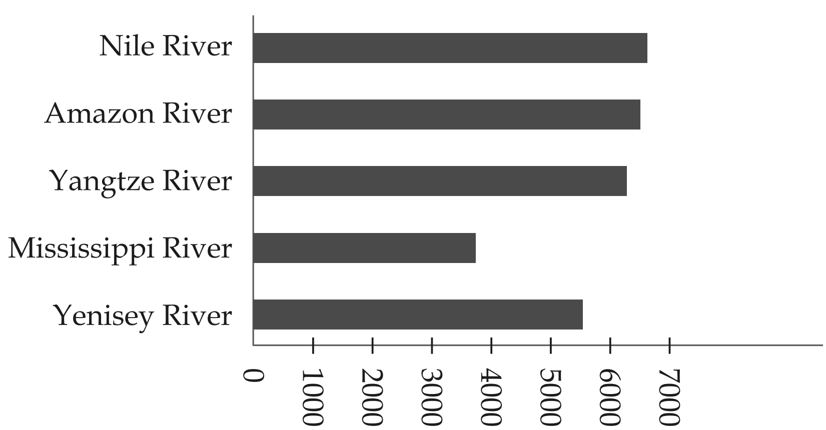
1. Graph with vertical bars. Vertical graphs are like pillars and show a better presentation of the person's height than that of horizontal graphs show.

2. Graph bars, because rivers flow on land horizontally not vertically.

In the following table five longest rivers in the world are given with lengths and the related country represent them with a suitable bar graph.

Rivers and Country	Nile River North eastern Africa	Amazon River South America	Yangtze River China	Mississippi River United States	Yenisey River Northern Asia
Length (in km)	6650	6400	6300	3766	5539

Scale : 1 unit = 1000 km



CHAPTER

5 Prime Time

Assignment 5.1

1. Multiple of 35 are 35, 70, 105, 140, 175, 210, 245, 280, 315, 350, 385, 420, 455, 490, 525, …… .

Hence, multiples of 35, that lie between 300 and 500 are 315, 350, 385, 420, 455 and 490.

2. (a) One of the factor of the number which is to identify is 9.

Multiples of 9   9, 18, 27, 36, 45, 54, 63, 72, 81, 90. The number 72 is less than 80 and the sum of its digits   7   2   9.

Hence, the number   72.

(b) 9 is a factor of the number we shall find out the multiples of 9 less than 100 and they are 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108.

The number is 99, because the difference between two digits, 9   9   0.

Hence the number   99.

3. Divisors of 28   1, 2, 4, 7, 14.

Sum of its divisors

1   2   4   7   14   28.

So, 28 is a pefect number, because the sum of its divisors is equal to itself.

4. (a) Common factors of 16 and 40 except are :

16   2   2   2   2   40   2   2   2   5

The smallest common factor is 2. The highest common factor is 2   2   2   8.

(b) Common factors of 35 and 42 :

35   5   7

42   6   7

There is only one common factor for both numbers.

Hence, the smallest and the highest common factor of 35 and 42 is 7.

(c) Common factors of 22 and 121 :

22   11   2

121   11   11

There is only one common factor for both numbers. Hence, the smallest and the highest common factor of 22 and 121 is 11.

(d) Common factors of 57, 114 and 171:

57   3   19

114   2   3   19

171   3   3   19

Hence, the smallest common factor   3

The highest common factor

3   19   57

5. Multiples of 30   30, 60, 90, 120, 150, 180, 210, 240, …… .

Multiples of 60   60, 120, 180, 240, 300, 360, …… .

In the list, numbers 90, 150 and 210 are the multiples of 30 but not multiples of 60.

Hence, 90, 150, 210 are required multiples.

6. Numbers 99 and 101 are very close to the number 100.

Factor of 99   1   3   3   11

or 1   9   11   or 1   3   33

Factors of 101   1   101.

The numbers 9 and 11 are very close to 10, and the least common multiple of both is 9   11   99.

Hence, the number for which Idli-vada was said for the first time is 99.

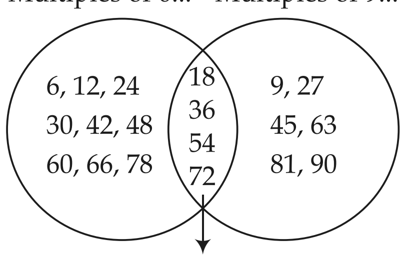
7. Factors of 39   1, 3, 13, 39.

Factors of 78   1, 2, 3, 13, 39, 78.

Common factors   1, 3, 13, 39.

Hence, jump sizes will land both 39 and 78 are 1, 3, 13, 39.

8. Multiples of 6...   Multiples of 9...



Common multiples

9. First five even numbers 2, 4, 6, 8, 10.

Factors of 2   1   2

Factors of 4   1   2   2

Factors of 6   1   2   3

Factors of 8   1   2   2   2

Factors of 10   1   2   5

Lest common multiple

2   2   2   3   5   120

10. First six odd numbers are 1, 3, 5, 7, 9, 11.

Factors of 1   1

Factors of 3   1   3

Factors of 5   1   5

Factors of 7   1   7

Factors of 9   1   3   3

Factors of 11   1   11

The least common multiple

1   3   3   5   7   11   3465

Hence, least common multiple   3465.

Assignment 5.2

1. 1 is not a prime number because it has only one factor which is 1. On the other hand, 1 is also not a composite number because it can not be divided by any other number except for 1 and itself. So, the number 1 is neither a prime nor a composite.

2. Prime numbers in the decade 0-9 are 2, 3, 5, 7.

Difference between two successive primes :

3   2   1   5   3   2   7   5   2.

Prime numbers in the decade 10-19 are 11, 13, 17, 19.

Difference between two successive primes :

13   11   2   17   13   4   19   17   2.

Hence, it is clear that the difference between two successive primes is not same.

3. The largest prime number   97 and the least prime number   2.

Difference of two numbers

97   2   95.

The obtained result is a compsoite number as the factors of 95 are 1, 5, 19, 95.

4. There are five such rows from 1 to 100, which have two prime-numbers in each in common these rows are

from 21 to 30,   from 31 to 40,

from 51 to 60, from 61 to 70

and from 81 to 90.

5. The rows of prime numbers whose difference is a number divisible by 10 are (11, 31), (41, 61), (61, 71).

31 11 20 (divisible by 10),

61 41 20 (divisible by 10),

71 61 10 (divisible by 10).

6. Yes, such the number are 67 and 89, both the numbers are prime and 9 8 1 and 7 6 1.

7. The rows are 21 to 30, 71 to 80 and 81 to 90. The composite numbers are : 24, 25, 26, 27 and 28; 74, 75, 76, 77 and 78; 84, 85, 86, 87 and 88.

8. First 20 prime numbes are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71.

Sum

2 3 5 7 11 13 17 19 23

29 31 37 41 43 47 53

59 61 67 71

639.

9. 26 (3 23); 44 (3 41); 48 (7 41);

56 (3 53); 66 (5 61).

10. 25 3 5 17 (All three primes)

39 3 5 57 (All three primes)

55 3 5 47 (All three primes)

77 3 3 71 (All three primes)

87 3 5 79 (All three primes)

11. 66 2 3 11 (Product of three primes)

70 2 5 7 (Product of three primes)

85 5 17 (Product of two primes)

99 3 3 11 (Using only two primes)

165 3 5 11 (Product of three primes)

Hence, the numbers 66, 70 and 165 are the product of three distinct primes.

12. (a) False. **Explanation :** Because 2 is only prime number that is not odd but an even.

(b) False. **Explanation :** All prime numbers except 2 and in 1, 3, 7 or 9 which are odd numbers. Also the sum of two odd numbers is always an even number which is composite.

(c) False. **Explanation :** Prime numbers have no other factor than 1 and the number itself. So, the product of two primes can never be a prime number.

(d) False. **Explanation :** We can get a whole number as quotient if the number is divided by any of its factor but a prime number has only two factors.

(e) False. **Explanation :** There is only one even prime number and that is 2.

Assignment 5.3

1. (a) Prime factorisation of 792

2 2 2 3 3 11.

(b) Prime factorisation of 810

2 3 3 3 3 5.

(c) Prime factorisation of 512

2 2 2 2 2 2 2 2 2.

(d) Prime factorisation of 1,512

2 2 2 3 3 3 7.

(e) Prime factorisation of 1,104

2 2 2 2 3 23.

(f) Prime factorisation of 1,530

2 3 3 5 17.

(g) Prime factorisation of 2,610

2 3 3 5 29.

(h) Prime factorisation of 728

2 2 2 7 13.

(i) Prime factorisation of 1,116

2 2 3 3 31.

(j) Prime factorisation of 2,115

3 3 5 47.

2. To find up the number, these prime factors are multiplied together.

So, two 2's three 3's two 5's one 13

2 2 3 3 3 5 5 13 35,100.

Thus, the number is 35,100.

3. To find these numbers, we prime factorise the given number 3,795.

3,795 3 5 11 23

Obtained all numbers are less than 25 and their product is 3,795.

Hence, the four prime numbers whose product is 3,795 are 3, 5, 11 and 23.

4. (a) Prime factors of 34 2 17.

Prime factors of 56 2 2 2 7.

Prime factors of 91 7 13.

Combined prime factors of 34 56 91

2 17 2 2 2 7 7 13

or 2 2 2 2 7 7 13 17

(b) Prime factors of 64

2 2 2 2 2 2

Prime factors of 81 3 3 3 3

Prime factors of 125 5 5 5

Combined factors of 64 81 125

2 2 2 2 2 2 3 3 3 3

5 5 5

(c) Prime factors of 168 2 2 2 3 7

Prime factors of 256

2 2 2 2 2 2 2 2

Prime factors of 121 11 11

Combined prime factors of

168 256 121

2 2 2 3 7 2 2 2 2 2

2 2 2 11 11

or 2 2 2 2 2 2 2 2 2 2

2 3 7 11 11

(d) Prime factors of 128

2 2 2 2 2 2 2

Prime factors of 343 7 7 7

Prime factors of 9 3 3

Combined prime factors of 128 343 9

2 2 2 2 2 2 2 7 7 7 3 3

or 2 2 2 2 2 2 2 3

3 7 7 7

(e) Prime factors of 115 5 23

Prime factors of 217 7 31

Prime factors of 319 11 29

Combined prime factors of 115 217 319

5 23 7 31 11 29

or 5 7 11 23 29 31

5. (a) Five successive different prime numbers are 2, 3, 5, 7 and 11. To find the smallest number with these primes as factors, we multiply them together.

So, 2 3 5 7 11 2110

Hence, the smallst number whose factors are five successive different primes is 2,110.

(b) Six successive different prime numbers are 2, 3, 5, 7, 11 and 13. To find the smallest number with these primes as factors, we multiply them together.

So, 2 3 5 7 11 13 30,030.

(c) Two successive prime numbers between 20 and 30 are 23 and 29. To find the smallest number with these primes we multiply them together

So, 23 29 667.

(d) Three successive prime numbers between 60 and 70 are 61, 67 and 69. To find the smallest number with these primes we multiply them together.

So, 61 67 69 2,82,003.

Assignment 5.4

1. Prime factorisation of 512 and 945

512 2 2 2 2 2 2 2 2 2

945 3 3 3 5 7

Since, two numbers 512 and 945 have no common factors.

Hence, 512 and 945 are co-prime numbers.

(b) Prime factorisation of 1080 and 135

1080 2 2 2 5 27

135 5 27.

Since, two numbers 1080 and 135 have common factors 5 and 27.

Hence, these two numbers are not co-primes.

(c) Prime factorisation of 735 and 147

735 3 5 7 7

147 3 7 7.

Since, two given numbers have 3, 7 and 7 have as common factor.

Hence, 735 and 147 are co-primes.

(d) 1305 and 112, factorising these two numbers

1305 3 3 5 29

112 2 2 2 2 7

Since, 1305 and 112 have no common factors.

Hence, they are co-prime numbers.

2. (a) Prime factorisation of 2352 and 84

2352 2 2 2 2 3 7 7

84 2 2 3 7

Since, all factors of 84 are included in the prime factors of 2352.

Hence, the number 2352 is divisible by 84.

(b) Prime factorisation of 1080 and 135.

1116 2 2 3 3 31

62 2 31

Since, all factors of 62 are included in the prime factors of 1116.

Hence, 1080 is divisible by 135.

(c) Prime factorisation of 1377 and 162.

1377 3 3 3 3 17

162 2 3 3 3 3.

Since, all the prime factors of 162 are not included in the prime factors of 1377.

Hence, 1377 is not divisible by 162.

(d) Prime factorisation of 1036 and 111 are

1036 2 2 7 37

111 3 37.

Since, all prime factors of 111 are not included in the prime factors of 1036.

Hence, 1036 is not divisible by 111.

3. Since, the prime number 11 is common in both the given numbers. So, these two numbers are not co-primes, because the first and only condition for being a co-prime number is that there should be no common factor other than 1.

Since, all the prime factors of one of the given numbers are not included in the prime factors of other number.

Hence, one does not divide the other perfectly.

4. It cannot be possible because all even numbers has 2 as its prime factor. First and last condition for co-primes, that no common factor is included other than 1.

Assignment 5.5

1. If the unit digit of a number is '0', then the number is divided by 2, 5 and 10.

So, the number 19400, 1234560 and 500000 are divisible by 2, 5 and 10.

2. We know that if the numbers formed by the digits at unit and tens place of a number is divisible by 4, then the original number will also be divisible by 4, then the original number will also be divisible by 4. Therefore the numbers (i) 23408, (iii) 34972, (v) 58724, (vi) 19000, and (viii) 86336 are divisible by 4. As their last digits make numbers 08, 72, 24, 00 and 36 which are divisible by 4.

3. (a) Factors of 7836 and 12

7836 2 2 3 653, 12 2 2 3

Since, the factors of 7836 include all the factors of 12. Therefore the number 7836 will be completely divisible by 12.

(b) 3456 2 2 2 2 2 2 2 3 3 3,

9 3 3

Since, the factors of 3456 include all the factors of 9.

Hence, the number 3456 will be completely divisible by 9.

(c) 8890 2 5 7 127,

14 2 7

Since, the factors of 8890 include all the factors of 14.

Hence, the number 8890 will be completely divisible by 14.

(d) 10725 3 5 5 11 13

33 3 11

Since, factors of 10725 include all the factors of 33.

Hence, the number 10725 will be completely divisible by 33.

(e) 16250 2 5 5 5 5 13

39 3 13.

Since, factors of 16250 do not include the factors of 39.

Hence, the number 16250 will not be completely divisible by 39.

(f) 3993 3 11 11 11

122 2 61

Since the factors of 3993 do not include the factors of 122.

Hence, 3993 will not be completely divisible by 122.

4. (a) If the unit digit of a number is 0 or 5, then the number is divisible by 5.

Hence, 0 will be filled.

(b) If the sum of digits in a number is a number is a multiple of 3, then the number is divisible by 3 also. Hence, 1 will be filled.

(c) If the sum of digits in a number is the multiple of 6, then the number is divisible by 6.

Hence, numbers 4 and 2 respectively filled.

(d) If the number formed by the digits in unit and tens place of a number is divisible by 4, then the number is also divisible by 4. Hence, 0 and 2 respectively will be filled.

(e) If the last three digits of a number are divisible by 8, then the number is also divisible by 8. Hence, 0 will be filled in both places.

(f) If the difference between the sum of the digits in the odd places and the sum of the digits in the even places is 0 or a multiple of 11, then the number will be divisible by 11.

Hence, 0 and 1 respectively will be filled.

5. If the sum of digits used in number is a multiple of 9, then the original number is divisible by 9.

So, 19506, the sum of digits

1 9 5 0 6 21

But the first number is 19503 and the second number is 19539.

6.

Numbers	2	3	4	5	6	7	8	9	10	11
84	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗
112	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗
756	✓	✓	✓	✗	✓	✓	✗	✓	✗	✗
1000	✓	✗	✓	✓	✗	✗	✓	✗	✓	✗
4563	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗
1455	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗
3862210	✓	✗	✗	✓	✗	✗	✗	✗	✓	✓

7. (i) (a), (ii) (d), (iii) (d), (iv) (a), (v) (d), (vi) (a).

8. (a) True, (b) True, (c) False, (d) True, (e) True.

TEXTBOOK EXERCISES

Exercise 5.1

1. 320, 360, 400.

Since multiples of 40 are 40, 80, 120, 160, 200, 240, 280, 320, 360, 400, 440, …… .

Out of which numbers 320, 360, 400 lie between the numbers 310 and 410.

2. (a) 7 is a factors of 7, 14, 21, 28, 35 which are less than 40. There is one number which has digit sum is

35 (3 5) 8. So, I am 35.

(b) Common factors of 3 and 5 are 15, 30, 45, 60, 75, 90, which are less than 100. There is only one number whose one of it's digit is 1 more than other and that is 45. So, I am 45.

3. The perfect number between 1 and 10 is 6. All factors or divisors of 6 are 1, 2, 3, 6.

Sum of all divisors 1 2 3 6 12

Here, 6 is a perfect number as 6 2 12.

4. (a) Factors of 20 are 1, 2, 4, 5, 10 and 20.

Factors of 28 are 1, 2, 4, 7, 14 and 28.

Common factors are 1, 2 and 4.

(b) Factors of 35 are 1, 5, 7 and 35.

Factors of 50 are 1, 2, 5, 10, 25 and 50.

Common factors 1, 5.

(c) Factors of 4 1, 2, 4.

Factors of 8 1, 2, 4, 8.

Factors of 12 1, 2, 3, 4, 6, 12.

Common factors 1, 2, 4.

(d) Factors of 5 1 and 5.

Factors of 15 1, 5 and 15.

Factors of 25 1, 5 and 25.

Common factors 1, 5.

5. Multiples of 25

25, 50, 75, 100, 125, 150, 175, …

Multiples of 50

50, 100, 150, 200, 250, …

Hence, three numbers multiples of 25 but not of 50 75, 125, 175.

6. If Idli vada is said after number 50, it means that the least common multiple of two numbers must be greater than 50. If we choose 8 and 9 then common multiple of these two numbers are 18, 36, 54. Number 54 is larger than fifty but idli-vada can not be used for this as it is the third multiple of 6 and 9.

So, we take the numbers 7 and 9, as the least common multiple of these two numbers is 63 and 20. So, idli-vada can be used for it first time.

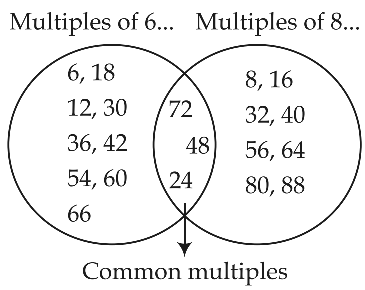
7. Factors of 28 1, 2, 4, 7, 14, 28.

Factors of 70 1, 2, 5, 7, 10, 14, 35, 70.

Common factors 1, 2, 7, 14.

Hence, jump sizes that will land both 28 and 70 are 1, 2, 7 and 14.

8.



Here number 6 can be replaced by 8 and the number 8 can be replaced by 12.

9. To find the smallest number that is a multiple of all the numbers from 1 to 10 except 7, we shall factorise first the given numbers

1 1 1   2 1 2   3 1 3

4 1 2 2   5 1 5   6 1 2 3

8 1 2 2 2   9 1 3 3

10 1 2 5

Now, we shall find the product of all common factors including the numbers that are not common.

Thus, 1 2 2 2 3 3 5 360

Hence, the smallest number that is a multiple of all the numbers from 1 to 10 except 7 is 360.

10. To find the smallest number that is a multiple of all the numbers from 1 to 10, we shall get the prime factors of given numbers.

1 1 1   2 1 2   3 1 3

4 1 2 2   5 1 5   6 1 2 3

7 1 7   8 1 2 2 2

9 1 3 3   10 1 2 5

Now we will find the product of all the common factors and those factors are not common.

Here, 2 2 2 3 3 5 7 2520

Hence, the smallest number that is a multiple of all numbers from 1 to 10 is 2520.

Exercise 5.2

1. No, 2 is the only even prime number. Since 2 is the only even number that meets the criteria of a prime number (the divisors of 2 are only 1 and 2 itself), it is the only even prime number. All other even numbers are divisible by 2 and at least one other number, so they are not prime.

2. To find the smallest difference between two successive prime numbers up to 100, we will make a list the prime numbers in the range of 1 to 100 and calculate the difference between two successive primes.

Prime numbers up to 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97.

Difference between two successive primes

3 2 1   5 3 2   7 5 2

11 7 4   13 11 2   17 13 4

19 17 2   23 19 4   29 23 6

31 29 2   37 31 6   41 37 4

47 41 6   53 47 6   59 53 6

61 59 2   67 61 6   71 67 4

79 73 6   83 79 4   89 83 6

97 89 8.

The smallest difference between two successive primes 2 and 3   3   2   1.

And the largest difference between two successive primes 89 and 97   97   89   8.

3. There is not an equal number of primes in every row. It is different number of primes in among the rows.

The decade 90-99 has the least number of primes as there is only 1 prime in it, that is 97.

The decades 0-9 and 10-19 have the largest number of primes each with 4 primes.

4. Numbers 23 and 37 are primes because both have no divisor other than 1 and themselves.

5. The primes less than 20 are : 2, 3, 5, 7, 11, 13, 17, 19.

Three pairs of prime numbers whose sum is a multiple of 5 are (2, 3), (3, 7), (2, 13)

2   3   5   3   7   10   2   13   15

6. The pairs of prime numbers up to 100 that consists of the same digits are :

(13, 31), (17, 71), (37, 73) and (79, 97).

7. Seven consecutive composite numbers between 1 and 100 are : 90, 91, 92, 93, 94, 95, 96.

8. The twin primes other than (3, 5) and (17, 19) between 1 and 100 are :

(5, 7), (11, 13), (29, 31), (41, 43), (59, 61) and (71, 73).

9. (a) True. **Explanation :** Except 2 all other primes end in 1, 3, 7 or 9, because any number that ends in 0, 2, 4, 6 or 8 is always divisible by 2.

(b) False. **Explanation :** A product of prime numbers is only prime if it involves exactly one prime number. When two or more prime numbers are multiplied together, the result is always a composite number not a prime. As this number has more than two factors.

(c) False. **Explanation :** Prime numbers have exactly two factors first is one and second is the number itself.

(d) False. **Explanation :** The number 2 is an even number but not composite as it has only two factors 1 and itself.

(e) True. **Explanation :** For every prime number greater than 2, the next number is composite.

10. Here 45   1   3   3   5 (only 2 primes).

60   1   2   2   3   5 (3 primes)

91   1   7   13 (2 distinct primes)

105   1   3   5   7 (3 distinct primes)

330   1   2   3   5   11 (4 distinct primes)

Hence, the number 105 is the product of exactly three distinct primes and they are 3, 5, 7.

11. Digits 2, 4 and 5 can not form any prime numbers because, if the unit digit either 2 or 4, of the formed number, then it will be divisible by 2 and if the unit digit of the number so formed is 5, then the number will be divisible by 5.

So, the digits 2, 4 and 5 can not form a prime number.

12. The five prime number for which doubling and adding 1 gives another prime are

2   (2   2   1)   5

3   (2   3   1   7)

5   (2   5   1   11)

11   (2   11   1   23)

23   (2   23   1   47)

Exercise 5.3

1. (i) The prime factorisation of 64

2   2   2   2   2   2

(ii) The prime factorisation of 104

2   2   2   13

(iii) The prime factorisation of 105

3 5 7

(iv) The prime factorisation of 243

3 3 3 3 3

(v) The prime factorisation of 320

2 2 2 2 2 2 5

(vi) The prime factorisation of 141

3 47

(vii) The prime factorisation of 1728

2 2 2 2 2 2 3 3 3

(viii) The prime factorisation of 729

3 3 3 3 3 3

(ix) The prime factorisation of 1024

2 2 2 2 2 2 2 2 2 2

(x) The prime factorisation of 1331

11 11 11

(xi) The prime factorisation of 1000

2 2 2 5 5 5

2. Find up the numbers, these prime factors are multiplied together 2 two 3's one 11.

2 3 3 11 198

Thus, the number is 198.

3. To find these prime numbers, we prime factorise 1955.

1955 5 17 23

Obtained all numbers are less than 30 and their product is 1955.

Hence, the three prime numbers whose product is 1955 are 5, 17 and 23.

4. (a) Prime factors of 56 2 2 2 7.

Prime factors of 25 5 5.

Combined prime factoristaion of

56 25 2 2 2 7 5 5

or 2 2 2 5 5 7.

(b) Prime factors of 108 2 2 3 3 3.

Prime factors of 75 3 5 5.

Combined prime factorisation of 108 75

2 2 3 3 3 3 5 5.

(c) Prime factors of 1000

2 2 2 5 5 5.

Prime factors of 81 3 3 3 3

Combined prime factors of 1000 81

2 2 2 5 5 5 3 3 3 3

or 2 2 2 3 3 3 3 5 5 5

5. (a) Three different prime numbers are 2, 3 and 5. To find the smallest number with these primes as factors, we shall multiplying them together

2 3 5 30

Hence, the smallest number whose prime factorisation has three different primes is 30.

(b) First four prime numbes are 2, 3, 5 and 7. To find the smallest number whose prime factorisation has these four primes as factors, we shall multiply these together

2 3 5 7 210

Thus, the smallest number whose prime-factorisation has four different primes is 210.

Exercise 5.4

1. (a) No. **Verification :** Factors of 30 and 45

30 2 3 5 and 45 3 3 5.

Common factors, 3 5 15.

Hence, 30 and 45 are not a pair of co-prime numbers.

(b) Yes. **Verification :** Prime factorisation of 57 and 85.

57 3 19 and 85 5 17

There is no common factor.

Hence, 57 and 85 are co-prime numbers.

(c) No. **Verification :** Prime factors of 121 and 1331.

121 11 11 and 1331 11 11 11.

There is common factors is 11 11 121.

Hence, 121 and 1331 are not co-prime numbers.

(d) Yes. **Verification :** Prime factorisation of 343 and 216.

343 7 7 7

216 2 2 2 3 3 3.

There is no common factor.

Hence, 343 and 216 are co-prime numbers.

2. (a) Prime factorisation 225 and 27

225 3 3 5 5 and 27 3 3 3.

Since 225 has two 3's as prime factors, while 27 has three 3's. So, number of 3's in 225 are not enough to be divisible by 27.

Hence, 225 is not divisible by 27.

(b) Prime factors of 96 and 24

96 2 2 2 2 2 3

24 2 2 2 3

Since 96 has the required factors to match those in 24.

Hence, 96 is divisible by 24.

(c) Prime factors of 343 and 17.

343 7 7 7 and 17 1 17.

Since, the prime factorisation of 343 does not have 17 in it.

Hence, 343 is not divisible by 17.

(d) Prime factors of 999 and 99

999 3 3 3 37 and 99 3 3 11

Since, 999 does not have 11 as a factor in it.

Hence, 999 is not divisible by 99.

3. The two numbers have common factors 3 and 7.

So, they are not co-prime.

Since neither number has all the factors of the other number.

So, one of them can not divide other number.

4. Yes, he is right as all co-prime numbers have no common factor other than 1.

Exercise 5.5

1. (a) I was born in 2010. So, from the year 2010 till 2024, there are 4 leap years, 2012, 2016, 2020 and 2024.

(b) The leap years from 2024 till 2099 will be 2024, 2028, 2032, 2036, 2040, 2044, 2048, 2052, 2056, 2060, 2064, 2068, 2072, 2076, 2080, 2084, 2088, 2092 and 2096.

Hence, there will be 19 leap years from 2025 till 2099.

2. The largest 4-digit number divisible by 4 and also palindrom is 8888.

The smallest 4-digit number divisible by 4 and also palindrom is 2112.

3. (a) Sum of two even numbers gives a multiple of 4 is sometimes true. For example, 6 4 10, not divisible by 4. But 4 8 12 (divisible by 4).

(b) Sum of two odd numbers gives a multiple of 4 is sometimes true. For example, 3 5 8 is divisible by 4, but at the other hand 9 5 14 is not divisible by 4.

4.

(i)	(ii)	(iii)
10) 78 (7	5) 78 (15	2) 78 (39
– 70	– 5	– 6
8	28	18
Remainder 8	– 25	– 18
	3	0
	Remainder 3	Remainder 0

Similarly do yourself.

99 10, R 9, 99 5, R = 4

99 2, R = 1

173 10, R = 3, 173 5, R 3

173 2, R 1

572 10, R 2, 572 5, R 2

572 2, R 0

980 10, R 0, 980 5, R 0

980 2, R 0

1111 10, R 1, 1111 5, R 1

1111 2, R 1

2345 10, R 5, 2345 5, R 0,

2345 2, R = 1

5. The factors of 8 are 2 and 4 and the factors of 10 are 2 5.

Now, if a number is divisible by 10, then it will also be divisible by 2 and 5. Similarly, if a number is divisible by 8, then it will also be divisible by 2 and 4.

Therefore, checking divisibility by 8 and 10, it is confirm that number is also divisible by all other numbers (2, 4 and 5).

Hence, the pair of numbers that Guna checked to determine that 14560 is divisible by all 2, 4, 5, 8 and 10 are 10 and 8.

6. **572 :** The end digits of 572 is neither '0' nor 5. So, it is not divisible by 5 or 10.

The last three digit are not divisible by 8, so 572 is not divisible by 8.

The last two digit make a number 72 that is divisible by 4 and so the number is also divisible by 2.

Hence, the number 572 is divisible by 2 and 4 but not divisible by 5, 8 and 10.

2352 : The last digit of the number is neither 0 nor 5. So, 2352 is not divisible by 5 or 10.

The number formed by last 3 digits is 352 that is divisible by 8, so the number is divisible by 2, 4 and 8.

5600 : The last digit of the number is 0, and the number formed by last digits is 600, that is divisible by 8. Thus the number 5600 is divisible by all the numbers 2, 4, 5, 8 and 10.

6000 : The last 3 digits of this number 0, so the number is divisible by all the given numbers 2, 4, 5, 8 and 10.

77622160 : The last digit of this number is 0, so it is divisible by 5 and 10.

And last three digits form a number 160, which is divisible by 8, thus the number divisible by 2, 4 and 0. Hence, 77622160 is divisible by 2, 4, 5, 8 and 10.

Hence, the number 5600, 6000 and 77622160 are divisible all the given numbers 2, 4, 8, 5 and 10.

7. The prime factorisation of the number

10,000 2 2 2 2 5 5 5 5

Making groups, we have

(2 2 2 2) (5 5 5 5) 16 625

Hence, two numbers whose product is 10,000 but not have 0 as unit digit are 16 and 625.

CHAPTER

6 Perimeter and Area

Assignment 6.1

1. Given, length of one side of all polygon 5 cm

(a) A triangle has three sides.

So, perimter of an equilateral triangle

3 side length

3 5 cm 15 cm

(b) A square is a special type of rectangle with all sides equal.

So, perimeter of rectangular shape

4 side length

4 5 cm 20 cm

(c) A pentagon has five sides.

So,perimter of regular pentagon

5 side length

5 5 cm 25 cm

(d) A hexagon has six sides.

So, Perimter of a regular hexagon

6 sides length

6 5 cm 30 cm

2. Given, length of a side of square shaped field

140 meter

Distance between two saplings 7 m

Perimeter of square saped field

4 length of one side

4 140 m 560 m

Total number of mango shaplings

$$\frac{\text{Perimeter of the field}}{\text{Distance between two saplings}}$$

$$\frac{560 \text{ m}}{7 \text{ m}} \quad 80$$

3. Given, length of the table cloth 85 cm, breadth of the table cloth 65 cm

Required length of the lace

perimeter of table cloth

2 (length + breadth)

2 (85 cm 65 cm)

2 150 cm 300 cm

Now, we have to convert cm into m

$$300 \text{ cm} \quad \frac{300}{100} \quad 3 \text{ meter}$$

Rate of tying lace ₹15 per meter

Total cost Rate length

15 m ₹3 per meter ₹45

Hence, total cost of lacing ₹45

4. (a) There are four triangles formed.

(b) Name of four triangles are *AFE*, *BDF*, *CDE* and *DEF*.

Perimeter of the largest triangle

ABC 3 length of the side

3 8 cm 24 cm

(c) Total perimeter of 4 smaller triangle

3 3 3 3 3 3 3 3

9 9 9 9 36 cm

(d) Yes, all the smaller triangles are equal in perimeter.

5. Given, length of the rectangle 17 cm, breadth of the rectangle 15 cm

To find perimeter of the rectangle,

Perimeter 2 (length + breadth)

2 (17 cm + 15 cm)

2 32 cm

64 cm

The length of the wire

Perimeter of rectangle figure

Perimeter of square figure

4 side length 64 cm

side length $\frac{64}{4}$ 16 cm

Hence, the length of side of square 16 cm.

6. Given, length of the side of triangle 10.25 cm

Perimeter of the equilateral triangle

3 length of one side

3 10.25

30.75 cm

Length of the wire perimeter of the triangle

Perimeter of regular pentagon

30.75 cm

5 side 30.75 cm

Length of side $\frac{30.75 \text{ cm}}{5}$ 6.15 cm

Hence, the length of side of regular pentaon 6.15 cm.

7. R. Octagon : 80 cm; R. Hexagon : 15 cm; R. Pentagon : 41.5 cm; Square : 29.40 cm; E. triangle : 9.3 cm.

Assignment 6.2

1. Given, length of a piece of paper required for envelope 20 cm

Its width 5 cm

Area of the piece of paper required for one envelope length breadth

20 cm 5 cm 100 sq. cm

Length of the paper sheet 100 cm

Its breadth 75 cm

Area of the paper sheet

length breadth

100 cm 75 cm

Number of envelope made

$\frac{\text{Area of the paper sheet}}{\text{Area of the piece of paper required for one envelope}}$

$\frac{100 \text{ cm} \quad 75 \text{ cm}}{100 \text{ sq. cm}}$

75 envelopes

Hence, envelopes that can be made with this paper sheet 75

2. Given, length of brick 26 cm

breadth of brick 10 cm

Therefore, area covered by one brick

length width

26 cm 10 cm

260 sq. cm

The length of footpath 130 m

breadth of the footpath 1.5 m

Area of the footpath

length breadth

130 m 1.5 m

130 100 cm 1.5 100 cm

Number of bricks to lay

$$\frac{\text{Area of the footpath}}{\text{Area of one brick}}$$

$$\frac{130 \quad 100\,\text{cm} \quad 1.5 \quad 100\,\text{cm}}{260\,\text{sq. cm}}$$

7500 bricks

Hence, number of bricks to lay a footpath 7500

3. Given, length of the ploat 32 m

32 100 cm

breadth of plot 18 m 18 100 cm

Area of the plot length breadth

32 100 cm 18 100 cm

length of one tile 12 cm

breadth of one tile 8 cm

Area of the tile length breadth

12 cm 8 cm

Number of tiles needed

$$\frac{\text{Area of the plot}}{\text{Area of one tile}}$$

$$\frac{32 \quad 100 \quad 18 \quad 100}{12 \quad 8} \quad 60000 \text{ tiles}$$

Hence, the number of tiles needed 60000.

4. Given, length of the field 121 m, breadth of the field 54 m

Area of the field length breadth

121 m 54 m

Area required for one mango tree 33 sq. m

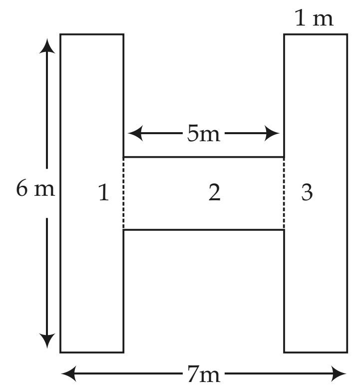
Maximum number of plants to be planted

$$\frac{\text{Area of the field}}{\text{Area required for one mango tree}}$$

$$\frac{121\text{ m} \quad 54\text{ m}}{33} \quad 198$$

Hence, maximum number of trees that can be planted in the field 198.

5. (a) By splitting the given figure into 1, 2 and 3 rectangles as shown in the adjoining figure, we get



Area of rectangle 1 length breadth

6 cm 1 cm 6 sq. m

Area of rectangle 2 length breadth

5 m 1 m 5 sq. m.

Area of rectangle 3 length breadth

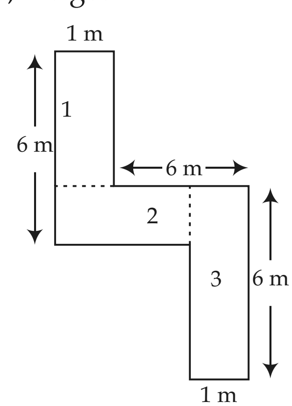
6 m 1 m 6 sq. m

Total area of whole figure

6 5 6 17 sq. m

Hence, the total area of the given figure 17 sq. m

(b) By splitting the given figure into 1, 2 and 3 as shown in the adjoining figure, we get



Area of rectangle 1 length breadth

5 m 1 m 5 sq. m

Area of rectangle 2 length breadth

6 m 1 m 6 sq. m

Area of rectangle 3 length breadth

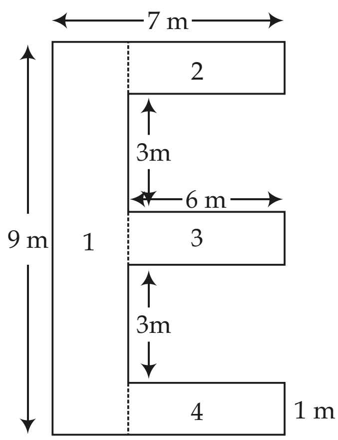
6 m 1 m 6 sq. m

Total area of whole figure

5 6 6 17 sq. m

Hence, the total area of the given figure 17 sq. m.

(c) By splitting the given figure into 1, 2, 3 and 4 as shown in the adjoining figure, we get



Area of rectangle 1 length breadth

9 m 1 m 9 sq. m

Area of rectangle 2 length breadth

6 m 1 m 6 sq. m

Area of rectangle 3 length breadth

6 m 1 m 6 sq. m

Area of rectangle 4 length breadth

6 m 1 m 6 sq. m

Total area of whole figure

9 6 6 6 27 sq. m

Hence, the total area of the given figure 27 sq. m

Assignment 6.3

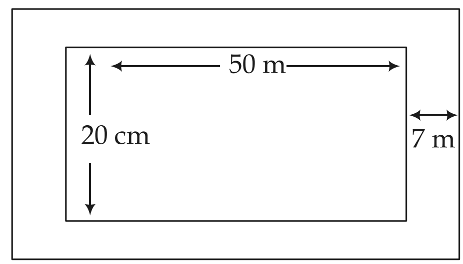
1. Given, Length of the garden 50 m

breadth of the garden 20 m

Area of the garden length breadth

50 m 20 m

1000 sq. m



Width of the path 7 cm

So, length of the garden including the width of the path

50 m 7 m 7 m 64 m

breadth of the garden including width of the path

20 m 7 m 7 m

34 m

Area of the garden including the area of the path

64 m 34 m 2176 sq. m

Area of the path

Area of the garden width path

Area of the garden

2176 sq. m 1000 sq. m

1176 sq. m

Hence, the area of the path

1176 sq. m.

2. The length of the garden 55 meters

The breadth of the garden 25 meters

Width of the beds in side the garden

2.5 meters

Length of the garden without beds

55 m 2.5 m 2.5 m

55 m 5 m 50 m

Breadth of the garden without beds

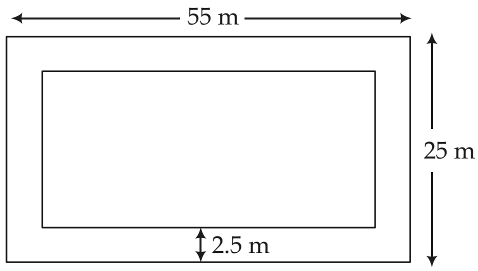
25 m 2.5 m 2.5 m

25 m 5 m 20 m

The area of the garden

length breadth

55 m 25 m 1375 sq. m



Area of the garden without beds

50 m 20 m 1000 sq. m

Area of the beds Area of garden
Area of garden without beds

1375 sq. m 1000 sq. m

375 sq. m.

Rate of the planting grass ₹15 sq. m

Cost of the planting grass

Rate Area

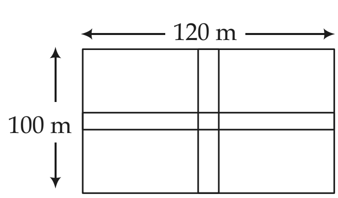
₹15 sq. per m 375 sq. m

₹5625

Hence, cost of the planting grass in the beds ₹5625

3. Clearly, similar

Breadth of the each road 5 m



Therefore the area of roads

100 5 120 5 5 5

500 600 25

1100 25 1075 sq. m.

Area of the park

120 100 12000 sq. m

Area of the remaining part of the park

12000 sq. m 1075 sq. m

10925 sq. m

Hence, the area of the roads 1075 sq. m and the area of the remaining part of garden 10925 sq. m

4. Given, Area of the triangle with perpendicular 36 m long Area of the square with side length 12 m

So, $\frac{1}{2}$ perpendicular base

side side

$\frac{1}{2}$ 36 m base 12 m 12 m

base $\frac{12 \text{ m} \quad 12 \text{ m} \quad 2}{36 \text{ m}}$ 8 m

Hence, the length of the base of the triangle 8 m

5. Side length of the first square 8 cm

Area side side

8 cm 8 cm 64 sq. cm

side length of second square 4 cm

Area 4 cm 4 cm 16 sq. cm

Area of the rectangle 64 sq. cm 16 sq. cm

80 sq. cm

The possible side of the rectangle

(40 2), (20 4), (16 5), (10 8)

The largest perimeter of the rectangles

2 (40 2) 84 cm

6. The length of given rectangle 15 units

The breadth of given rectangle

12 units

So, Its area length breadth

15 units 12 units

180 sq. units

The area of the inside rectangle

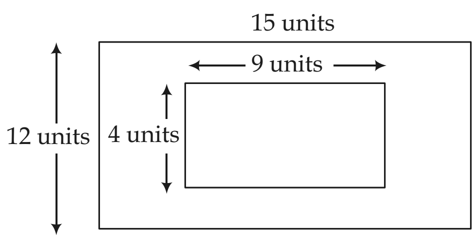
one-fifth of this rectangle

So, area of the inside rectangle

$180 \text{ sq. m} \;\; \frac{1}{5} \;\; 36 \text{ sq. m}$

The sides of the inside rectangle may be (18 2), (12 3), (9 4).

Hence, the rectangle is as follows :



7. The perimeter of given rectangle

22 units

The area of given rectangle 24 sq. units

The area of the new rectangle

$\frac{3}{4}$ 24 sq. units 18 sq. units

The perimter of this rectangle may be (9 2), (6 3) and (18 1).

The perimeter of this rectangle may be

2 (9 units 2 units) 22 units

2 (6 units 3 units) 18 units and

2 (18 units 1 unit) 38 units

Hence, yes such rectangle is possible.

8. Let the side of given square be 8 units.

The perimeter will be 4 8 units 32 units

The area will be 8 units 8 units 64 units

(a) Since, the square is cut off twice from the middle, so the quadrilateral obtained has four equal sides of length 4 cm each.

Hence, the name of the quadrilateral is a square.

(b) The area of these four square

4 area of one square

4 (4 units 4 units)

64 sq. units

Hence, the combined area of obtained square is equal to the area of original square.

(c) Perimeter of one obtained square

4 side length

4 4 units 16 units

Perimeter of obtained four square

4 16 64 units

Hence, the combined perimeter of four squares is double to the perimeter of original square.

TEXTBOOK EXERCISES

Exercise 6.1

1. (a) Given, perimeter of rectangle 14 cm, breadth 2 cm

To find its length.

Perimeter of rectangle

2 (Length + Breadth)

14 cm 2 (Length 2 cm)

$\frac{14 \text{ cm}}{2}$ Length 2 cm

7 cm Length 2 cm

Length 7 cm – 2 cm 5 cm

Hence, length of the rectangle 5 cm

(b) Given, perimeter of square 20 cm

To find out side of square, 4 side perimeter

4 side 20 cm

side $\frac{20}{4}$ 5 cm

Hence, side of the square 5 cm.

(c) Given, perimeter of rectangle 12 m, breadth 3 m

To find out length,

2 (length breadth) Perimeter

2 (3 m + breadth) 12 m

3 m + breadth $\frac{12}{2}$ 6 m

breadth 6 m – 3 m 3 m

Hence, breadth of the rectangle 3 m.

Note : *Since length and breadth of given rectangle are same, so it is a square (a special type rectangle).*

2. Given, side length of rectangle are 5 cm and 3 cm

length 5 cm and breadth 3 cm

To find perimeter,

Perimeter 2 (length + breadth)

2 (5 cm 3 cm)

2 8 cm 16 cm

Length of the wire used 16 cm

Since, with the same wire square is formed.

So, perimeter of square length of wire

4 side 16 cm

side $\frac{16}{4}$ 4 cm

Hence, the length of the side of square 4 cm.

3. Given, perimeter of triangle 55 cm

Length of two sides 20 cm and 14 cm

To find the third side of triangle. Let sides of triangle ABC be AB, BC and CA.

Perimeter of triangle AB BC CA

55 cm 20 cm 14 cm CA

CA 20 cm (20 cm 14 cm)

CA 55 cm 34 cm 21 cm

Hence, length of third side of triangle 21 cm.

4. Given, length of rectangular park 150 cm, its breadth 120 cm

Cost of fencing ₹40 per meter

Length of fencing of the park

Perimeter of the park

2 (length + breadth)

2 (150 m 120 m)

2 270 m 540 m

Total cost of fencing

Rate per meter length of fencing

₹40 540 m ₹21600

Hence, the cost of fencing ₹21600.

5. Given, length of piece of string

36 cm

To form, a square

(a) Length of string

perimeter of square

4 side 36 cm

side $\frac{36}{4}$ cm 9 cm

(b) To form a triangle with equal sides.

Perimeter of the triangle formed length of the wire used

3 length of one equal side 36 cm

length of one equal side $\frac{36}{3}$ 12 cm

(c) Perimeter of the regular hexagon

length of string

6 length of side 36 cm

length of side $\frac{36}{6}$ 6 cm

6. Given, length of rectangular field 230 m, breadth 160 m

Length of rope to fence 3 rounds the field.

Perimeter of rectangular field

2 (length + breadth)

2 (230 m 160 m)

2 390 m 780 m

Length of the rope needed to fence one round Perimeter of rectangular field 780 m

Length of the rope needed to fence 3 rounds

3 780 m 2340 meter.

Hence, the length of the rope needed for 3 rounds 2340 m

Exercise 6.2

1. Given, area of the rectangular garden

300 sq. m.

The length of the garden 25 m

length width area of the rectangular garden

25 m width 300 sq. m

width $\frac{300 \text{ sq. m}}{25 \text{ m}}$ 12 m

2. Given, the length of the rectangular plot 500 m

and its width 200 m

Rate of the tiling ₹8 per sq. m

Area of the rectangular plot

length width

500 200 m 100000 sq. m

Cost of the tiling

Area of the plot rate of tiling

1,00,000 sq. m ₹8 ₹8,00,000

Hence, the cost of the tiling the plot

₹8,00,000

3. Given, length and width of the rectangular grove is 100 m and 50 m

And the area required for one tree

25 sq. m.

To find the number of tree in the grove,

Area of the rectangular grove

length width

100 m 50 m 5000 sq. m.

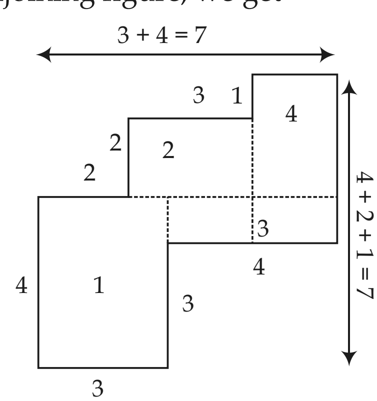
Number of maximum tree in the grove

$\frac{\text{Area of the grove}}{\text{Area required for one tree}}$

$\frac{5000 \text{ sq. m}}{25 \text{ sq. m}}$ 200

Hence, the maximum number of coconut trees that can be planted in to grove 200

4. (a) By splitting the given figure into 1, 2, 3 and 4 rectangles as shown in adjoining figure, we get



The area of rectangle 1

length breadth

4 cm 3 cm 12 sq. cm.

Area of rectangle 2 length breadth

3 cm 2 cm 6 sq. cm.

Area of rectangle 3 length breadth

4 cm 1 cm 4 sq. cm.

Area of rectangle 4 length breadth

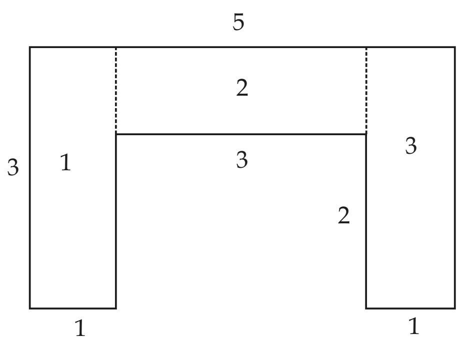
3 cm 2 cm 6 sq. cm.

The total area of the whole figure

12 6 4 6 28 sq. cm

Hence, the total area of the whole figure 28 sq. cm.

(b) By splitling figure, we get three rectangles 1, 2 and 3, as shown in the adjoining figure.



Area of the rectangle 1

length breadth

3 cm 1 cm 3 sq. cm

Area of the rectangle 2

length breadth

3 cm 1 cm 3 sq. cm

Area of the rectangle 3

length breadth

3 cm 1 cm 3 sq. cm

The total area of the figure

3 3 3 9 sq. cm

Exercise 6.3

1. Area of rectangle one 5 m 10 m

50 sq. m.

Area of rectangle two

2 m 7 m 14 sq. m.

The sum of the areas of these two rectangles 50 14 64 sq. m

The area of new rectangle formed 64 sq. m

Let the sides of this rectangle be x and y.

Thus, x y 64 1

or x y 32 2

or x y 16 4

Hence, the dimensions of the rectangle may be (64 1), (32 2), (16 4).

2. Given, length of the garden 50 m

Area of the garden 1000 sq. m

Width of the garden

$$\frac{\text{Area of the garden}}{\text{Length of the garden}}$$

$$\frac{1000 \text{ sq. m}}{50 \text{ m}} \quad 20 \text{ m}$$

Hence, the width of the garden 20 m

3. Given, length of the floor 5 m

breadth of the floor 4 m

and each side of carpet laid 3 m

The area of the floor

length breadth

5 m 4 m 20 sq. m

The area of the carpet side side

3 m 3 m 9 sq. m

So, Not carpeted area of the floor

20 sq. m 9 sq. m 11 sq. m

4. Length of the flower bed 2 m

Its width 1 m

Length of the garden 15 m

It's width 12 m

Area of one flower bed

length breadth

2 m 1 m 2 sq. m

Area of 4 flower beds

2 sq. m 4 8 sq. m

Area of the garden

15 m 12 m 180 sq. m.

Available area for laying lawn

Area of the garden

Area of 4 flower beds

180 sq. m 8 sq. m

172 sq. m

Hence, the area available for laying lawn 172 sq. m.

5. Shape *A* has an area of 18 sq. units. Thus, the possible dimensions are

18 (18 1), (9 2) and (6 3)

And shape *B* has an area of 20 sq. units.

Thus, the possible dimensions are 20

(20 1), (10 2) and (5 4)

Here, perimeters of shape *A* may be

2 (18 1) 38 units

2 (9 2) 22 units

and 2 (6 3) 18 units

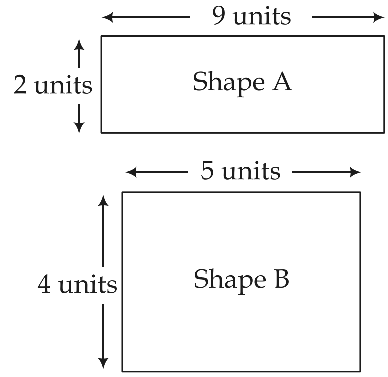
The perimeters of shape *B* may be

2 (20 1) 42 units

2 (10 2) 24 units

and 2 (5 4) 18 units

On comparing, we find the rectangular figures as follows :



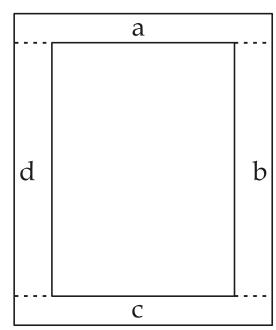
6. The length of a page of our Hindi book 24 cm (let)

The breadth of a page of our Hindi book 17 cm (let)

Distance of the border from top and bottom 1 cm

and the distance from right and left 1.5 cm

The border makes 4 rectangles a, b, c and d as shown in the figure.



Length of rectangle a 17 cm

and its breadth 1 cm

Perimeter 2 (length + breadth)

2 (17 cm 1 cm) 2 18 cm 36 cm

Rectangle a recgangle c

Thus, the perimeter of rectangle

c 36 cm

length of the rectangle b

24 1 1 22 cm

and its breadth 1.5 cm

Perimeter of rectangle b

2 (22 cm 1.5 cm)

2 23.5 cm 47 cm

Sincerectangle b rectangle d

Thus, the perimeter of rectangle

d 47 cm

Total perimeter of the border

36 36 47 47 166 cm

Hence, the perimeter of the border 166 cm

7. The area of the given rectangle

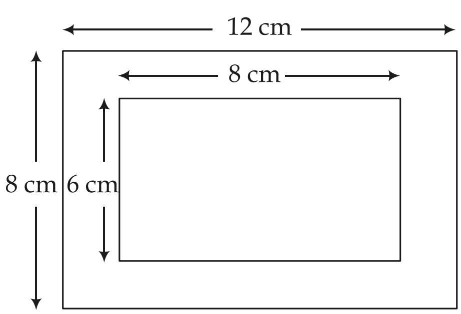
12 units 8 units 96 sq. units

And the area of the rectangle inside it

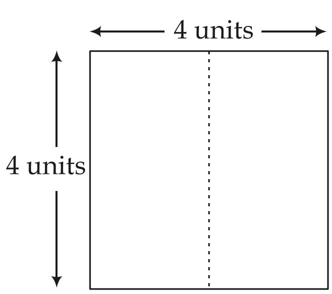
$\frac{1}{2}$ 96 sq. units 48 sq. units

Possible sides of the inside rectangle are (48 1), (24 2), (16 3), (12 4) and (8 6)

The condition is not to touch the outer rectangle so the sides of the rectangle are 8 cm and 6 cm as shown in the figure given below :



8.



We have square shaped paper with sides 4 cm each. Thus the perimeter of the square

4 4 cm 16 cm

and the area of the square

4 cm 4 cm 16 sq. cm

The square is folded and cut to get the rectangles of same dimensions.

Perimeter of the obtained rectangle

2 (2 cm 4 cm) 12 cm

Perimeter of the rectangle together

2 12 cm 24 cm

Area of the obtained rectangle

2 cm 4 cm 8 sq. cm

Area of the rectangles together

2 8 sq. cm 16 sq. cm

(a) The statement is not true as area of one rectangle obtained is smaller than the area of square.

i.e., 8 sq. cm 16 sq. cm

(b) The statement is not true as the perimeter of the square is smaller than the perimeters of both rectangles added together.

i.e., 24 cm 16 cm

(c) The statement is true as the perimeter of the square is 16 cm and the perimeters of two obtained rectangles together is 24 cm.

That is $\frac{3}{2}$ times of the 16.

(d) The statement is not true the area of the square and the areas of two rectangles together is same

i.e., 2 4 2 4 8 8 16 sq. cm

Area of the square 4 cm 4 cm 16 sq. cm.

CHAPTER 7

Fractions

Assignment 7.1

1. A pile (one unit) wheat was divided into 20 equal parts, so the amount of each part of wheat $\frac{1}{20}$

(a) It was shared among 5 poors.

So, $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$

i.e., 5 times of $\frac{1}{20}$ $\frac{5}{20}$ part of the wheat.

(b) It was shared among 11 poors.

So, $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$

$\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$

i.e., 11 times of $\frac{1}{20}$ $\frac{11}{20}$

2. (a) If we fold a paper strip into seven equal parts and then unfold it, each of the seven parts we get will be $\frac{1}{7}$.

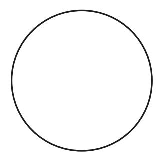
$\frac{1}{7}$						

(b) If we fold it again in the same way and then fold the folded part from the middle and open it, then each part obtained will be $\frac{1}{14}$.

$\frac{1}{14}$													

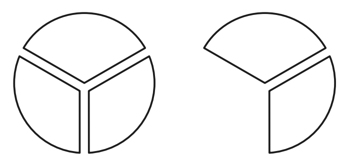
(c) No, we can not get $\frac{1}{21}$, we shall get $\frac{1}{28}$ in this way.

3.



A whole roti represents one units.

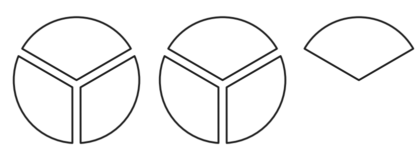
(a)



$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{5}{3}$

One whole roti and two, one third roti.

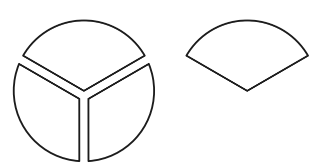
(b)



$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{7}{3}$

2 whole roti and one, one third roti.

(c)

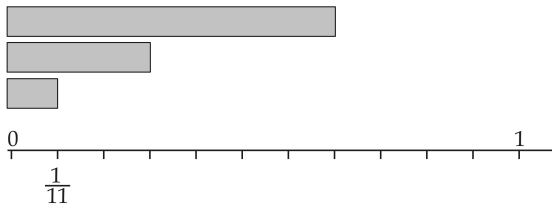


$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{4}{3}$

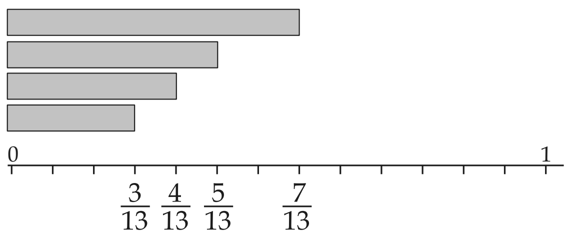
One whole roti and one, one third roti.

4. A. 3; B 1; C 5; D 2; E 4

5.



6. The fractions are $\frac{3}{13}$, $\frac{4}{13}$, $\frac{5}{13}$ and $\frac{7}{13}$.



7. No, all the fractions are a part of a whole unit. So, no fraction can be more than one whole unit.

8. Since smaller line length $\frac{1}{3}$

So, larger line length $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{3}{3}$ 1

Assignment 7.2

1. $\frac{10}{3}$ 10 times of $\frac{1}{3}$

$\frac{10}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

1 1 1 $\frac{1}{3}$ 3 $\frac{1}{3}$

Hence, there are 3 whole units in $\frac{10}{3}$.

$\frac{14}{3}$ 14 times of $\frac{1}{3}$

$\frac{14}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

1 1 1 1 $\frac{2}{3}$ 4 $\frac{2}{3}$

Hence, there are 4 whole units in $\frac{14}{3}$.

2. $\frac{7}{5}$ 7 times of $\frac{1}{5}$

$\frac{7}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

1 $\frac{2}{5}$

Hence, there is one whole unit in $\frac{7}{5}$

$\frac{10}{5}$ 10 times of $\frac{1}{5}$

$\frac{10}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

1 1 2

Hence, there are 2 whole units in $\frac{10}{5}$.

3. (a) $\frac{17}{6}$, since denominator is 6, so numerator 17 is split into as many 6's *i.e.,*

(Numerator 17 6 6 5)

1 1 $\frac{5}{6}$ $2\frac{5}{6}$

Hence, number of whole units in $\frac{17}{6} \quad 2$

(b) $\frac{15}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} (15 \quad 5 \quad 5 \quad 5)$

$1 \quad 1 \quad 1 \quad 3$

Hence, the number of whole units in $\frac{14}{5} \quad 3$

4. (a) $\frac{49}{8} \quad \frac{8}{8} \quad \frac{8}{8} \quad \frac{8}{8} \quad \frac{8}{8} \quad \frac{8}{8} \quad \frac{8}{8} \quad \frac{1}{8}$

$1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{1}{8} \quad 6\frac{1}{8}$

(b) $\frac{37}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{2}{5}$

$1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{2}{5} \quad 7\frac{2}{5}$

(c) $\frac{34}{7} \quad \frac{7}{7} \quad \frac{7}{7} \quad \frac{7}{7} \quad \frac{7}{7} \quad \frac{6}{7}$

$1 \quad 1 \quad 1 \quad 1 \quad \frac{6}{7} \quad 4\frac{6}{7}$

(d) $\frac{23}{11} \quad \frac{11}{11} \quad \frac{11}{11} \quad \frac{1}{11} \quad 1 \quad 1 \quad \frac{1}{11} \quad 2\frac{1}{11}$

(e) $\frac{65}{14} \quad \frac{14}{14} \quad \frac{14}{14} \quad \frac{14}{14} \quad \frac{14}{14} \quad \frac{9}{14}$

$1 \quad 1 \quad 1 \quad 1 \quad \frac{9}{14} \quad 4\frac{9}{14}$

(f) $\frac{71}{20} \quad \frac{20}{20} \quad \frac{20}{20} \quad \frac{20}{20} \quad \frac{11}{20}$

$1 \quad 1 \quad 1 \quad \frac{11}{20} \quad 3\frac{11}{20}$

5. (a) $3\frac{18}{19}$, can be written as $3 \quad \frac{18}{19}$ on splitting 3, we get

$3 \quad \frac{18}{19} \quad 1 \quad 1 \quad 1 \quad \frac{18}{19}$

$\frac{19}{19} \quad \frac{19}{19} \quad \frac{19}{19} \quad \frac{18}{19} \quad \frac{75}{19}$

(b) $5\frac{17}{21}$, can be written as $5 \quad \frac{17}{21}$ on splitting 5, we get

$5 \quad \frac{17}{21} \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{17}{21}$

$\frac{21}{21} \quad \frac{21}{21} \quad \frac{21}{21} \quad \frac{21}{21} \quad \frac{21}{21} \quad \frac{17}{21}$

$\frac{122}{21}$

(c) $3\frac{19}{29}$ can be written as $3 \quad \frac{19}{29}$ on splitting 3, we get

$3 \quad \frac{19}{29} \quad 1 \quad 1 \quad 1 \quad \frac{19}{29}$

$\frac{29}{29} \quad \frac{29}{29} \quad \frac{29}{29} \quad \frac{19}{29} \quad \frac{106}{29}$

(d) $4\frac{23}{24}$ can be written as $4 \quad \frac{23}{24}$ on splitting 4, we get

$4 \quad \frac{23}{24} \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{23}{24}$

$\frac{24}{24} \quad \frac{24}{24} \quad \frac{24}{24} \quad \frac{24}{24} \quad \frac{23}{24}$

$\frac{119}{24}$

(e) $6\frac{47}{48}$ can be written as $6 \quad \frac{47}{48}$ on splitting 6, we get

$6 \quad \frac{47}{48} \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{47}{48}$

$\frac{48}{48} \quad \frac{48}{48} \quad \frac{48}{48} \quad \frac{48}{48} \quad \frac{48}{48} \quad \frac{48}{48} \quad \frac{47}{48} \quad \frac{335}{48}$

(f) $3\frac{19}{20}$ can be written as $3 \quad \frac{19}{20}$ on splitting 3, we get

$3 \quad \frac{19}{20} \quad 1 \quad 1 \quad 1 \quad \frac{19}{20}$

$\frac{20}{20} \quad \frac{20}{20} \quad \frac{20}{20} \quad \frac{19}{20} \quad \frac{79}{20}$

Assignment 7.3

1. No, the fractions $\frac{3}{4}$ and $\frac{4}{5}$ are not equivalent as they have unequal paper strips as shown in the fraction wall.

2. Since $\frac{3}{13} \quad 3 \quad \frac{1}{13}$ and $\frac{21}{91} \quad \frac{7 \quad 3}{7 \quad 13}$.

According to the fraction wall, the length of $\frac{3}{13}$, $\frac{9}{39}$ and $\frac{21}{91}$ are equal. So given fraction are equivalent.

3. (a) $\frac{2}{15} \quad \frac{2 \quad 2}{15 \quad 2} \quad \frac{2 \quad 3}{15 \quad 3} \quad \frac{2 \quad 4}{15 \quad 4}$

Hence, equivalent fraction of $\frac{2}{15}$ are $\frac{4}{30}, \frac{6}{45}, \frac{8}{60}$.

(b) $\frac{3}{17} \quad \frac{3 \quad 2}{17 \quad 2} \quad \frac{3 \quad 3}{17 \quad 3} \quad \frac{3 \quad 4}{17 \quad 4}$

Hence, three equivalent fractions of $\frac{3}{17}$ are $\frac{6}{34}, \frac{9}{51}, \frac{12}{68}$

(c) $\frac{5}{11} \quad \frac{5 \quad 2}{11 \quad 2} \quad \frac{5 \quad 3}{11 \quad 3} \quad \frac{5 \quad 6}{11 \quad 6}$

Hence, three equivalent fractions of $\frac{5}{11}$ are $\frac{10}{22}, \frac{15}{33}, \frac{30}{66}$.

(d) $\frac{7}{8} \quad \frac{7 \quad 2}{8 \quad 2} \quad \frac{7 \quad 5}{8 \quad 5} \quad \frac{7 \quad 7}{8 \quad 7}$

Hence, three equivalent fractions of $\frac{7}{8}$ are $\frac{14}{16}, \frac{35}{40}, \frac{49}{56}$.

4. (a) $\frac{63}{105}$

Both 63 and 105 are the multiples of 3

So, $\frac{63}{105} \quad \frac{63 \quad 3}{105 \quad 3} \quad \frac{21}{35}$

Now, both 21 and 35 are the multiples of 7

So, $\frac{21}{35} \quad \frac{21 \quad 7}{35 \quad 7} \quad \frac{3}{5}$

Now, the numerator and denominator have no common factor other than 1.

Hence, the lowest form of $\frac{63}{105}$ is $\frac{3}{5}$.

(b) $\frac{95}{114}$

Both 95 and 114 are the multiples of 19.

So, $\frac{95}{114} \quad \frac{95 \quad 19}{114 \quad 19} \quad \frac{5}{6}$

Hence, the smallest form of $\frac{95}{114}$ is $\frac{5}{6}$.

(c) $\frac{65}{325}$

Both 65 and 325 are the multiples of 5.

So, $\frac{65}{325} \quad \frac{65 \quad 5}{325 \quad 5} \quad \frac{13}{65}$

Again, both 13 and 65 both are the multiples of 13.

So, $\frac{13}{65} \quad \frac{13 \quad 13}{65 \quad 13} \quad \frac{1}{5}$

Hence, the lowest form of $\frac{65}{325}$ is $\frac{1}{5}$.

(d) $\frac{324}{408}$

Both numerator and denominators are even, so divisible by 2.

$\frac{324}{408} \quad \frac{324 \quad 2}{408 \quad 2} \quad \frac{162}{204}$

Again, 162 and 204 are even, so divisible by 2

$\frac{162}{204} \quad \frac{162 \quad 2}{204 \quad 2} \quad \frac{81}{102}$

Now, 81 and 102 both are the multiples of 3.

So, $\frac{81}{102} \quad \frac{81 \quad 3}{102 \quad 3} \quad \frac{27}{34}$

Now, there is no common factor of 27 and 34 other than 1.

Hence, the lowest form of $\frac{324}{308}$ is $\frac{27}{34}$.

5. (a) $\frac{12}{13}, \frac{25}{26}$

The least common multiple of 13 and 26 is 26.

$\frac{12}{13} \quad \frac{12 \quad 2}{13 \quad 2} \quad \frac{24}{26}$ and $\frac{25}{26} \quad \frac{25}{26}$

Since, $\frac{25}{26} \quad \frac{24}{26}$

Hence, $\frac{25}{26} \quad \frac{12}{13}$

(b) $\frac{8}{9}, \frac{25}{27}$

The least common multiple of 9 and 27 is 27.

So, $\frac{8}{9} \quad \frac{8 \quad 3}{9 \quad 3} \quad \frac{24}{27}$ and $\frac{25}{27} \quad \frac{25}{27}$

Since, $\frac{25}{27} \quad \frac{24}{27}$

Hence, $\frac{25}{27} \quad \frac{8}{9}$

(c) $\frac{100}{121}, \frac{10}{11}$

The least common multiple of 121 and 11 is 121.

$\frac{100}{121} \quad \frac{100}{121}$ and $\frac{10}{11} \quad \frac{10 \quad 11}{11 \quad 11} \quad \frac{110}{121}$

Since, $\frac{110}{121} \quad \frac{100}{121}$

Hence, $\frac{10}{11} \quad \frac{100}{121}$

(d) $\frac{21}{69}, \frac{39}{46}$

The least common multiple of 69 and 46 is 138.

So, $\frac{21}{69} \quad \frac{21 \quad 2}{69 \quad 2} \quad \frac{42}{138}$

and $\frac{39}{46} \quad \frac{39 \quad 3}{46 \quad 3} \quad \frac{117}{138}$

Since, $\frac{117}{138} \quad \frac{42}{138}$

Hence, $\frac{39}{46} \quad \frac{21}{69}$

(e) $\frac{17}{70}, \frac{23}{84}$

The least common multiple of 84 and 70 is 420.

So, $\frac{17}{70} \quad \frac{17 \quad 6}{70 \quad 6} \quad \frac{102}{420}$

and $\frac{23}{84} \quad \frac{23 \quad 5}{84 \quad 5} \quad \frac{115}{420}$

Since, $\frac{115}{420} \quad \frac{102}{120}$

Hence, $\frac{23}{84} \quad \frac{17}{70}$

(f) $\frac{13}{120}, \frac{17}{150}$

The least common multiple of 120 and 150 is 600.

So, $\frac{13}{120} \quad \frac{13 \quad 5}{120 \quad 5} \quad \frac{65}{600}$

and $\frac{17}{150} \quad \frac{17 \quad 4}{150 \quad 4} \quad \frac{68}{600}$

Since, $\frac{68}{600} \quad \frac{65}{600}$

Hence, $\frac{17}{150} \quad \frac{13}{120}$

6. (a) $\frac{1}{2}, \frac{5}{17}, \frac{21}{34}, \frac{1}{4}$

The least common factor of 2, 17, 34, 4 is 68.

So, $\frac{1}{2} \quad \frac{1 \quad 34}{2 \quad 34} \quad \frac{34}{68}$

$\frac{5}{17} \quad \frac{5 \quad 4}{17 \quad 4} \quad \frac{20}{68}$

$\frac{21}{34} \quad \frac{21 \quad 2}{34 \quad 2} \quad \frac{42}{68}$

$\frac{1}{4} \quad \frac{1 \quad 17}{4 \quad 17} \quad \frac{17}{68}$

Clearly, $\frac{17}{68} \quad \frac{20}{68} \quad \frac{34}{68} \quad \frac{42}{68}$

Hence, $\frac{1}{4} \quad \frac{5}{17} \quad \frac{1}{2} \quad \frac{21}{34}$

(b) $\frac{8}{15}, \frac{7}{13}, \frac{3}{5}, \frac{1}{3}$

The least common factor of 15, 13, 5 and 3 is 195.

So, $\frac{8}{15} \quad \frac{8 \quad 13}{15 \quad 13} \quad \frac{104}{195}$

$\frac{7}{13} \quad \frac{7 \quad 15}{13 \quad 15} \quad \frac{105}{195}$

$\frac{3}{5} \quad \frac{3 \quad 39}{5 \quad 39} \quad \frac{117}{195}$

$\frac{1}{3} \quad \frac{1 \quad 65}{3 \quad 65} \quad \frac{65}{195}$

Clearly, $\frac{65}{195} \quad \frac{104}{195} \quad \frac{105}{195} \quad \frac{117}{195}$

Hence, $\frac{1}{3} \quad \frac{8}{15} \quad \frac{7}{13} \quad \frac{3}{5}$

7. (a) $\frac{3}{4}, \frac{21}{32}, \frac{11}{16}, \frac{5}{8}$

The least common factor of 4, 32, 16 and 8 is 32.

So, $\frac{3}{4} \quad \frac{3 \quad 8}{4 \quad 8} \quad \frac{24}{32}$

$\frac{21}{32} \quad \frac{21}{32}$

$\frac{11}{16} \quad \frac{11 \quad 2}{16 \quad 2} \quad \frac{22}{32}$

and $\frac{5}{8} \quad \frac{5 \quad 4}{8 \quad 4} \quad \frac{20}{32}$

Clearly, $\frac{24}{32} \quad \frac{22}{32} \quad \frac{21}{32} \quad \frac{20}{32}$

Hence, $\frac{3}{4} \quad \frac{11}{16} \quad \frac{21}{32} \quad \frac{5}{8}$

(b) $\frac{11}{15}, \frac{3}{5}, \frac{23}{30}, \frac{2}{3}$

The least common multiple of 15, 5, 30 and 3 is 30.

So, $\frac{11}{15} \quad \frac{11 \quad 2}{15 \quad 2} \quad \frac{22}{30}$

$\frac{3}{5} \quad \frac{3 \quad 6}{5 \quad 6} \quad \frac{18}{30}$

$\frac{23}{30} \quad \frac{23}{30}$

$\frac{2}{3} \quad \frac{2 \quad 10}{3 \quad 10} \quad \frac{20}{30}$

Clearly, $\frac{23}{30} \quad \frac{22}{30} \quad \frac{20}{30} \quad \frac{18}{30}$

Hence, $\frac{23}{30} \quad \frac{11}{15} \quad \frac{2}{3} \quad \frac{3}{5}$

8. Firstly we make the denominators of all the given fraction pairs equal and then we will compare them

(a) $\frac{7}{8} \ldots\ldots \frac{8}{7} \qquad \frac{7}{8} \quad \frac{7 \quad 7}{8 \quad 7} \quad \frac{49}{56}$

and $\frac{8}{7} \quad \frac{8 \quad 8}{7 \quad 8} \quad \frac{64}{56}$

Hence, $\frac{7}{8} \quad \frac{8}{7}$

(b) $\frac{4}{7} \ldots \frac{5}{7}$ $\qquad \frac{4}{7} \quad \frac{5}{7}$

(c) $\frac{9}{11} \ldots \frac{17}{20}$

$\frac{9}{11} \quad \frac{9 \quad 20}{11 \quad 20} \quad \frac{180}{220}$

$\frac{17}{20} \quad \frac{17 \quad 11}{20 \quad 11} \quad \frac{187}{220}$

Hence, $\frac{9}{11} \quad \frac{17}{20}$

(d) $\frac{8}{9} \ldots \frac{64}{72}$

$\frac{8}{9} \quad \frac{8 \quad 8}{9 \quad 8} \quad \frac{64}{72}$

Hence, $\frac{8}{9} \quad \frac{64}{72}$

(e) $\frac{5}{6} \ldots \frac{7}{8}$

$\frac{5}{6} \quad \frac{5 \quad 4}{6 \quad 4} \quad \frac{20}{24}$

$\frac{7}{8} \quad \frac{7 \quad 3}{8 \quad 3} \quad \frac{21}{24}$

Hence, $\frac{5}{6} \quad \frac{7}{8}$

(f) $\frac{5}{12} \ldots \frac{6}{11}$

$\frac{5}{12} \quad \frac{5 \quad 11}{12 \quad 11} \quad \frac{55}{132}$

$\frac{6}{11} \quad \frac{6 \quad 12}{11 \quad 12} \quad \frac{72}{132}$

Hence, $\frac{5}{12} \quad \frac{6}{11}$

Assignment 7.4

1. (a) $\frac{5}{8} \quad \frac{3}{4} \quad \frac{4}{5}$

The LCM of 8, 4, 5 is 40.

Expressing as equivalent equations with denominator 40, we get

$\frac{5}{8} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{5 \quad 5}{8 \quad 5} \quad \frac{3 \quad 10}{4 \quad 10} \quad \frac{4 \quad 8}{5 \quad 8}$

$\frac{25}{40} \quad \frac{30}{40} \quad \frac{32}{40}$

$\frac{25 \quad 30 \quad 32}{40} \quad \frac{87}{40}$

$\frac{87}{40} \quad 2 \quad \frac{40}{40} \quad \frac{7}{40} \quad 2 \quad \frac{7}{40} \quad 2\frac{7}{40}$

(b) $\frac{7}{10} \quad \frac{8}{9} \quad \frac{5}{6}$

LCM of 10, 9 and 6 is 90.

Expressing as equivalent fractions with denominator 90, we get

$\frac{7}{10} \quad \frac{8}{9} \quad \frac{5}{6} \quad \frac{7 \quad 9}{10 \quad 9} \quad \frac{8 \quad 10}{9 \quad 10} \quad \frac{5 \quad 15}{6 \quad 15}$

$\frac{63}{90} \quad \frac{80}{90} \quad \frac{75}{90}$

$\frac{63 \quad 80 \quad 75}{90} \quad \frac{218}{90}$

$\frac{218}{90} \quad \frac{109}{45}$ (The lowest form)

$2 \quad \frac{45}{45} \quad \frac{19}{45} \quad 2 \quad \frac{19}{45} \quad 2\frac{19}{45}$

(c) $\frac{10}{21} \quad \frac{3}{7} \quad \frac{1}{3}$

LCM of 21, 7 and 3 is 21. Now expressing as equivalent fraction with denominator 21, we get

$\frac{10}{21} \quad \frac{3}{7} \quad \frac{1}{3} \quad \frac{10}{21} \quad \frac{3 \quad 3}{7 \quad 3} \quad \frac{1 \quad 7}{3 \quad 7}$

$\frac{10}{21} \quad \frac{9}{21} \quad \frac{7}{21}$

$\frac{10 \quad 9 \quad 7}{21} \quad \frac{26}{21}$

$\frac{24}{21} \quad \frac{5}{21} \quad 1 \quad \frac{5}{21} \quad 1\frac{5}{21}$

(d) $\frac{5}{11}\quad\frac{3}{4}\quad\frac{19}{22}$

The denominator of 11, 4 and 22 is 88. Expressing as equivalent fractions with denominator 88, we get

$$\frac{5}{11}\quad\frac{3}{4}\quad\frac{19}{22}\quad\frac{5\quad 8}{11\quad 8}\quad\frac{3\quad 22}{4\quad 22}\quad\frac{19\quad 4}{22\quad 4}$$

$$\frac{40}{88}\quad\frac{66}{88}\quad\frac{76}{88}$$

$$\frac{40\quad 66\quad 76}{88}\quad\frac{182}{88}$$

$$\frac{182}{88}\quad\frac{91}{44}\ \text{(The lowest form)}$$

$$\frac{91}{44}\quad 2\quad\frac{44}{44}\quad\frac{3}{44}\quad 2\quad\frac{3}{44}\quad 2\frac{3}{44}$$

(e) $\frac{13}{14}\quad\frac{19}{21}\quad\frac{2}{3}$

The LCM of 14, 21 and 3 is 42.

Expressing as equivalent fraction with denominator 42, we get

$$\frac{13}{14}\quad\frac{19}{21}\quad\frac{2}{3}\quad\frac{13\quad 3}{14\quad 3}\quad\frac{19\quad 2}{21\quad 2}\quad\frac{2\quad 14}{3\quad 14}$$

$$\frac{39}{42}\quad\frac{38}{42}\quad\frac{28}{42}$$

$$\frac{39\quad 38\quad 28}{42}\quad\frac{105}{42}$$

$$\frac{105}{42}\quad\frac{5}{2}\ \text{(The simplest form)}$$

$$\frac{5}{2}\quad 2\quad\frac{2}{2}\quad\frac{1}{2}\quad 2\quad\frac{1}{2}\quad 2\frac{1}{2}$$

(f) $\frac{7}{13}\quad\frac{2}{3}\quad\frac{1}{2}$

The LCM of 13, 3 and 2 is 78.

Expressing as equivalent fraction with denominator 78, we get

$$\frac{7}{13}\quad\frac{2}{3}\quad\frac{1}{2}\quad\frac{7\quad 6}{13\quad 6}\quad\frac{2\quad 26}{3\quad 26}\quad\frac{1\quad 39}{2\quad 39}$$

$$\frac{42}{78}\quad\frac{52}{78}\quad\frac{39}{78}$$

$$\frac{42\quad 52\quad 39}{78}\quad\frac{133}{78}$$

$$\frac{133}{78}\quad\frac{78}{78}\quad\frac{55}{78}\quad 1\quad\frac{55}{78}\quad 1\frac{55}{78}$$

(g) $\frac{7}{9}\quad\frac{17}{18}\quad\frac{26}{27}$

The LCM of 9, 18 and 27 is 54.

Expressing as equivalent fractions with denominator 54, we get

$$\frac{7}{9}\quad\frac{17}{18}\quad\frac{26}{27}\quad\frac{7\quad 6}{9\quad 6}\quad\frac{17\quad 3}{18\quad 3}\quad\frac{26\quad 2}{27\quad 2}$$

$$\frac{42}{54}\quad\frac{51}{54}\quad\frac{52}{54}$$

$$\frac{42\quad 51\quad 52}{54}\quad\frac{145}{54}$$

$$\frac{145}{54}\quad 2\quad\frac{54}{54}\quad\frac{37}{54}\quad 2\quad\frac{37}{54}\quad 2\frac{37}{54}$$

(h) $\frac{3}{4}\quad\frac{1}{5}\quad\frac{8}{15}$

The LCM of 4, 5 and 15 is 60. Expressing as equivalent fraction with denominator 60, we get

$$\frac{3}{4}\quad\frac{1}{5}\quad\frac{8}{15}\quad\frac{3\quad 15}{4\quad 15}\quad\frac{1\quad 12}{5\quad 12}\quad\frac{8\quad 4}{15\quad 4}$$

$$\frac{45}{60}\quad\frac{12}{60}\quad\frac{32}{60}$$

$$\frac{45\quad 12\quad 32}{60}\quad\frac{89}{60}$$

$$\frac{89}{60}\quad\frac{60}{60}\quad\frac{29}{60}\quad 1\quad\frac{29}{60}\quad 1\frac{29}{60}$$

(i) $\frac{8}{17}\quad\frac{2}{3}\quad\frac{27}{51}$

The LCM of 17, 3 and 51 is 51. Expressing as equivalent fraction with denominator 51, we get

$$\frac{8}{17} \quad \frac{2}{3} \quad \frac{27}{51} \quad \frac{8 \quad 3}{17 \quad 3} \quad \frac{2 \quad 17}{3 \quad 17} \quad \frac{27}{51}$$

$$\frac{24}{51} \quad \frac{34}{51} \quad \frac{27}{51}$$

$$\frac{24 \quad 34 \quad 27}{51} \quad \frac{85}{51}$$

$$\frac{51}{51} \quad \frac{34}{51} \quad 1 \quad \frac{34}{51} \quad 1\frac{34}{51}$$

2. Jack ate $\frac{3}{5}$ pie and Sara ate $\frac{2}{7}$ pie

They both ate altogether

$$\frac{3}{5} \quad \frac{2}{7} \text{ of pie}$$

The LCM of 5 and 7 is 35.

Expressing as equivalent fraction with denominator 35, we get

$$\frac{3}{5} \quad \frac{2}{7} \quad \frac{3 \quad 7}{5 \quad 7} \quad \frac{2 \quad 5}{7 \quad 5}$$

$$\frac{21}{35} \quad \frac{10}{35} \quad \frac{31}{35}$$

Hence, Jack and Sara ate altogether $\frac{31}{35}$ of the pie.

3. First man distributed 7 chapatis, second man distributed 9 chapatis and third man distributed 10 chapatis.

Number of beggers to whom chapati were given 5

The chapatis were equally distributed so each of the begger got $\frac{7}{5} \quad \frac{9}{5} \quad \frac{10}{5}$ of chapatis.

Since, the numerators of three fractions is same, $\frac{7 \quad 9 \quad 10}{5} \quad \frac{26}{5}$

$$\frac{26}{5} \quad 5 \quad \frac{5}{5} \quad \frac{1}{5} \quad 5 \quad \frac{1}{5} \quad 5\frac{1}{5}$$

Hence, each begger got $5\frac{1}{5}$ chapatis.

4. He gave his wife $\frac{1}{3}$ of property

He gave his son $\frac{1}{2}$ of property

He gave his daughter $\frac{1}{3}$ of property

He gave in total $\frac{1}{3} \quad \frac{1}{2} \quad \frac{1}{3}$

$$\frac{2}{6} \quad \frac{3}{6} \quad \frac{2}{6} \quad \frac{2 \quad 3 \quad 2}{6} \quad \frac{7}{6}$$

$$\frac{7}{6} \quad \frac{6}{6} \quad \frac{1}{6} \quad 1 \quad \frac{1}{6}$$

But $1\frac{1}{6}$ is more than his property.

Hence, it is not possible.

5. (a) $\frac{9}{13} \quad \frac{7}{13}$

Since, the denominator of given fractions is the same *i.e.*, 13, so the numerators will be substracted and the denominator will be kept same.

$$\frac{9}{13} \quad \frac{7}{13} \quad \frac{9 \quad 7}{13} \quad \frac{2}{13}$$

(b) $\frac{29}{69} \quad \frac{10}{69}$

As the denominator is the same *i.e.,* 69, so we will simply subtract the numerators, keeping denominator the same

$$\frac{29}{69} \quad \frac{10}{69} \quad \frac{29 \quad 10}{69} \quad \frac{19}{69}$$

(c) $\frac{53}{100} \quad \frac{33}{100}$

As the denominator is the same *i.e.,* 100, so we will simply subtract the numerators, keeping denominator the same.

$$\frac{53}{100} \quad \frac{33}{100} \quad \frac{53 \quad 33}{100} \quad \frac{20}{100} \quad \frac{1}{5}$$

(The smallest form)

6. (a) $\frac{7}{9}$ from $\frac{32}{39}$

The LCM of 39 and 9 is 117.

So, expressing as equivalent fractions with denominator 117, we get

$$\frac{32}{39} \quad \frac{7}{9} \quad \frac{32 \quad 3}{39 \quad 3} \quad \frac{7 \quad 13}{9 \quad 13}$$

$$\frac{96}{117} \quad \frac{91}{117} \quad \frac{96 \quad 91}{117} \quad \frac{5}{117}$$

(b) $\frac{5}{8}$ from $\frac{47}{60}$

The LCM of 8 and 60 is 120.

So, expressing as equivalent fractions with denominator 120, we get

$$\frac{47}{60} \quad \frac{5}{8} \quad \frac{47 \quad 2}{60 \quad 2} \quad \frac{5 \quad 15}{8 \quad 15} \quad \frac{94}{120} \quad \frac{75}{120}$$

$$\frac{94 \quad 75}{120} \quad \frac{19}{120}$$

(c) $\frac{5}{6}$ from $\frac{8}{9}$

The LCM of 9 and 6 is 18.

So, expressing equivalent fractions with denominator 18, we get

$$\frac{8}{9} \quad \frac{5}{6} \quad \frac{8 \quad 2}{9 \quad 2} \quad \frac{5 \quad 3}{6 \quad 3} \quad \frac{16}{18} \quad \frac{15}{18}$$

$$\frac{16 \quad 15}{18} \quad \frac{1}{18}$$

7. (a) $\frac{25}{46} \quad \frac{59}{115}$

The LCM of 46 and 115 is 230.

So expressing as equivalent fractions with denominator 230, we get

$$\frac{25}{46} \quad \frac{59}{115} \quad \frac{25 \quad 5}{46 \quad 5} \quad \frac{59 \quad 2}{115 \quad 2}$$

$$\frac{125}{230} \quad \frac{118}{230} \quad \frac{7}{230}$$

(b) $\frac{9}{8} \quad \frac{14}{13}$

The LCM of 8 and 13 is 104.

So, expressing as equivalent fractions with denominator 104, we get

$$\frac{9}{8} \quad \frac{14}{13} \quad \frac{9 \quad 13}{8 \quad 13} \quad \frac{14 \quad 8}{13 \quad 8}$$

$$\frac{117}{104} \quad \frac{112}{104} \quad \frac{5}{104}$$

(c) $\frac{20}{7} \quad \frac{24}{11}$

The LCM of 7 and 11 is 77.

So, expressing as equivalent fractions with denominator 77, we get

$$\frac{20}{7} \quad \frac{24}{11} \quad \frac{20 \quad 11}{7 \quad 11} \quad \frac{24 \quad 7}{11 \quad 7}$$

$$\frac{220}{77} \quad \frac{168}{77}$$

$$\frac{220 \quad 168}{77} \quad \frac{52}{77}$$

8. Let x should be added to $\frac{31}{47}$ to get $\frac{3}{4}$

So, $\frac{31}{47} \quad x \quad \frac{3}{4}$

$x \quad \frac{3}{4} \quad \frac{31}{47}$

The LCM of 4 and 47 is 188.

So, expressing as equivalent fractions with denominator 188, we get

$$\frac{3}{4} \quad \frac{31}{47} \quad \frac{3 \quad 47}{4 \quad 47} \quad \frac{31 \quad 4}{47 \quad 4} \quad \frac{141}{188} \quad \frac{124}{188}$$

$$\frac{141 \quad 124}{188} \quad \frac{17}{188}$$

9. Length of cloth given to tailor $\frac{12}{17}$ m

Length of cloth used $\frac{1}{5}$ m

Length of cloth unused $\frac{12}{17} \quad \frac{1}{5}$ m

The LCM of 17 and 5 is 85.

So, expressing as equivalent fractions with denominator 85, we get

$$\frac{12}{17} \quad \frac{1}{5} \quad \frac{12 \quad 5}{17 \quad 5} \quad \frac{1 \quad 17}{5 \quad 17} \quad \frac{60}{85} \quad \frac{17}{85}$$

$$\frac{60 \quad 17}{85} \quad \frac{43}{85}$$

Hence, the length of the cloth unused is $\frac{43}{85}$ meter.

10. Total length of wire 10 m or $\frac{10}{1}$ m

Length of wire cutoff $\frac{7}{2}$ m

Length of wire left $\frac{10}{1}$ m $\frac{7}{2}$ m

$$\frac{10 \quad 2}{2 \quad 1} \quad \frac{7}{2} \quad \frac{20}{2} \quad \frac{7}{2} \quad \frac{13}{2} \text{ m}$$

$$\frac{13}{2} \text{ m} \quad 6 \quad \frac{2}{2} \quad \frac{1}{2} \quad 6 \quad \frac{1}{2} \quad 6\frac{1}{2}$$

Hence, the length of wire left is $6\frac{1}{2}$ m.

11. The fraction of girls students $\frac{1}{2}$

The fraction of girls students in lower classes

$$\frac{3}{5} \text{ of } \frac{1}{2} \quad \frac{3}{5} \quad \frac{1}{2} \quad \frac{3}{10}$$

Fraction of girls students in upper classes

Total fraction of girls in the School

Fraction of girls in lower classes

$$\frac{1}{2} \quad \frac{3}{10} \quad \frac{1 \quad 5}{2 \quad 5} \quad \frac{3}{10}$$

$$\frac{5}{10} \quad \frac{3}{10} \quad \frac{5 \quad 3}{10} \quad \frac{2}{10} \quad \frac{1}{5}$$

(The lowest form)

Hence, the fraction of the girls studying in upper classes are $\frac{1}{5}$.

12. Let his property be 1

His son got one-half $\frac{1}{2}$

His wife got one-third $\frac{1}{3}$

His daughter got one-seventh $\frac{1}{7}$

He divided his property in total

$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{7}$$

The LCM of 2, 3 and 7 is 42.

So, expressing as equivalent fraction with the denominator 42, we get

$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{7} \quad \frac{1 \quad 21}{2 \quad 21} \quad \frac{1 \quad 14}{3 \quad 14} \quad \frac{1 \quad 6}{7 \quad 6}$$

$$\frac{21}{42} \quad \frac{14}{42} \quad \frac{6}{42}$$

$$\frac{21 \quad 14 \quad 6}{42} \quad \frac{41}{42}$$

Remaining property Total property

Property divided

$$1 \quad \frac{41}{42} \quad \frac{42}{42} \quad \frac{41}{42}$$

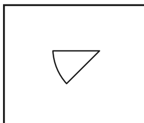
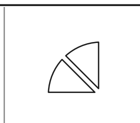
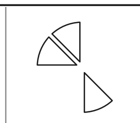
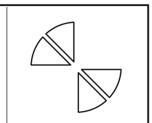
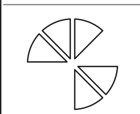
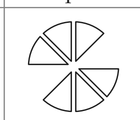
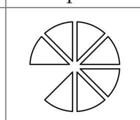
$$\frac{42 \quad 41}{42} \quad \frac{1}{42}$$

Hence, the property left with man is $\frac{1}{42}$.

TEXTBOOK EXERCISES

Exercise 7.1

1.

			
$\frac{1}{4}$ 1 time one-quarter	$\frac{1}{4}$ $\frac{1}{4}$ 2 times one-quarter	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ 3 times one-quarter	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ 4 times one-quarter
			
$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ 5 times one-quarter	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ 6 times one- quarter	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ 7 times one-quarter	

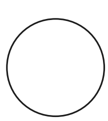
2.

$\frac{1}{3}$		

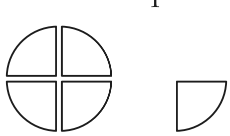
Yes, using $\frac{1}{3}$, we can make $\frac{1}{6}$.

On dividing $\frac{1}{3}$ into two equal parts we get $\frac{1}{6}$.

$\frac{1}{6}$					

3. 

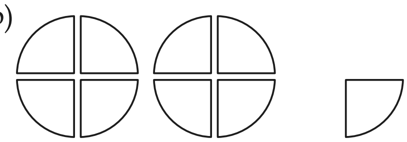
A whole rot represents one unit.

(a) 

5 times of $\frac{1}{4}$ of a whole roti

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{5}{4}$

One whole role and a quarter roti.

(b) 

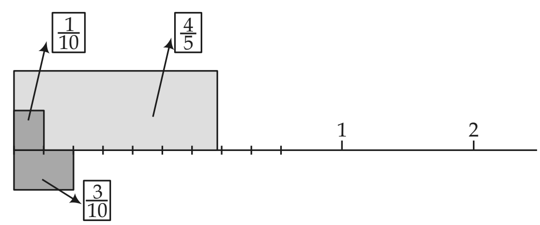
9 times of $\frac{1}{4}$ of a whole roti

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{9}{4}$

2 whole roti and one quarter roti.

4. A 3; B 4; C 1; D 2

5.



6. The fractions are

$$\frac{1}{11}, \frac{3}{11}, \frac{5}{11}, \frac{7}{11} \text{ and } \frac{10}{11}.$$

7. There are an infinite number of fractions lie between 0 and 1.

For example :

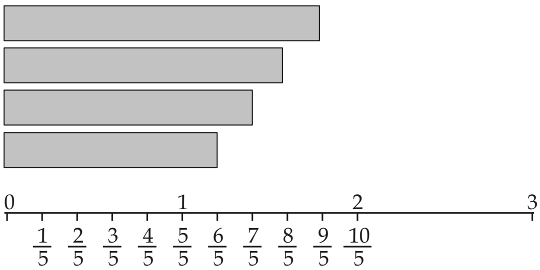
$$\ldots, \frac{1}{1000}, \frac{1}{999}, \frac{1}{998}, \ldots, \text{etc.}$$

8. Length of unshaded strip $\frac{1}{2}$

Length of shaded strip $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

Fraction that gives length of shaded strip $\frac{3}{2}$.

9.



Exercise 7.2

1. Here, $\frac{7}{2}$ 7 times of $\frac{1}{2}$

$$\frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2}$$

$$\frac{1}{2} \quad \frac{1}{2} \qquad \frac{1}{2} \quad \frac{1}{2} \qquad \frac{1}{2} \quad \frac{1}{2} \qquad \frac{1}{2}$$

$$\frac{2}{2} \quad \frac{2}{2} \quad \frac{2}{2} \quad \frac{1}{2} \quad 1 \quad 1 \quad 1 \quad \frac{1}{2}$$

$$3 \quad \frac{1}{2}$$

Hence, there are 3 whole units in $\frac{7}{2}$.

2. Here, $\frac{4}{3}$ 4 times of $\frac{1}{3}$

$$\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3}$$

$$\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \qquad \frac{1}{3} \quad 1 \quad \frac{1}{3}$$

Hence, there is one whole unit in $\frac{4}{3}$.

$$\frac{7}{3} \quad 7 \text{ times of } \frac{1}{3}$$

$$\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3}$$

$$\frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \qquad \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3} \qquad \frac{1}{3}$$

$$1 \quad 1 \quad \frac{1}{3} \quad 2 \quad \frac{1}{3}$$

Hence, there are 2 whole units in $\frac{7}{3}$.

3. (a) $\frac{8}{3}$, since, denominator is 3, so numerator 8 is split into as many 3's (*i.e.*, numerator 8 3 3 2)

$$1 \quad 1 \quad \frac{2}{3} \quad 2\frac{2}{3}$$

Hence, number of whole units in $\frac{8}{3}$ 2.

(b) $\frac{11}{5}$ $\frac{5}{5}$ $\frac{5}{5}$ $\frac{1}{5}$

(Numerator 11 5 5 1)

$$1 \quad 1 \quad \frac{1}{5} \quad 2\frac{1}{5}$$

Hence, number of whole units in $\frac{11}{5}$ 2

(c) $\frac{9}{4}$ $\frac{4}{4}$ $\frac{4}{4}$ $\frac{1}{4}$

(Numerator 9 4 4 1)

$$1 \quad 1 \quad \frac{1}{4} \quad 2\frac{1}{4}$$

Hence, number of whole units in $\frac{9}{4}$ 2

4. Yes, all fractions greater than 1 can be written as mixed fractions/numbers.

5. (a) $\frac{9}{2}$ $\frac{2}{2}$ $\frac{2}{2}$ $\frac{2}{2}$ $\frac{2}{2}$ $\frac{1}{2}$

$$1 \quad 1 \quad 1 \quad 1 \quad \frac{1}{2} \quad 4\frac{1}{2}$$

(b) $\frac{9}{5}$ $\frac{5}{5}$ $\frac{4}{5}$ 1 $\frac{4}{5}$ $1\frac{4}{5}$

(c) $\frac{21}{19}$ $\frac{19}{19}$ $\frac{2}{19}$ 1 $\frac{2}{19}$ $1\frac{2}{19}$

(d) $\frac{47}{9}$ $\frac{9}{9}$ $\frac{9}{9}$ $\frac{9}{9}$ $\frac{9}{9}$ $\frac{9}{9}$ $\frac{2}{9}$

$$1 \quad 1 \quad 1 \quad 1 \quad 1 \quad \frac{2}{9} \quad 5\frac{2}{9}$$

(e) $\frac{12}{11}$ $\frac{11}{11}$ $\frac{1}{11}$ 1 $\frac{1}{11}$ $1\frac{1}{11}$

(f) $\frac{19}{6}\quad \frac{6}{6}\quad \frac{6}{6}\quad \frac{6}{6}\quad \frac{1}{6}$

$1\quad 1\quad 1\quad \frac{1}{6}\quad 3\frac{1}{6}$

6. (a) $3\frac{1}{4}$ can be written as $3\quad \frac{1}{4}$ on splitting 3, we get

$3\quad \frac{1}{4}\quad 1\quad 1\quad 1\quad \frac{1}{4}\quad \frac{4}{4}\quad \frac{4}{4}\quad \frac{4}{4}\quad \frac{1}{4}\quad \frac{13}{4}$

(b) $7\frac{2}{3}$ can be written as $7\quad \frac{2}{3}$ on splitting 7, we get

$7\quad \frac{2}{3}\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad \frac{2}{3}$

$\frac{3}{3}\quad \frac{3}{3}\quad \frac{3}{3}\quad \frac{3}{3}\quad \frac{3}{3}\quad \frac{3}{3}\quad \frac{3}{3}\quad \frac{2}{3}\quad \frac{23}{3}$

(c) $9\frac{4}{9}$ can be written as $9\quad \frac{4}{9}$ on splitting 9, we get

$9\quad \frac{4}{9}\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad 1\quad \frac{4}{9}$

$\frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{9}{9}\quad \frac{4}{9}$

$\frac{85}{9}$

(d) $3\frac{1}{5}$ can be written as $3\quad \frac{1}{5}$ on splitting 3, we get

$3\quad \frac{1}{5}\quad 1\quad 1\quad 1\quad \frac{1}{5}\quad \frac{5}{5}\quad \frac{5}{5}\quad \frac{5}{5}\quad \frac{1}{5}\quad \frac{16}{5}$

(e) $2\frac{3}{11}$ can be written as $2\quad \frac{3}{11}$ on splitting 2, we get

$2\quad \frac{3}{11}\quad 1\quad 1\quad \frac{3}{11}\quad \frac{11}{11}\quad \frac{11}{11}\quad \frac{3}{11}\quad \frac{25}{11}$

(f) $3\frac{9}{10}$, can be written as $3\quad \frac{9}{10}$ on splitting 3, we get

$3\quad \frac{9}{10}\quad 1\quad 1\quad 1\quad \frac{9}{10}$

$\frac{10}{10}\quad \frac{10}{10}\quad \frac{10}{10}\quad \frac{9}{10}\quad \frac{39}{10}$

Exercise 7.3

1. Since, lengths of strips $\frac{3}{6}, \frac{4}{8}$ and $\frac{5}{10}$ are equal as shown in the fractional wall.

So, $\frac{3}{6}, \frac{4}{8}$ and $\frac{5}{10}$ are equivalent.

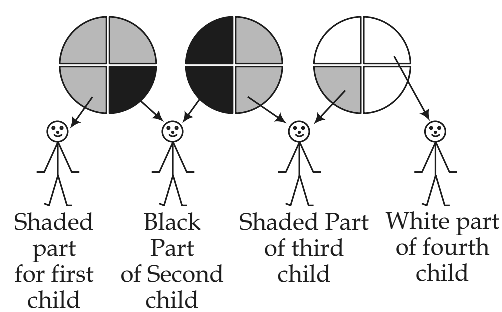
2. The equivalent fraction of $\frac{2}{6}$ are

$\frac{2}{6}\quad \frac{2}{2}\quad \frac{4}{12}$ and $\frac{2\quad 3}{6\quad 3}\quad \frac{6}{18}$

3. $\frac{4}{6}\quad \frac{2}{3}\quad \frac{6}{9}\quad \frac{8}{12}\quad \frac{10}{15}\quad \frac{12}{18}$

$\frac{14}{21}\quad \frac{16}{24}\quad \frac{18}{27}\ldots$

4.



The division facts.

3 whole papads divided into 4 parts

$3\quad 4\quad \frac{3}{4}$

The addition facts.

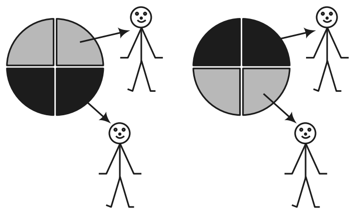
Four times of $\frac{3}{4}$ added gives 3 whole papad

$\frac{3}{4}\quad \frac{3}{4}\quad \frac{3}{4}\quad \frac{3}{4}\quad \frac{12}{4}\quad 3$

The multiplication facts.

4 parts of $\frac{3}{4}$ make 3 whole papad

$$4 \quad \frac{3}{4} \quad 3$$

5. 

Since, two papads of equal size, shape and mass. These papads are to be shared by 4 children. So, each of the children get one half of one papad.

Division facts

2 whole papads are divided into 4 parts

$$2 \quad 4 \quad \frac{2}{4} \quad \frac{1}{2}$$

Addition facts

$\frac{2}{4} \quad \frac{2}{4} \quad \frac{2}{4} \quad \frac{2}{4} \quad \frac{8}{4}$ 2 whole papads.

Multiplication facts 4 $\frac{2}{4}$ 2 whole papads.

6. Each child in Group I gets $\frac{4}{7}$ glasses of orange juice and each child in group II gets $\frac{5}{7}$ glasses.

Since, the fractions $\frac{4}{7}$ and $\frac{5}{7}$ have same denominator, so $\frac{4}{7} \quad \frac{5}{7}$

Hence, each child in group II got more orange juice.

> Clearly, if the denominators of two or more fractions are the same, then the fraction whose numerator is larger is also larger.

7. (a) $\frac{7}{2}$ and $\frac{3}{5}$

The denominators of given fractions are 2 and 5 and their least common multiple is 10.

Therefore both the fractions must have the denominator 10.

Now, for $\frac{7}{2}$, multiply numerator and denominator by 5

$$\frac{7}{2} \quad \frac{7 \quad 5}{2 \quad 5} \quad \frac{35}{10}$$

and for $\frac{3}{5}$, multiply the numerator and the denominator by 2, we get

$$\frac{3}{5} \quad \frac{3 \quad 2}{5 \quad 2} \quad \frac{6}{10}$$

Hence, the equivalent fractions with the same denominator are $\frac{35}{10}$ and $\frac{6}{10}$.

(b) $\frac{8}{3}$ and $\frac{5}{6}$, the denominators of given fractions are 3 and 6.

The least common multiple of 3 and 6 is 6. Now, for $\frac{8}{3}$ multiply both the numerator and denominator by 2

$$\frac{8}{3} \quad \frac{8 \quad 2}{3 \quad 2} \quad \frac{16}{6}$$

And $\frac{5}{6}$ already has a denominator 6.

Hence, the equivalent fractions with the same denominators are $\frac{16}{6}$ and $\frac{5}{6}$.

(c) $\frac{3}{4}$ and $\frac{3}{5}$

Here, the denominators of given fractions are 4 and 5.

And the least common multiple of 4 and 5 is 20.

Now, for $\frac{3}{4}$, multiply both numerator and denominator by 5, we get

$$\frac{3}{4} \quad \frac{3 \quad 5}{4 \quad 5} \quad \frac{15}{20}$$

and for $\frac{3}{5}$, multiply both numerator and denominator by 4, we get

$$\frac{3}{5} \quad \frac{3 \quad 4}{5 \quad 4} \quad \frac{12}{20}$$

Hence, the equivalent fractions with the same denominator are $\frac{15}{20}$ and $\frac{12}{20}$.

(d) $\frac{6}{7}$ and $\frac{8}{5}$

Here, the denominators are 7 and 5.

And the least common multiple of 7 and 5 is 35. Now, for $\frac{6}{7}$, multiply both the numerator and denominator by 5, we get

$$\frac{6}{7} \quad \frac{6 \quad 5}{7 \quad 5} \quad \frac{30}{35}$$

For $\frac{8}{5}$, multiply both numerator and denominator by 7, we get

$$\frac{8}{5} \quad \frac{8 \quad 7}{5 \quad 7} \quad \frac{56}{35}$$

Hence, the equivalent fractions with the same denominator are $\frac{30}{35}$ and $\frac{56}{35}$.

(e) $\frac{9}{4}$ and $\frac{5}{2}$

Here, the denominators are 4 and 2.

And the least common multiple of 4 and 2 is 4.

So, $\frac{9}{4}$ is already has the denominator 4 and for $\frac{5}{2}$, multiply both numerator and denominator by 2, we get

$$\frac{5}{2} \quad \frac{5 \quad 2}{2 \quad 2} \quad \frac{10}{4}$$

Hence, the equivalent fractions with the same denominator are $\frac{9}{4}$ and $\frac{10}{4}$.

(f) $\frac{1}{10}$ and $\frac{2}{9}$

The denominators of given fractions are 10 and 9 and the least common multiple of 9 and 10 is 90. For $\frac{1}{10}$, multiply both numerator and denominator by 9, we get

$$\frac{1}{10} \quad \frac{1 \quad 9}{10 \quad 9} \quad \frac{9}{90}$$

And for $\frac{1}{9}$, multiply both numerator and denominator by 10, we get

$$\frac{2}{9} \quad \frac{2 \quad 10}{9 \quad 10} \quad \frac{20}{90}$$

Hence, the equivalent fractions with the same denominator are $\frac{9}{90}$ and $\frac{20}{90}$.

(g) $\frac{8}{3}$ and $\frac{11}{4}$

The denominators of given fractions are 3 and 4 and the common multiple of 3 and 4 is 12,

For $\frac{8}{3}$, multiply both the numerator and the denominator by 4. We get

$$\frac{8}{3} \quad \frac{8 \quad 4}{3 \quad 4} \quad \frac{32}{12}$$

And for $\frac{11}{4}$, multiply both the denominator and the numerator by 3, we get

$$\frac{11}{4} \quad \frac{11 \quad 3}{4 \quad 3} \quad \frac{33}{12}$$

Hence, the equivalent fractions with same denominator are $\frac{32}{12}$ and $\frac{33}{12}$.

(h) $\frac{13}{6}$ and $\frac{1}{9}$

The denominators of the given fractions are 6 and 9. The least common multiple of 6 and 9 is 18,

For $\frac{13}{6}$, multiply both the numerator and the denominator by 3, we get

$$\frac{13}{6} \quad \frac{13 \quad 3}{6 \quad 3} \quad \frac{39}{18}$$

For $\frac{1}{9}$, multiply both the numerator and the denominator by 2, we get

$$\frac{1}{9} \quad \frac{1 \quad 2}{9 \quad 2} \quad \frac{2}{18}$$

Hence, the equivalent fractions with same denominator are $\frac{39}{18}$ and $\frac{2}{18}$.

8. (a) $\frac{17}{51}$

17 and 51 both are divisible by 17.

So, $\frac{17}{51} \quad \frac{1 \quad 17}{3 \quad 17} \quad \frac{1}{3}$

Hence, lowest form of $\frac{17}{51}$ is $\frac{1}{3}$.

(b) $\frac{64}{144}$

Numerator and denominator both are even, so divisible by 2.

$$\frac{64}{144} \quad \frac{64 \quad 2}{144 \quad 2} \quad \frac{32}{72}$$

Again 32 and 72 both are even, so divisible by 2.

$$\frac{32 \quad 2}{72 \quad 2} \quad \frac{16}{36}$$

16 and 36 both are even, so divisible by 2.

$$\frac{16}{36} \quad \frac{16 \quad 2}{36 \quad 2} \quad \frac{8}{18}$$

Again 8 and 18 both are even, so divisible by 2.

$$\frac{8}{18} \quad \frac{8 \quad 2}{18 \quad 2} \quad \frac{4}{9}$$

Now, there is common factor in 4 and 9. Therefore, $\frac{64}{144} \quad \frac{4}{9}$

Hence, the lowest form of $\frac{64}{144}$ is $\frac{4}{9}$

(c) $\frac{126}{147}$ Here, both numerator and denominator are divisible by 3.

$$\frac{126}{147} \quad \frac{126 \quad 3}{147 \quad 3} \quad \frac{42}{49}$$

Therefore, $\frac{126}{147} \quad \frac{6}{7}$

Hence, the lowest form of $\frac{126}{147}$ is $\frac{6}{7}$

(d) $\frac{525}{112}$

Here, 525 and 112 both are the multiple of 7.

So, $\frac{525}{112} \quad \frac{525 \quad 7}{112 \quad 7} \quad \frac{75}{16}$

Now, both 75 and 16 have no common factor

$$\frac{75}{16} \quad 4 \quad \frac{11}{16} \quad 4\frac{11}{16}$$

Hence, the lowest form of $\frac{525}{112}$ is $4\frac{11}{16}$.

9. (a) $\frac{8}{3}$ and $\frac{5}{2}$

The least common multiple of 3 and 2 is 6.

$$\frac{8}{3} \quad \frac{8 \quad 2}{3 \quad 2} \quad \frac{16}{6} \text{ and } \frac{5}{2} \quad \frac{5 \quad 3}{2 \quad 3} \quad \frac{15}{6}$$

Clearly, $\frac{16}{6} \quad \frac{15}{6}$ Hence, $\frac{8}{3} \quad \frac{5}{2}$

(b) $\frac{4}{9}$ and $\frac{3}{7}$

The least common multiple of 9 and 7 is 63.

So, $\frac{4}{9} \quad \frac{4 \quad 7}{9 \quad 7} \quad \frac{28}{63}$ and $\frac{3}{7} \quad \frac{3 \quad 9}{7 \quad 9} \quad \frac{27}{63}$

Clearly, $\frac{28}{63} \quad \frac{27}{63}$

Hence, $\frac{4}{9} \quad \frac{3}{7}$

(c) $\frac{7}{10}$ and $\frac{9}{14}$

The least common multiple of 10 and 14 is 70.

So, $\frac{7}{10} \quad \frac{7 \quad 7}{10 \quad 7} \quad \frac{49}{70}$

and $\frac{9}{14} \quad \frac{9 \quad 5}{14 \quad 5} \quad \frac{45}{70}$

Clearly, $\frac{49}{70} \quad \frac{45}{70}$ Hence, $\frac{7}{10} \quad \frac{9}{14}$

(d) $\frac{12}{5}$ and $\frac{8}{5}$

The denominator of two given fractions is same, but numerator 12 8.

Hence, $\frac{12}{5} \quad \frac{8}{5}$

(e) $\frac{9}{4}$ and $\frac{4}{2}$

The least common multiple of 4 and 2 is 4.

So, $\frac{9}{4} \quad \frac{9}{4}$ and $\frac{4}{2} \quad \frac{4 \quad 2}{2 \quad 2} \quad \frac{8}{4}$

Clearly, $\frac{9}{4} \quad \frac{8}{4}$ Hence, $\frac{9}{4} \quad \frac{4}{2}$

10. (a) $\frac{7}{10}, \frac{11}{15}, \frac{2}{5}$

The least common multiple of 10, 15 and 5 is 30.

So, $\frac{7}{10} \quad \frac{7 \quad 3}{10 \quad 3} \quad \frac{21}{30}$

$\frac{11}{15} \quad \frac{11 \quad 2}{15 \quad 2} \quad \frac{22}{30}$

and $\frac{2}{5} \quad \frac{2 \quad 6}{5 \quad 6} \quad \frac{12}{30}$

Clearly, $\frac{12}{30} \quad \frac{21}{30} \quad \frac{22}{30}$

Hence, $\frac{2}{5} \quad \frac{7}{10} \quad \frac{11}{15}$

(b) $\frac{19}{24}, \frac{5}{6}, \frac{7}{12}$

The least common multiple of 24, 6 and 12 is 24.

So, $\frac{19}{24} \quad \frac{19}{24}$

$\frac{5}{6} \quad \frac{5 \quad 4}{6 \quad 4} \quad \frac{20}{24}$

and $\frac{7}{12} \quad \frac{7 \quad 2}{12 \quad 2} \quad \frac{14}{24}$

Clearly, $\frac{14}{24} \quad \frac{19}{24} \quad \frac{20}{24}$

Hence, $\frac{7}{12} \quad \frac{19}{24} \quad \frac{5}{6}$

11. (a) $\frac{25}{16}, \frac{7}{8}, \frac{13}{4}, \frac{17}{32}$

The least common multiple of 16, 8, 4 and 32 is 32.

So, $\frac{25}{16} \quad \frac{25 \quad 2}{16 \quad 2} \quad \frac{50}{32}$

$$\frac{7}{8} \quad \frac{7 \quad 4}{8 \quad 4} \quad \frac{28}{32}$$

$$\frac{13}{4} \quad \frac{13 \quad 8}{4 \quad 8} \quad \frac{104}{32}$$

and $\frac{17}{32} \quad \frac{17}{32}$

Clearly, $\frac{104}{32} \quad \frac{50}{32} \quad \frac{28}{32} \quad \frac{17}{32}$

Hence, $\frac{13}{4} \quad \frac{25}{16} \quad \frac{7}{8} \quad \frac{17}{32}$

(b) $\frac{3}{4}, \frac{12}{5}, \frac{7}{12}, \frac{5}{4}$

The least common multiple of 4, 5 and 12 is 60.

So, $\frac{3}{4} \quad \frac{3 \quad 15}{4 \quad 15} \quad \frac{45}{60}$

$$\frac{12}{5} \quad \frac{12 \quad 12}{5 \quad 12} \quad \frac{144}{60}$$

$$\frac{7}{12} \quad \frac{7 \quad 5}{12 \quad 5} \quad \frac{35}{60}$$

and $\frac{5}{4} \quad \frac{5 \quad 15}{4 \quad 15} \quad \frac{75}{60}$

Clearly, $\frac{144}{60} \quad \frac{75}{60} \quad \frac{45}{60} \quad \frac{35}{60}$

Hence, $\frac{12}{5} \quad \frac{5}{4} \quad \frac{3}{4} \quad \frac{7}{12}$

Exercise 7.4

1. (a) $\frac{2}{7} \quad \frac{5}{7} \quad \frac{6}{7}$

The denominator of the given fraction is the same.

So, $\frac{2 \quad 5 \quad 6}{7} \quad \frac{13}{7}$

Hence, $\frac{13}{7} \quad 1 \quad \frac{6}{7} \quad 1\frac{6}{7}$

(b) $\frac{3}{4} \quad \frac{1}{3}$

Here the least common multiple of 4 and 3 is 12.

So, the equivalent fraction of $\frac{3}{4}$ with denominator 12 is $\frac{9}{12}$ and equivalent fraction of $\frac{1}{3}$ with denominator 12 is $\frac{4}{12}$.

Therefore, $\frac{9}{12} \quad \frac{4}{12} \quad \frac{9 \quad 4}{12} \quad \frac{13}{12}$

$$\frac{12}{12} \quad \frac{1}{12} \quad 1 \quad \frac{1}{12} \quad 1\frac{1}{12}$$

(c) $\frac{2}{3} \quad \frac{5}{6}$

Least common multiple of 3 and 6 is 6. Expressing as equivalent fractions with denominator 6, we get

$$\frac{2}{3} \quad \frac{5}{6} \quad \frac{2 \quad 2}{3 \quad 2} \quad \frac{5}{6} \quad \frac{4}{6} \quad \frac{5}{6}$$

$\frac{9}{6} \quad \frac{3}{2}$ (The lowest form)

$$\frac{2}{2} \quad \frac{1}{2} \quad 1 \quad \frac{1}{2} \quad 1\frac{1}{2}$$

(d) $\frac{2}{3} \quad \frac{2}{7}$

The least common multiple of 3 and 7 is 21. Expressing as equivalent fractions with denominator 21, we get,

$$\frac{2}{3} \quad \frac{2}{7} \quad \frac{2 \quad 7}{3 \quad 7} \quad \frac{2 \quad 3}{7 \quad 3} \quad \frac{14}{21} \quad \frac{6}{21} \quad \frac{20}{21}$$

(e) $\frac{3}{4} \quad \frac{1}{3} \quad \frac{1}{5}$

The least common multiple (LCM) of 4, 3, 5 is 60. Expressing as equivalent fractions with denominator 60, we get

$$\frac{3}{4}\quad \frac{1}{3}\quad \frac{1}{5}\quad \frac{3\quad 15}{4\quad 15}\quad \frac{1\quad 20}{3\quad 20}\quad \frac{1\quad 12}{5\quad 12}$$

$$\frac{45}{60}\quad \frac{20}{60}\quad \frac{12}{60}$$

$$\frac{45\quad 20\quad 12}{60}\quad \frac{77}{60}$$

$$\frac{60}{60}\quad \frac{17}{60}\quad 1\quad \frac{17}{60}\quad 1\frac{17}{60}$$

(f) $\frac{2}{3}\quad \frac{4}{5}$

The LCM of 3 and 5 is 15. Expressing as equivalent fractions with denominator 15, we get

$$\frac{2}{3}\quad \frac{4}{5}\quad \frac{2\quad 5}{3\quad 5}\quad \frac{4\quad 3}{5\quad 3}\quad \frac{10}{15}\quad \frac{12}{15}$$

$$\frac{10\quad 12}{15}\quad \frac{22}{15}$$

$$\frac{15}{15}\quad \frac{7}{15}\quad 1\quad \frac{7}{15}\quad 1\frac{7}{15}$$

(g) $\frac{4}{5}\quad \frac{2}{3}$

The LCM of 5 and 3 is 15. Expressing as equivalent fractions with denominator 15, we get

$$\frac{4}{5}\quad \frac{2}{3}\quad \frac{4\quad 3}{5\quad 3}\quad \frac{2\quad 5}{3\quad 5}$$

$$\frac{12}{15}\quad \frac{10}{15}\quad \frac{12\quad 10}{15}\quad \frac{22}{15}$$

$$\frac{15}{15}\quad \frac{7}{15}\quad 1\quad \frac{7}{15}\quad 1\frac{7}{15}$$

(h) $\frac{3}{5}\quad \frac{5}{8}$

The LCM of 5 and 8 is 40. Expressing as equivalent fractions with denominator 40, we get

$$\frac{3}{5}\quad \frac{5}{8}\quad \frac{3\quad 8}{5\quad 8}\quad \frac{5\quad 5}{8\quad 5}\quad \frac{24}{40}\quad \frac{25}{40}$$

$$\frac{24\quad 25}{40}\quad \frac{49}{40}$$

$$\frac{40}{40}\quad \frac{9}{40}\quad 1\quad \frac{9}{40}\quad 1\frac{9}{40}$$

(i) $\frac{9}{2}\quad \frac{5}{4}$

The LCM of 2 and 4 is 4. Now, expressing as equivalent fractions with denominator 4, we get

$$\frac{9}{2}\quad \frac{5}{4}\quad \frac{9\quad 2}{2\quad 2}\quad \frac{5}{4}\quad \frac{18}{4}\quad \frac{5}{4}$$

$$\frac{18\quad 5}{4}\quad \frac{23}{4}\quad 5\quad \frac{4}{4}\quad \frac{3}{4}\quad 5\quad \frac{3}{4}\quad 5\frac{3}{4}$$

(j) $\frac{8}{3}\quad \frac{2}{7}$

The LCM of 3 and 7 is 21. Expressing as equivalent fractions with denominator 21, we get

$$\frac{8}{3}\quad \frac{2}{7}\quad \frac{8\quad 7}{3\quad 7}\quad \frac{2\quad 3}{7\quad 3}\quad \frac{56}{21}\quad \frac{6}{21}$$

$$\frac{56\quad 6}{21}\quad \frac{62}{21}$$

$$2\quad \frac{21}{21}\quad \frac{20}{21}\quad 2\quad \frac{20}{21}\quad 2\frac{20}{21}$$

(k) $\frac{3}{4}\quad \frac{1}{3}\quad \frac{1}{5}$

The LCM of 4, 3 and 5 is 60. Expressing as equivalent fractions with denominator 60, we get

$$\frac{3}{4}\quad \frac{1}{3}\quad \frac{1}{5}\quad \frac{3\quad 15}{4\quad 15}\quad \frac{1\quad 20}{3\quad 20}\quad \frac{1\quad 12}{5\quad 12}$$

$$\frac{45}{60}\quad \frac{20}{60}\quad \frac{12}{60}\quad \frac{45\quad 20\quad 12}{60}\quad \frac{77}{60}$$

$$\frac{77}{60}\quad \frac{60}{60}\quad \frac{17}{60}\quad 1\quad \frac{17}{60}\quad 1\frac{17}{60}$$

(l) $\frac{2}{3}\quad \frac{4}{5}\quad \frac{3}{7}$

The LCM of 3, 5 and 7 is 105. Now, expressing as equivalent fractions with denominator 105, we get

$$\frac{2}{3} \quad \frac{4}{5} \quad \frac{3}{7} \quad \frac{2 \quad 35}{3 \quad 35} \quad \frac{4 \quad 21}{5 \quad 21} \quad \frac{3 \quad 15}{7 \quad 15}$$

$$\frac{70}{105} \quad \frac{84}{105} \quad \frac{45}{105}$$

$$\frac{199}{105} \quad \frac{105}{105} \quad \frac{94}{105} \quad 1 \quad \frac{94}{105} \quad 1\frac{94}{105}$$

(m) $\frac{9}{2} \quad \frac{5}{4} \quad \frac{7}{6}$

The LCM of 2, 4 and 6 is 12. Now, expressing as equivalent fractions with denominator 12, we get

$$\frac{9}{2} \quad \frac{5}{4} \quad \frac{7}{6} \quad \frac{9 \quad 6}{2 \quad 6} \quad \frac{5 \quad 3}{4 \quad 3} \quad \frac{7 \quad 2}{6 \quad 2}$$

$$\frac{54}{12} \quad \frac{15}{12} \quad \frac{14}{12} \quad \frac{83}{12}$$

$$6 \quad \frac{12}{12} \quad \frac{11}{12} \quad 6 \quad \frac{11}{12} \quad 6\frac{11}{12}$$

2. The volume of yellow paint $\frac{2}{3}$ liters

The volume of blue paint $\frac{3}{4}$ liters

So, Total volume of green paint $\frac{2}{3} \quad \frac{3}{4}$

The LCM of the denominators 3 and 4 of given fractions is 12.

So, expressing as equivalent fractions with denominator 12, we get

$$\frac{2}{3} \quad \frac{3}{4} \quad \frac{2 \quad 4}{3 \quad 4} \quad \frac{3 \quad 3}{4 \quad 3}$$

$$\frac{8}{12} \quad \frac{9}{12} \quad \frac{8 \quad 9}{12} \quad \frac{17}{12} \text{ litres}$$

$$\frac{17}{12} \quad 1 \quad \frac{12}{12} \quad \frac{5}{12} \quad 1 \quad \frac{5}{12} \quad 1\frac{5}{12}$$

Hence, the volume of green paint is $1\frac{5}{12}$ liters.

3. Lace that Geeta bought $\frac{2}{5}$ meter

Lace that Shamim bought $\frac{3}{4}$ meter

Length of total lace, Geeta and Shamim bought $\frac{2}{5}$ m $\frac{3}{4}$ m

The LCM of the denominators 5 and 4 of given fraction 20

Expressing as equivalent fractions with denominator 20, we get

$$\frac{2}{5} \quad \frac{3}{4} \quad \frac{2 \quad 4}{5 \quad 4} \quad \frac{3 \quad 5}{4 \quad 5}$$

$$\frac{8}{20} \quad \frac{15}{20} \quad \frac{8 \quad 15}{20} \quad \frac{23}{20}$$

$$\frac{20}{20} \quad \frac{3}{20} \quad 1 \quad \frac{3}{20} \quad 1\frac{3}{20}$$

Hence, length of the lace that Geeta and Shamim bought $1\frac{3}{20}$ m

Since, $1\frac{3}{20} \quad 1$

So, the lace will be sufficient to cover the whole border.

4. (a) $\frac{6}{7} \quad \frac{4}{7} \quad \frac{6 \quad 4}{7} \quad \frac{2}{7}$

(b) $\frac{7}{9} \quad \frac{5}{9} \quad \frac{7 \quad 5}{9} \quad \frac{2}{9}$

(c) $\frac{10}{27} \quad \frac{1}{27} \quad \frac{10 \quad 1}{27} \quad \frac{9}{27} \quad \frac{1}{3}$

(The lowest form)

5. (a) $\frac{8}{15} \quad \frac{3}{15} \quad \frac{8 \quad 3}{15} \quad \frac{5}{15} \quad \frac{1}{5}$

(The lowest form)

(b) $\frac{2}{5} \quad \frac{4}{15} \quad \frac{2 \quad 3}{5 \quad 3} \quad \frac{4}{15}$

$$\frac{6}{15} \quad \frac{4}{15} \quad \frac{6 \quad 4}{15} \quad \frac{2}{15}$$

(c) $\frac{5}{6} \quad \frac{4}{9} \quad \frac{5 \quad 3}{6 \quad 3} \quad \frac{4 \quad 2}{9 \quad 2}$

$$\frac{15}{18} \quad \frac{8}{18} \quad \frac{15 \quad 8}{18} \quad \frac{7}{18}$$

(d) $\frac{2}{3} \quad \frac{1}{2} \quad \frac{2 \quad 2}{3 \quad 2} \quad \frac{1 \quad 3}{2 \quad 3}$

$$\frac{4}{6} \quad \frac{3}{6} \quad \frac{4 \quad 3}{6} \quad \frac{1}{6}$$

6. (a) $\frac{13}{4}$ from $\frac{10}{3}$

The LCM of 3 and 4 is 12. Expressing as equivalent fraction with denominator 12, we get

$$\frac{10}{3} \quad \frac{13}{4} \quad \frac{10 \quad 4}{3 \quad 4} \quad \frac{13 \quad 3}{4 \quad 3}$$

$$\frac{40}{12} \quad \frac{39}{12} \quad \frac{40 \quad 39}{12} \quad \frac{1}{12}$$

(b) $\frac{18}{5}$ from $\frac{23}{3}$

The LCM of 5 and 3 is 15. So, expressing as equivalent fraction with denominator 15, we get

$$\frac{23}{3} \quad \frac{18}{5} \quad \frac{23 \quad 5}{3 \quad 5} \quad \frac{18 \quad 3}{5 \quad 3}$$

$$\frac{115}{15} \quad \frac{54}{15} \quad \frac{115 \quad 54}{15} \quad \frac{61}{15}$$

$$\frac{61}{15} \quad 4 \quad \frac{15}{15} \quad \frac{1}{15} \quad 4 \quad \frac{1}{15} \quad 4\frac{1}{15}$$

(c) $\frac{29}{7}$ from $\frac{45}{7}$

Since, the denominators of given fractions is the same. *i.e.*, 7.

So, $\frac{45}{7} \quad \frac{29}{7} \quad \frac{45 \quad 29}{7} \quad \frac{16}{7}$

$$2 \quad \frac{7}{7} \quad \frac{2}{7} \quad 2 \quad \frac{2}{7} \quad 2\frac{2}{7}$$

7. (a) Total distance from Jaya's home to her school $\frac{7}{10}$ km

She covers a distance by an auto $\frac{1}{2}$ km

She covers a distance walking

Total distance

distance covered by an auto

$$\frac{7}{10} \quad \frac{1}{2}$$

Expressing as equivalent fraction with denominator 10, we get

$$\frac{7}{10} \quad \frac{1}{2} \quad \frac{7}{10} \quad \frac{1 \quad 5}{2 \quad 5} \quad \frac{7}{10} \quad \frac{5}{10}$$

$$\frac{7 \quad 5}{10} \quad \frac{2}{10} \quad \frac{1}{5} \text{ km}$$

Hence, she travels a distance daily $\frac{1}{5}$ km.

(b) Jeevika takes for one round

$$\frac{10}{3} \text{ minutes}$$

Namit takes for one round

$$\frac{13}{4} \text{ minutes}$$

Equallising the two denominator we get

$$\frac{10 \quad 4}{3 \quad 4} \quad \frac{40}{12} \text{ and } \frac{13}{4} \quad \frac{13 \quad 3}{4 \quad 3} \quad \frac{39}{12}$$

Clearly, $\frac{40}{12} \quad \frac{39}{12}$

Therefore, Jeevika takes more time.

Difference of two timing

$$\frac{40}{12} \quad \frac{39}{12} \quad \frac{40 \quad 39}{12} \quad \frac{1}{12} \text{ minutes}$$

Hence, Jeevika takes more time by $\frac{1}{12}$ minutes.

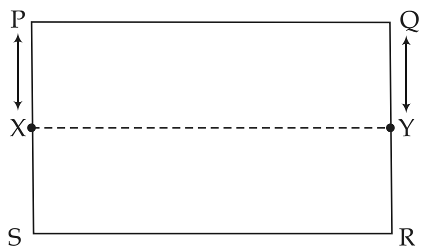
●●

CHAPTER 8

Playing with Constructions

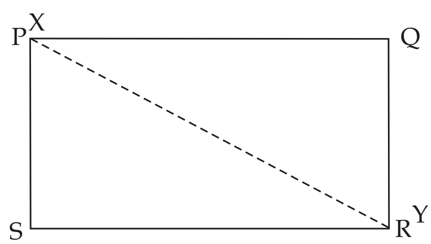
Assignment 8.1

1. (a)



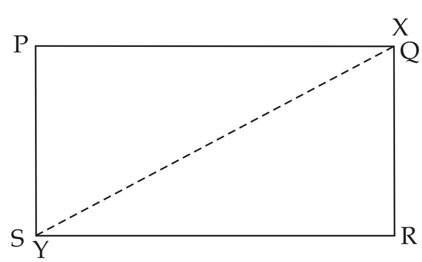
Length of *XY*   Length of *PQ*   8 cm

(b)



Using a ruler we find the length *YX*   10 cm.

(c)

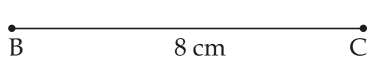


Using a ruler, we find the length of *XY*   10 cm.

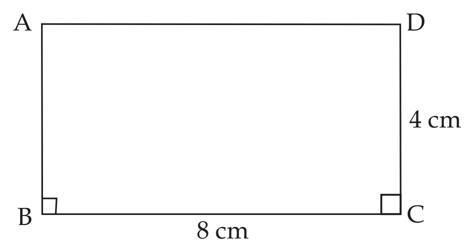
(d) *X* converses to *S* and *Y* converses to *Q*.

Hence, the length of *XY*   *SR*   8 cm.

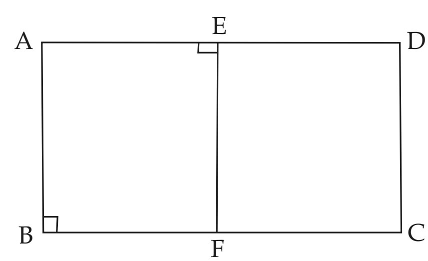
2. **Step 1.** Draw a line segment *BC*   8 cm



Step 2. Using a protractor, draw perpendiculars *AB* and *CD* on the points *B* and *C*. Such that *AB*   *CD*   4 cm. Join *A* to *D*



Step 3. Using a scale or compass, mark points *E* and *F* on *AD* and *BC* to divide them two equal parts. Join *E* to *F*.



ABFE and *EFCD* are the required square verification.

AB   *EF*   4 cm

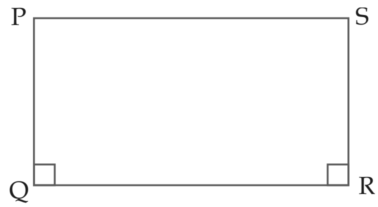
AE   *BF*   4 cm

A   *B*   *F*   *E*   90

Hence, 4 sides and 4 angles are equal, so *ABFE* and *EFCD* are the squares.

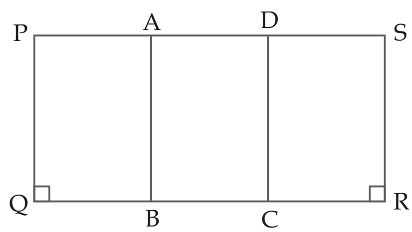
3. **Step 1.** Draw a line segment *QR*   7.5 cm using a protractor, draw the perpendiculars *PQ* and *RS* on points *Q* and *R* such that *PQ*   *RS*   2.5 cm.

Join P to S to get PS.



Step 2. Taking a distance of 2.5 cm and centre P and Q draw arcs A on PS and B on QR. Similarly with centres S and R and with same distance of 2.5 cm. Draw arcs D on PS and C on QR.

Join A to B and D to C.



$PQBA$, $ABCD$ and $DCRS$ are the required squares.

4. (a) No, because the length of rectangle 8 cm is not twice is breadth 3 cm.

(b) No, because the length of rectangle 10 cm is not thrice its breadth 3.5 cm.

(c) Yes, because length of rectangle 12 cm is 4 times of its breadth 3 cm.

5. **Step 1.** Draw a line segment AB 10 cm.

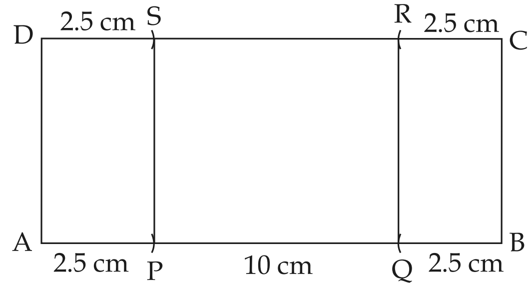
Step 2. Draw AD and BC of length 5 cm each perpendicular to the points A and B.

Step 3. Join C to D.

Step 4. Now taking a distance of 2.5 cm in the compass. Draw an arc from A which intersect AB at point P.

Step 5. Similarly, draw an arc from point B at a distance of 2.5 cm which intersects BA at point Q.

Step 6. In the same way draw arcs R and S on CD from points C and D.



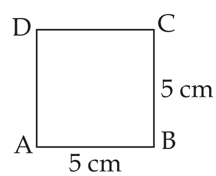
Step 7. Join P to S and Q to R.

Hence, $PQRS$ is the required square that has the same centre as that of the centre of the rectangle.

6. **Step 1.** Draw a line segment AB of length 5 cm.

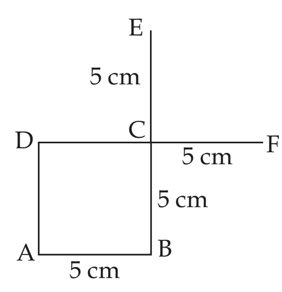
Step 2. Draw perpendiculars AD and BC of length 5 cm at points A and B.

Step 3. Join A to D and B to C.



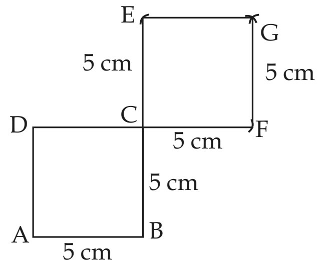
Step 4. Produce BC upwards to point E such that CE 5 cm.

Step 5. Produce DC towards right to F such that CF 5 cm.



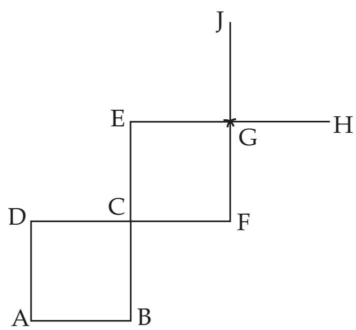
Step 6. Taking E and F as centres and keeping a distance of 5 cm in compass, draw arcs which intersect each other at point G.

Step 7. Join E to G and F to G.



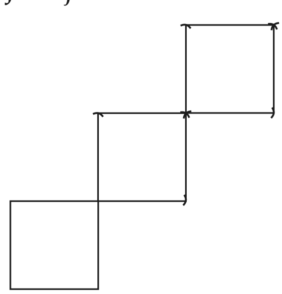
Step 7. Produce EG towards right to H, such that GH 5 cm.

Step 8. Produce FG upwards to point J, such that GJ 5 cm.



Step 9. Taking J and H as centres and keeping a distance of 5 cm in compass, draw arcs which intersect each other at point I.

Step 10. Join J to I and H to I.

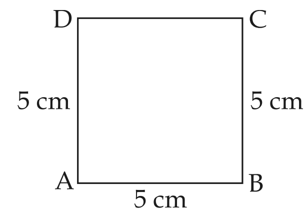


This is the required falling squares with side length 5 cm.

7. **Step 1.** Draw a line segment AB 5 cm.

Step 2. Draw perpendiculars AD and BC on points A and B, such that AD BC 5 cm.

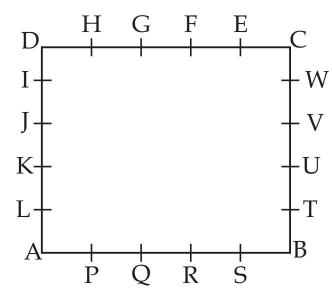
Step 3. Join C to D.



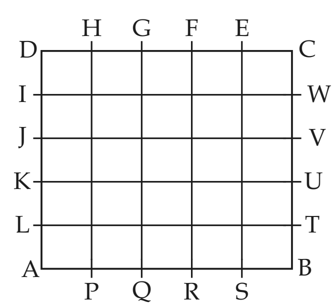
Step 4. To divide AB into five equal parts, use a compass and mark P, Q, R, S at a distance of 1 cm.

Step 5. Similarly, to divide BC into 5 equal parts. Use a compass and mark T, U, V, W at a distance of 1 cm.

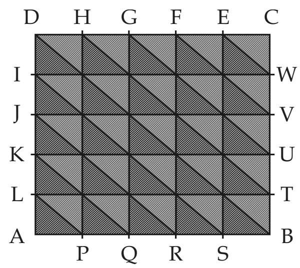
Step 6. In the same way divide the sides CD and AD into five parts by points E, F, G, H and I, J, K, L respectively.



Step 7. Join H to P, G to Q, F to R and E to S. Similarly, join I to W, J to V, K to U and L to T.



Step 8. Draw the diagonals to each of the square obtained. And draw lines to half of the each square and shade the other half.

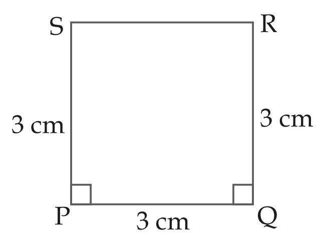


25 squares are possible to be drawn in this way.

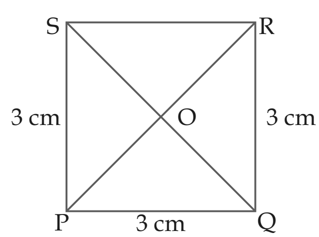
8. **Step 1.** Draw a line segment *PQ* 3 cm.

Step 2. Draw perpendiculars *PS* and *QR* to the points *P* and *Q*, such that *PS* *QR* 3 cm.

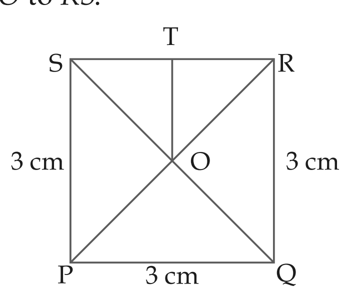
Step 3. Join *S* to *R*.



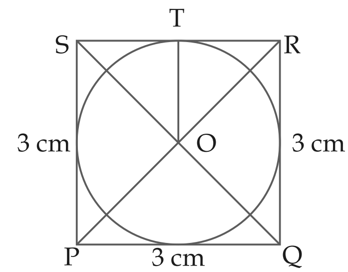
Step 4. Join *P* to *R* and *Q* to *S* to intersect at each other at *O*.



Step 5. Draw perpendicular *OT* from point *O* to *RS*.



Step 6. Taking *O* as centre and distance equal to *OT* in the compass, draw a circle that touches the four sides of square *PQRS*.

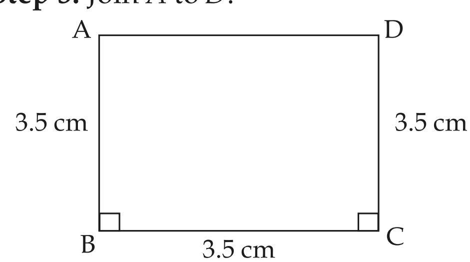


Hence, obtained circle is the required circle.

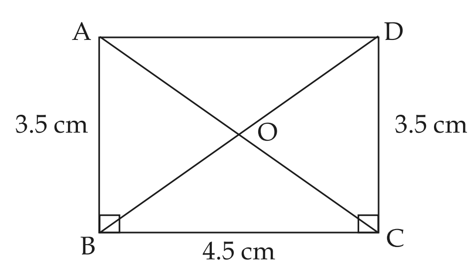
9. **Step 1.** Draw a line segment *BC* 4.5 cm.

Step 2. Draw perpendiculars *AB* and *CD* to the points *B* and *C*, such that *AB* *CD* 3.5 cm.

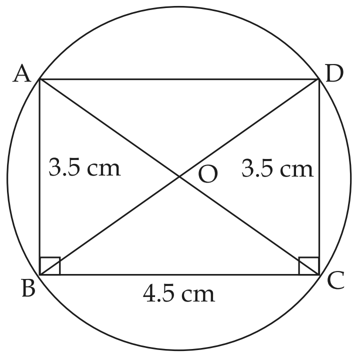
Step 3. Join *A* to *D*.



Step 4. Join *A* to *C* and *B* to *D* to intersect each other at *O*.



Step 5. Taking *O* as centre and distance equal to *OA*, in the compass, draw a circles that goes through the points *A*, *B*, *C* and *D*.

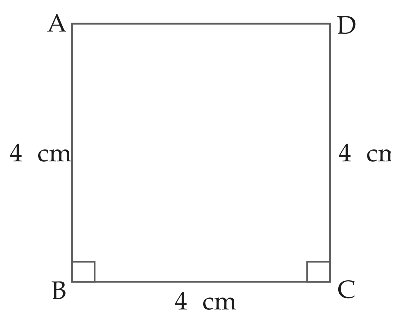


This is the required circle.

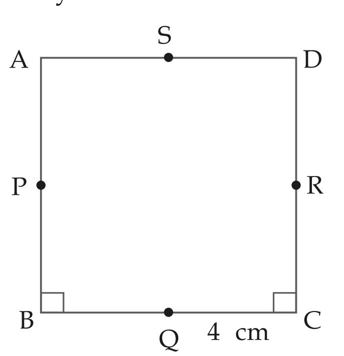
10. Step 1. Draw a line segment BC 4 cm.

Step 2. Draw perpendiculars AB and CD to the points B and C such that AB CD 4 cm.

Step 3. Join A to D.



Step 4. With the help of ruler or a compass find the mid points P, Q, R, S of sides AB, BC, CD and DA respectively.

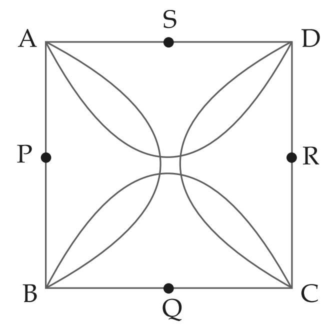


Step 5. Taking P as centre and distance equal to AP or BP 2 cm in the compass, draw a half circle.

Step 6. Taking Q as centre and distance QB QC 2 cm in the compass, draw another half circle.

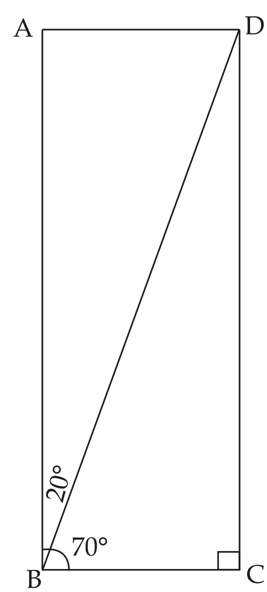
Step 7. With the centres R and S and keeping same distance in the compass, draw two other half circles.

All these circles touches each other at the point O.



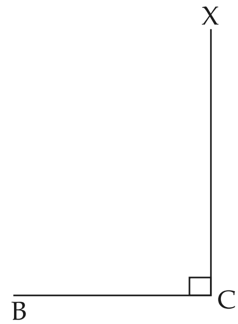
Assignment 8.2

1. First of all draw a rough sketch of rectangle $ABCD$.

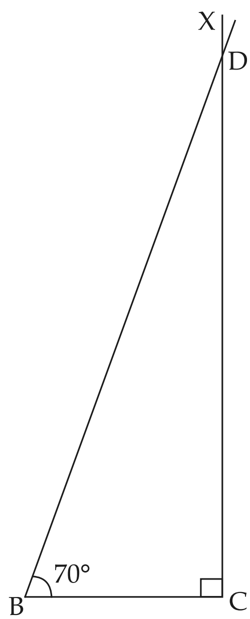


Step 1. Draw a line segment *C* with an arbitrary length.

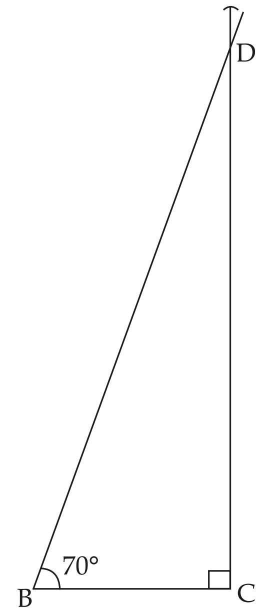
Step 2. Draw a perpendicular *CX* to *BC* passing through the point *C*.



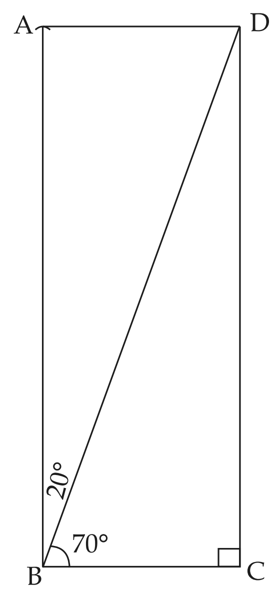
Step 3. Draw a line making an angle of 70° with *BC* at point *B* that intersects *CX* at *D*.



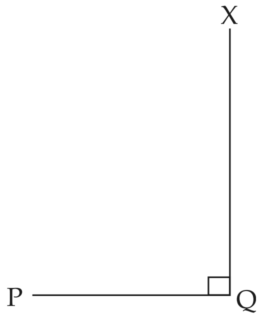
Step 4. Taking *B* as centre and a distance equal to *CD* in the compass draw an arc. Again, taking *D* as centre and a distance equal to *BC* draw another arc to intersect first arc at *A*.



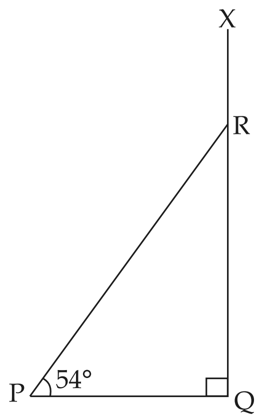
Step 5. Join *A* to *B* and *A* to *D*. Hence, *ABCD* is the required rectangle.



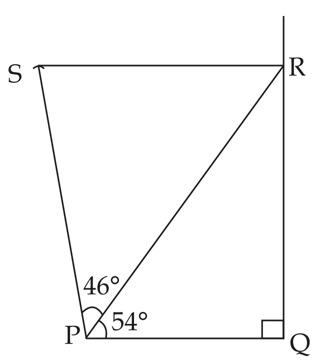
2. **Step 1.** Draw a line segment *PQ* with a arbitrary length and draw a perpendicular line *QX* through the point *Q*.



Step 2. Draw a line segment at point P, making an angle of 54° with PQ which intersects QX at point R.

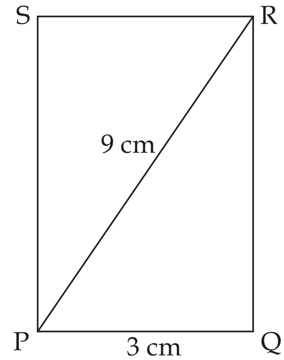


Step 3. Taking P and R as centres and taking distance equal to QR and PQ respectively in compass, draw arcs which intersect each other at point S.



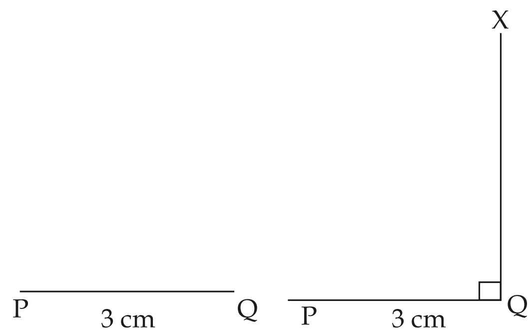
Hence, $PQRS$ is the required quadrilateral.

3. Very first draw a rough diagram.

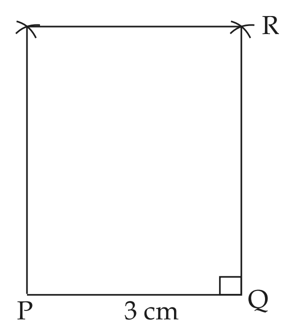


Step 1. Draw a line segment PQ 3 cm.

Step 2. Draw a perpendicular QX to PQ through the point Q.

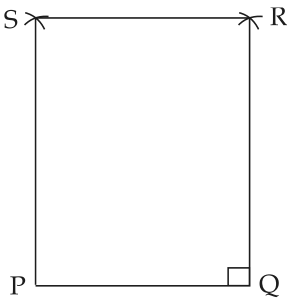


Step 3. With centre P and a distance of the diagonal equal to 9 cm, draw an arc to intersect QX at R.



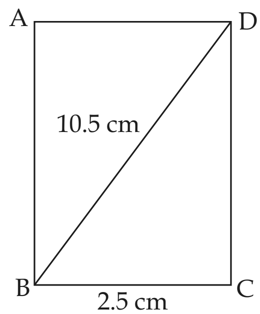
Step 4. Taking P and R as centres and distance equal to QR and PQ respectively, draw arcs to intersect each other at the point S.

Step 5. Join S to P and S to R.



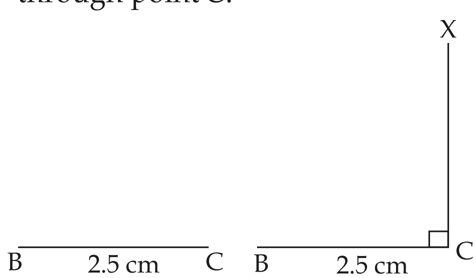
Hence, *PQRS* is the required rectangle.

4. First of all draw a rough diagram.

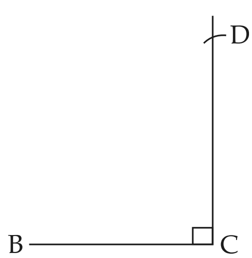


Step 1. Draw a line segment *BC* 2.5 cm.

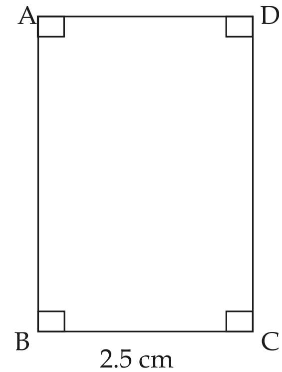
Step 2. Draw a perpendicular to *BC* through point *C*.



Step 3. Taking *B* as centre and a distance of 10.5 cm in the compass draw an arc that intersects the perpendicular drawn at *D*.



Step 4. Draw perpendiculars to *BC* and *CD* through points *B* and *D* respectively. Mark *A* at the intersection point of perpendicular

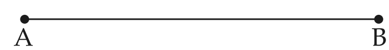


Hence, *ABCD* is the required rectangle.

TEXTBOOK EXERCISES

Exercise 8.1

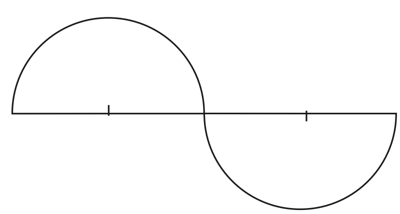
1. **Step 1 :** We start it with a central line *AB* of length 12 cm.



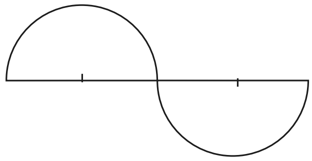
Step 2 : Since, a wave needs two halves circles. So mark 4 equidistant points on *AB*.

Where *AC* *CD* *DE* *EB* 3 cm each.

Step 3 : Taking *C* as centre and radius equal to *AC* in the compass, draw a half circle above *AB*. Similarly with *E* as centre and radius equal to *EB*, draw another half circle below the line *AB*.

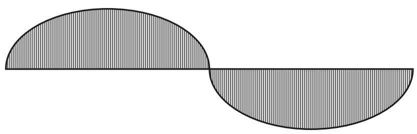


Step 4 : Shade inside the both half circles.



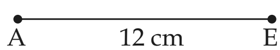
This is the required figure.

2. The 'Wavy Wave' should be drawn as given figure, appearing in the neck of figure of 'A Person'.



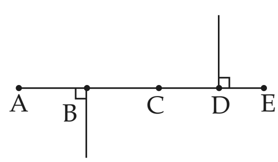
To draw this figure, necessary steps are given below :

Step 1 : Draw a central line *AE*   12 cm.

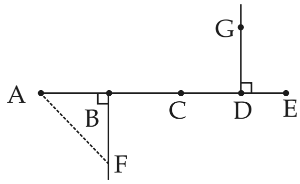


Step 2 : Since two equal ares are to be drawn so divide *AE* into four equal parts with the help of a ruler such that *AB*   *BC*   *CD*   *DE*   3 cm.

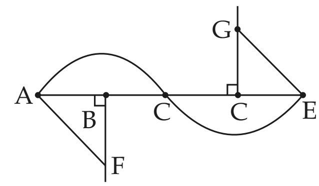
Step 3 : At *B* and *D* draw the perpendiculars with the help of protractor, as shown in the figure.



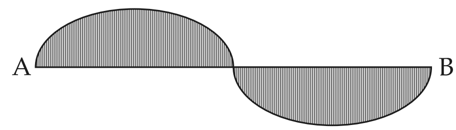
Step 4 : Using a ruler, mark points *F* and *G* on two perpendiculars such as *BF*   *DG*   1.5 cm.



Step 5 : Join *A* to *F* and *E* to *G*. Taking *F* and *G* as centres and radius equal to *AF* or *EG* draw two arcs, one above and other below the line *AE*.



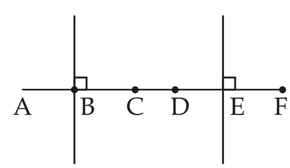
Step 6 : Shade inside two arcs.



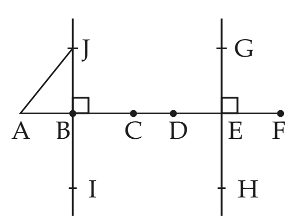
3. For this Artwork following steps will be followed :

Step 1 : Draw a line segment *AF*   8.5 cm. With the help of a ruler mark points *C* and on it such that *AC*   4 cm, *CD*   0.5 cm and *DB*   4 cm. Mark points *B* and *E* on it such that *AB*   2 cm and *EF*   2 cm.

Step 2 : Using a protractor draw perpen- diculars on points *B* and *E*.

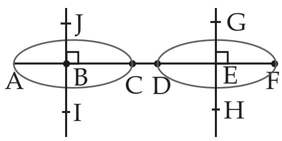


Step 3 : Using the compasses, draw arc to cut *BJ*   *BI*   *EG*   *EH*   1.5 cm. Join *A* to *J*.

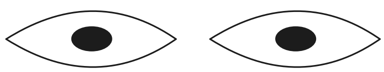


Step 4 : With the centre *J* and distance equal to *AJ* in the compass draw an arc from *A* to *C*, with the centre *I* and same distance draw another arc from *A* to *C*.

Similarly, Taking *G* and *H* as centres draw two arcs from *D* to *F*.



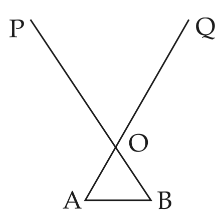
Step 5 : The points *B* and *E* change as black dark circles.



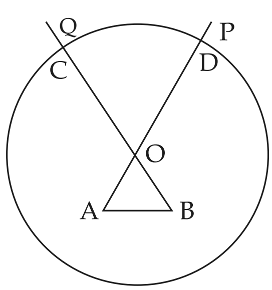
Hence, we get the shape of Eyes.

4. **Step 1 :** Draw a line segment *AB* 1 cm.

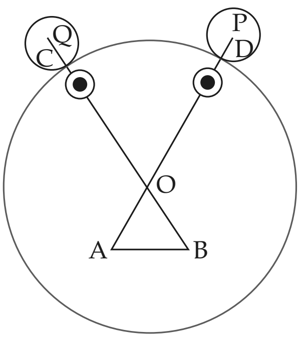
Step 2 : Using a protractor draw an angle of 60 on the points *A* and *B* both to cut the angle lines *BP* and *AQ* at the point *O*.



Step 3 : Taking *O* as centre and radius 2.5 cm draw a circle that intersect two lines of angle at *C* and *D*.



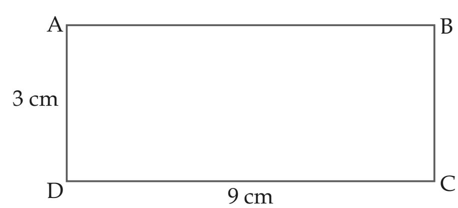
Step 5 : With the centres *P* and *Q* and radius in the compass equal to *PD* *QC*, draw circles. On the sides *AD* and *BC* draw small circles as shown in the figure below.



Hence, we obtained a face of a man.

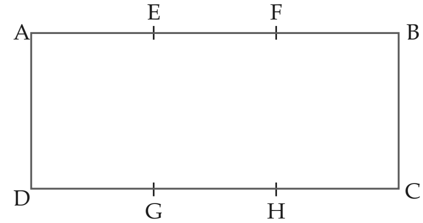
5. If this seem difficult, let us simplify the problem. For the purpose take the following steps :

Step 1. Construct a rectangle with length 9 cm and width 3 cm as you learnt just before topic.

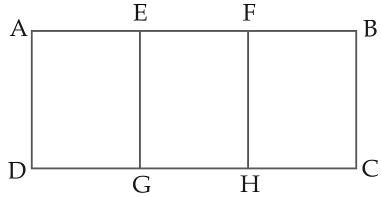


Step 2. Using a compase or a ruler divide *AB* into 3 equal parts *i.e.,* *AE* *EF* *FB* 3 cm.

Similarly, divide *DC* into 3 equal parts such as *DG* *GH* *HC*.



Step 3. Join *E* to *G* and *F* to *H*



AEGD, *EFHG* and *FBCH* are required squares.

Verification : Angle *A*   *D*   90

(angle of rectangle)

AD   3 cm

(width of the given rectangle)

AE   *DG*   3 cm (by construction)

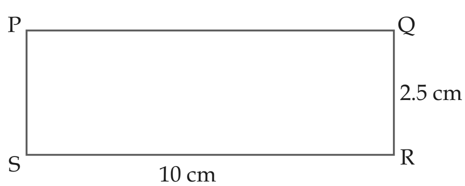
AD   *EG*   3 cm

Thus, *AEGD* is a square.

Hence, *AEGD*, *EFHG* and *FBCH* are the squares whose sum is equal to rectangle *ABCD*.

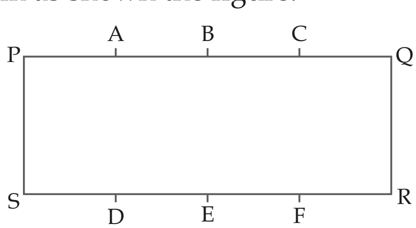
6. Using the steps given below, the problem can be made easier.

Step 1. Construct a rectangle with length 10 cm and width 2.5 cm.



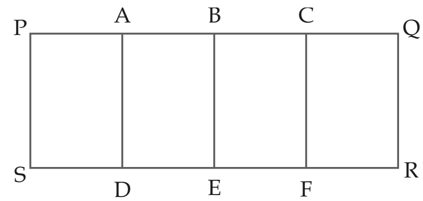
Step 2. Using a ruler or compass divide *PQ* into 4 equal parts such that *PA*   *AB*   *BC*   *CQ*   2.5 cm.

Similarly divide *RS* also into 4 equal parts such that *SD*   *DE*   *EF*   *FR*   2.5 cm as shown the figure.



Step 3. Join *A* to *D*, *B* to *E* and *C* to *F* to get the squares *PADS*, *ABED*, *BCFE* and *CQRF*.

Hence, *PADS*, *ABED*, *BCFE* and *CQRS* are the required squares.

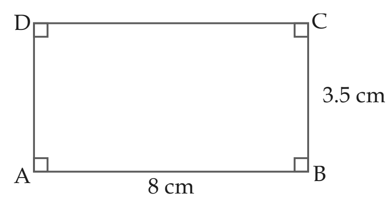


7. (a) When the length of a given rectangle is not exactly twice of its width, the rectangle cannot be divided into two identical squares.

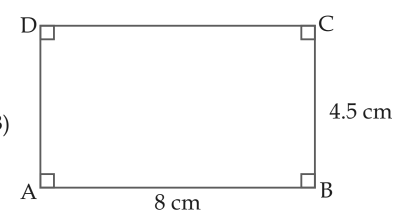
i.e., the length *AB*   8 cm and width *BC*   3.5 cm.

or the length *AB*   8 cm and width *BC*   4.5 cm.

(A)



(B)

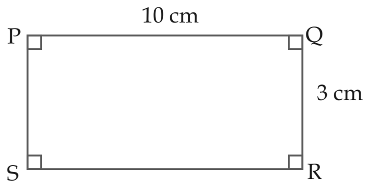


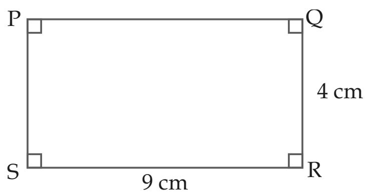
In these two cases, the rectangles can not be divided into two identical squares.

(b) If the length of a rectangle is not exactly three times larger than its width, the rectangle cannot be divided into three identical squares.

i.e.,   *PQ*   10 cm and *QR*   3 cm

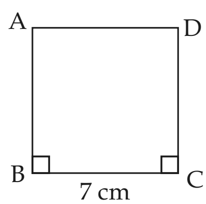
or *PQ* 9 cm and *QR* 4 cm



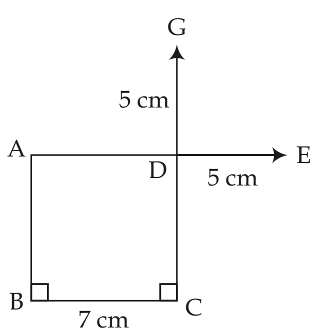


Above two cases, rectangles cannot be divided into two identical squares.

8. **Step 1.** Draw a line segment *BC* 7 cm. Using protractor draw perpendiculars on points *B* and *C*, such that *BA* *CD* 7 cm.

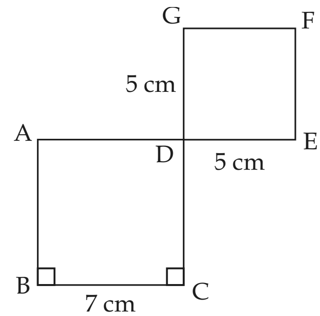


Step 2. Extend *AD* to *E*, such that *DE* 5 cm and extend *CD* to *G*, such that *DG* 5 cm

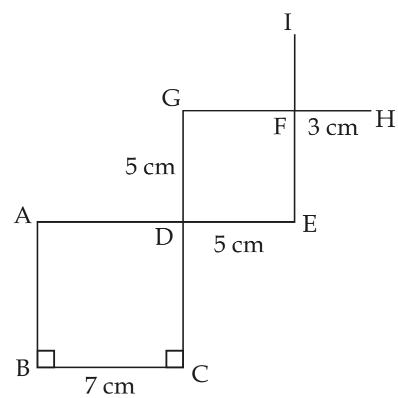


Step 3. Taking *E* and *G* as centres and keeping a distance of 5 cm in compass draw two arcs to intersect each other at *F*.

Join *E* to *F* and *G* to *F*.

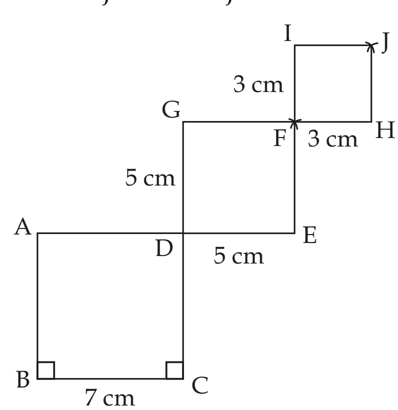


Step 4. Extend *GF* to *H*, such that *FH* 3 cm extend *EF* to *I* such that *FI* 3 cm.



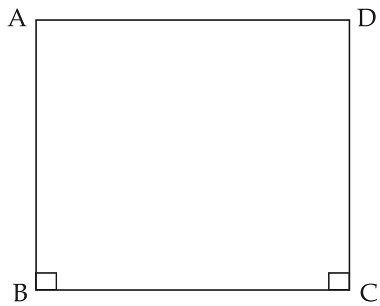
Step 5. Taking *H* and *I* as centres and keeping a distance of 3 cm in compass draw two arcs to intersect each other at *J*.

Join *H* to *J* and *I* to *J*

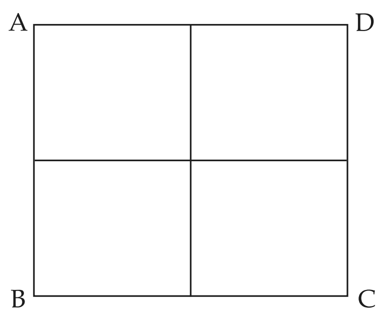


Hence, obtained shape is the required falling squares.

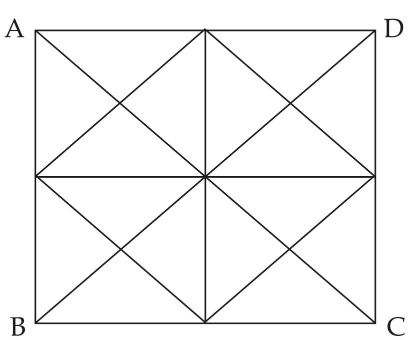
9. **Step 1.** Draw a square with its side 5 cm long as you have drawn earlier.



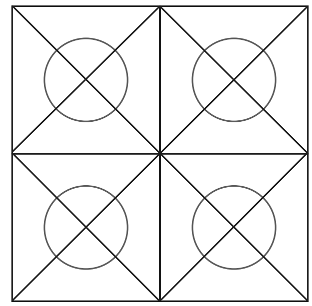
Step 2. Using a ruler or compass mark each side of the constructed square, dividing it into two equal parts and join the opposite marks as shown in the figure.



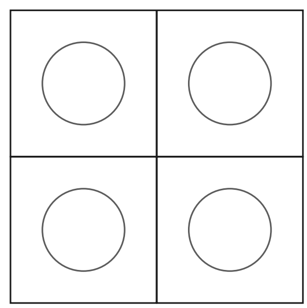
Step 3. Now draw the diagonals of each of the square to get the mid point of each square.



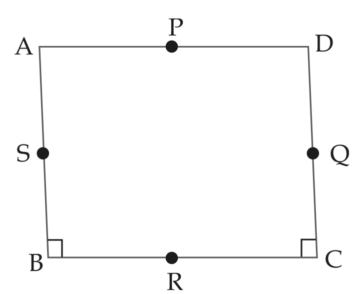
Step 4. With the centre of intersection points of the diagonals and distance 0.5 cm draw the circles.



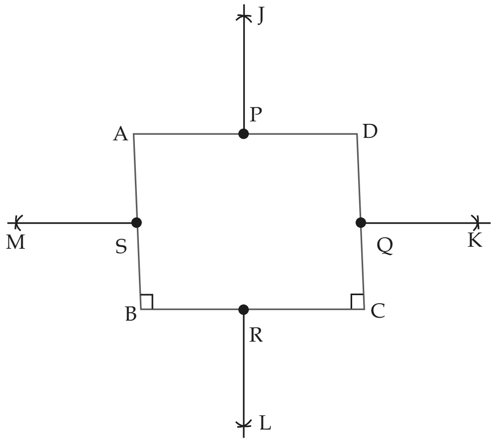
Hence, the following figure is required figure.



10. **Step 1.** Draw a square with its side length equal to 8 cm and mark the mid-points of four sides of it and mark them *PQRS*.

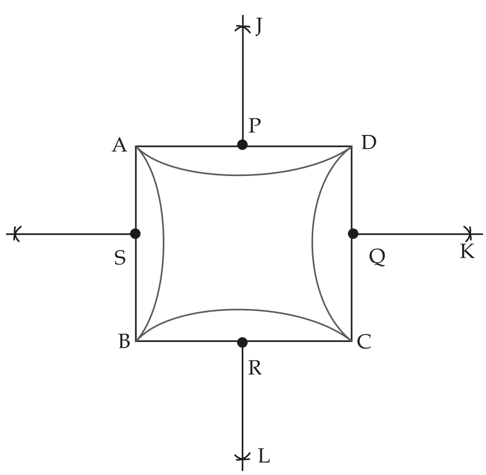


Step 2. Draw perpendiculars *PJ, OK, RL* and *SM* at the mid-points of the sides of the square such that *PJ QK RL SM* 4 cm and join *A* to *M*.



Step 3. Taking *M* as centre and distance in the compass, draw arc to meet *A* and *B*. Similarly, taking the points *J*, *K* and *L* as the centre and keeping the same distance in the compass, draw arcs so that they meet the respective arms both sides.

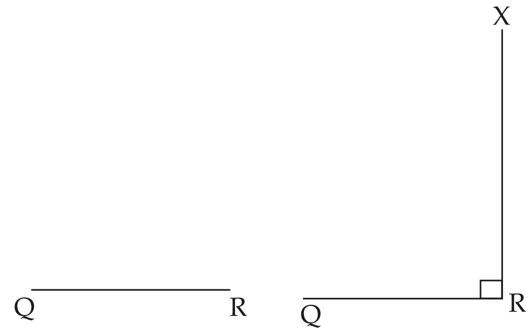
The image thus obtained is the desired image.



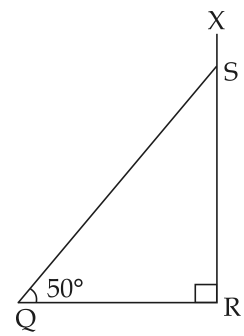
Exercise 8.2

1. **Step 1.** Draw a line segment *QR* with an arbitrary length.

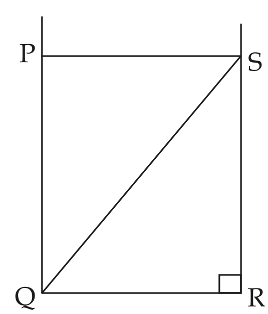
   Step 2. Draw a perpendicular *RX* to *QR* passing through the point *R*.



   Step 3. Draw a line making an angle of 50° with the point *Q* that intersects *RX* at *S*.



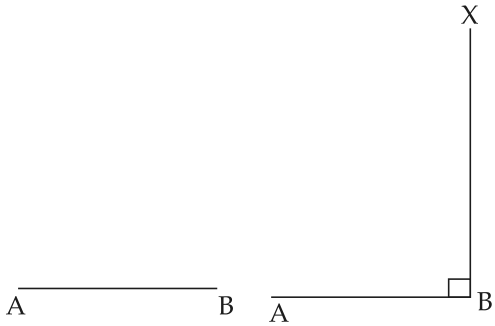
   Step 4. Draw perpendiculars to *QR* and *RS* passing through the points *Q* and *S* respectively. Where these perpendicular lines intersect each other, mark *P*.



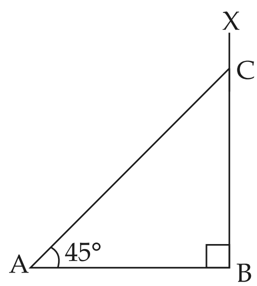
   Hence, *PQRS* is the required rectangle.

2. **Step 1.** Draw a line segment *AB* with arbitrary length.

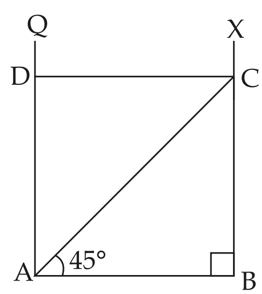
   Step 2. Draw a perpendicular to *AB* through *B*.



Step 3. Draw a line with *A* making an angle of 45°, that intersect *BX* at *C*.



Step 4. Draw perpendiculars to *AB* and *BC* passing through the points *A* and *C* respectively. Where these perpendiculars intersect each other mark *D*.



Hence, *ABCD* is the required rectangle.

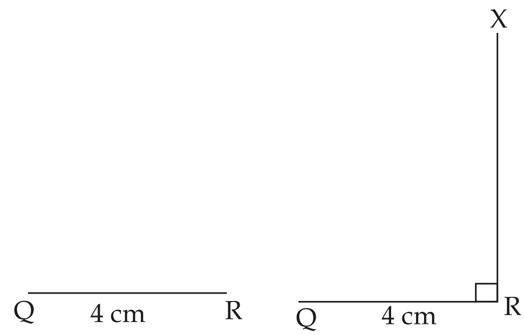
We obtain that the four sides of this rectangle are equal *i.e.,*

AB BC CD DA.

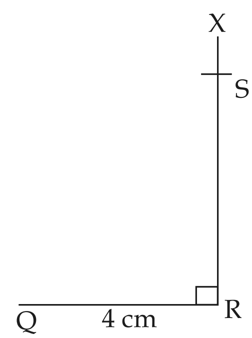
Note: square is a special type of rectangle.

3. Step 1. Draw a line segment *QR* 4 cm.

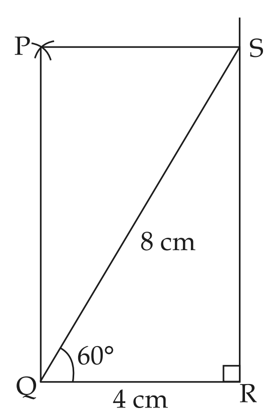
Step 2. Draw a perpendicular line *RX* passing through the point *R*.



Step 3. Taking *Q* as centre and radius 8 cm draw an arc that intersects *RX* at *S*.



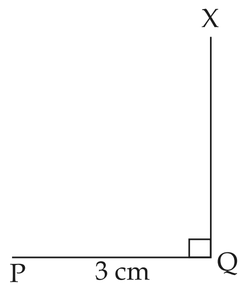
Step 4. Draw perpendiculars to *QR* and *RS* passing through the points *Q* and *S* respectively. At the intersection point of these two perpendiculars mark *P*.



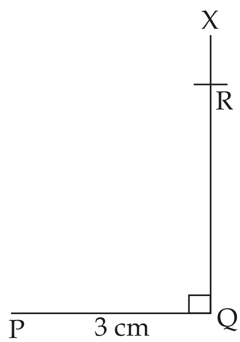
Hence, *PQRS* is the required rectangle.

4. **Step 1.** Draw a line segment *PQ* 3 cm.

Step 2. Draw a perpendicular *QX* to *PQ* through *Q*.



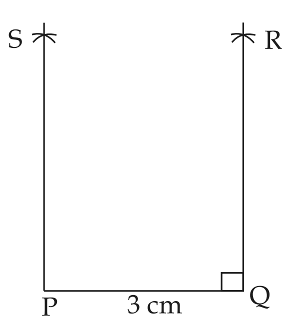
Step 3. Taking *P* as centre and a distance of 7 cm in a compass draw an arc to intersect *QX* at *R*.



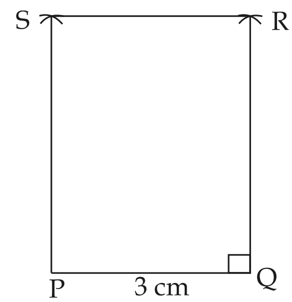
Step 4. Taking *P* as centre and distance equal to *QR* in the compass, draw an arc.

Step 5. Taking *R* as centre and a distance equal to *PQ* 3 cm, draw another arc to intersect the first arc.

Step 6. Mark the intersection point of to arcs as *S*.



Step 7. Join *S* to *R*.



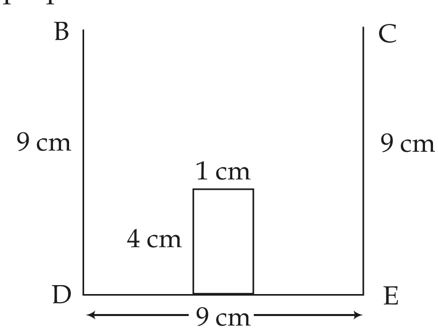
PQRS is the required rectangle.

5. **Step 1.** Draw a line segment *DE* 9 cm.

Step 2. Draw perpendiculars *BD* and *CE* of length 9 cm to *DE* through points *D* and *E* respectively.

Step 3. Mark dots on *DE*, 4 cm away from *D* and *E* respectively.

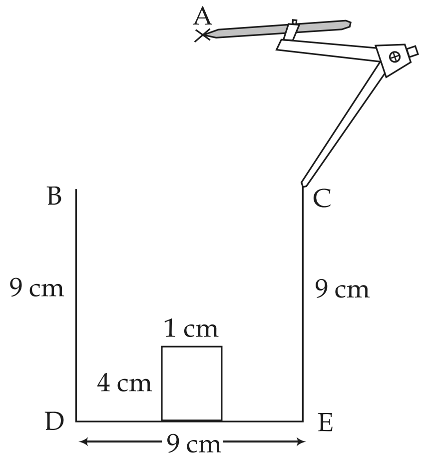
Step 4. Draw perpendiculars through these two dots with height 4 cm each and join the end points of two perpendiculars.



Step 5. With *B* as centre and a distance in the compass 9 cm draw an arc.

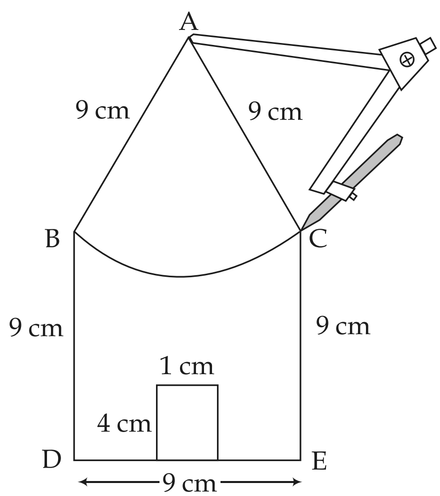
Step 6. Similarly draw another arc with centre *C* and distance 9 cm.

Step 7. Mark as *A* at the intersection point two arcs.



Step 8. Join *A* to *B* and *A* to *C*.

Step 9. Taking 9 cm radius in the compass and from the point *A*, draw an arc touching *B* and *C* as shown in the figure.

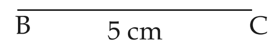


Now, your house is ready.

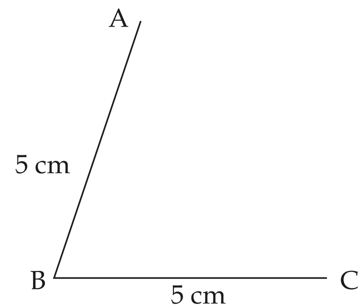
6. Yes, Rhombus is a 4-sided figure in which all sides are equal in length but is not a square.

To construct a rhombus, the following steps should be taken.

Step 1. Draw line segment *BC* 5 cm.

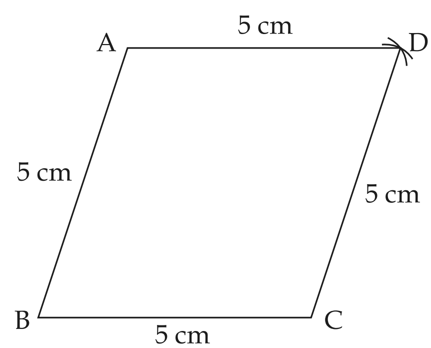


Step 2. Draw a side *AB* of length 5 cm from point *B* making an angle other than 90°.



Step 3. Now, taking *A* and *C* as centres, draw arcs with a compass at a distance of 5 cm which cut each other at point *D*.

Step 4. Join *A* to *D* and *C* to *D*.



Hence, *ABCD* is a rhombus, that has four equal sides but not 4 equal angles. So, it is not a square.

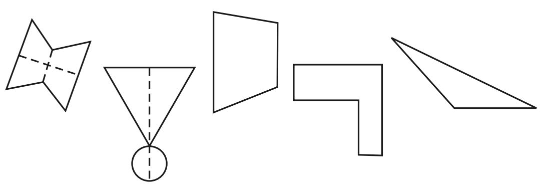
CHAPTER 9

Symmetry

Assignment 9.1

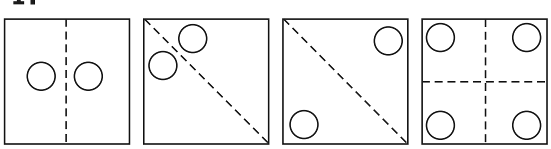
1. In ficus religiosa (Peepal tree leaf), and tortoise there is one line of symmetry.
2. Here, figure (a) has two lines of symmetry. Figure (b) has one line of symmetry.

   Figure (c), (d) and (e) have no line of symmetry.



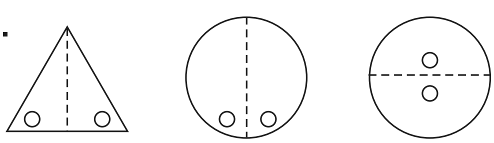
Assignment 9.2

1.

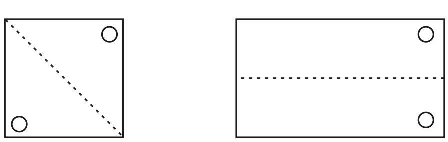


(a) (b) (c) (d)

2.

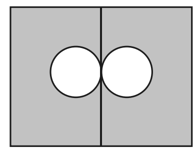
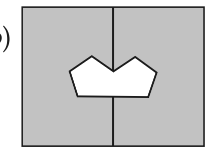


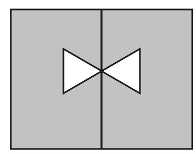
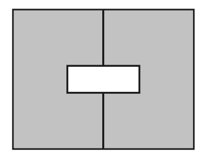
(a) (b) (c)



(d) (e)

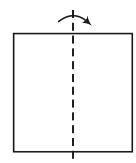
3.

(a)  (b) 

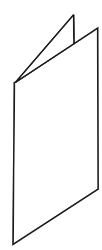
(c)  (d) 

4. To get each of the following shapes, the following steps will be followed :

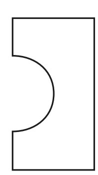
   (i) First fold the square sheet of paper in the middle.



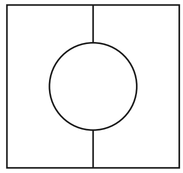
   (ii) Now, pressing it make a crease.



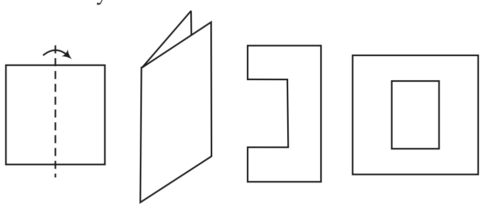
   (iii) Now, cut it with the help of a scissors.



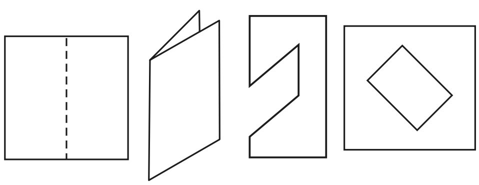
(iv) And then open it.



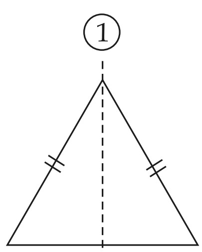
(b) Similarly



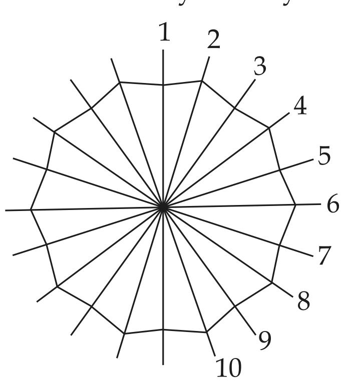
(c) Similarly



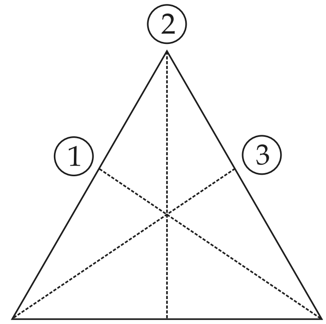
5. (a) Only one line of symmetry.



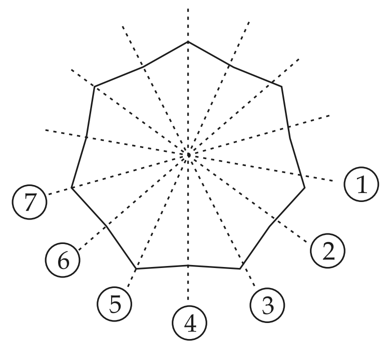
(b) A decagon has 10 sides with it, so it has 10 lines of symmetry.



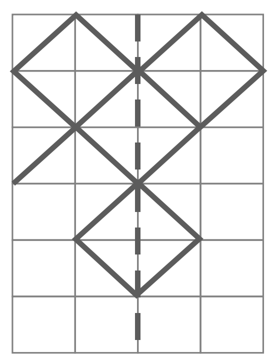
(c) Three lines of symmetry.



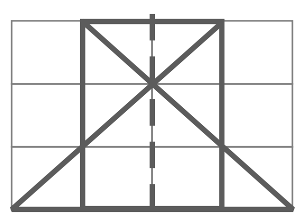
(iv) A regular seven sided polygon has seven lines of symmetry.



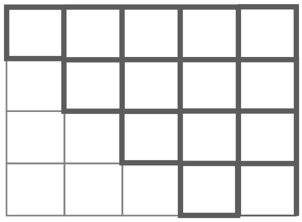
6. (a) One line of symmetry



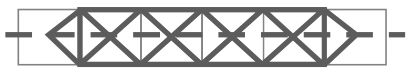
(b) One line of symmetry



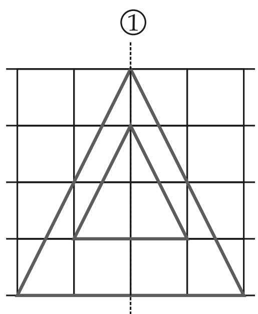
(c) No line of symmetry



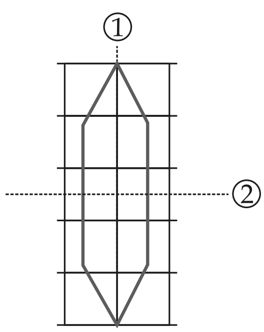
(d) Two lines of symmetry



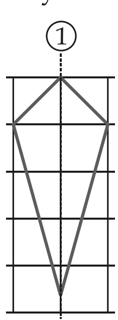
7. (a) One line of symmetry



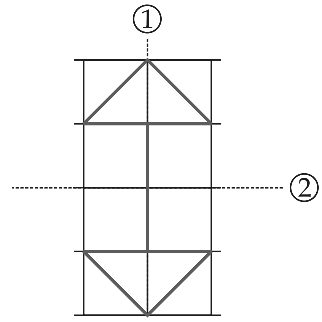
(b) Two lines of symmetry



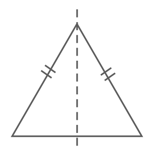
(c) One line of symmetry



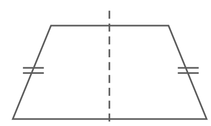
(d) Two lines of symmetry



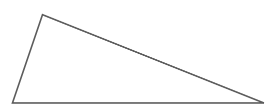
8. (a) An isosceles triangle has only one line of symmetry.



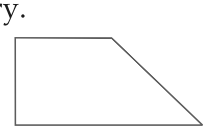
(b) A trapezium in which non parallel lines are equal.



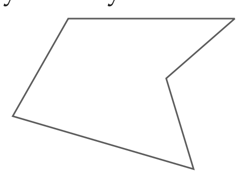
9. (a) A scalene triangle has all three sides unequal, so it has no line of symmetry.



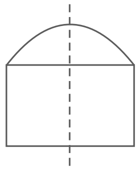
(b) A quadrilateral that has no pair of equal sides has not a line of symmetry.



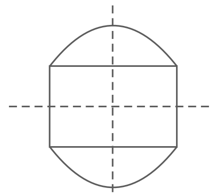
(c) All the irregular polygons have no line of symmetry.



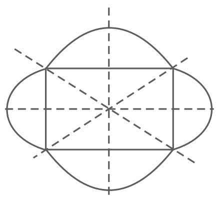
10.



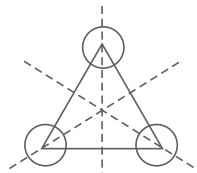
(a)



(b)

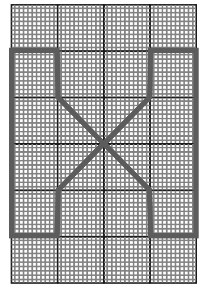


(c)

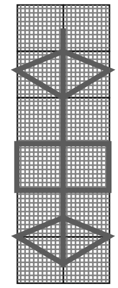


(d)

(e)

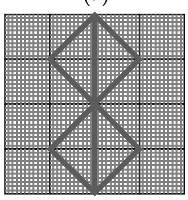


(f)

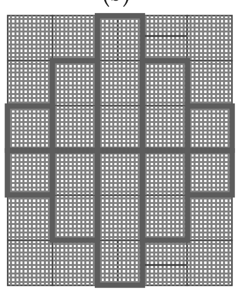


11.

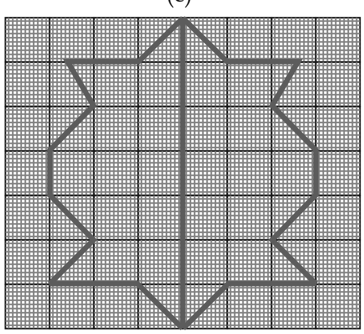
(a)



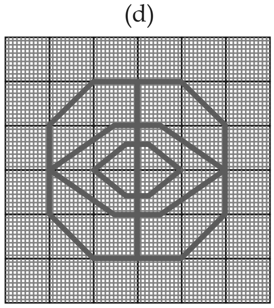
(b)



(c)

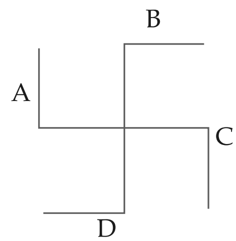


(d)



Assignment 9.3

1. (a) To find the angle of rotate symmetry rotate the figure by 90



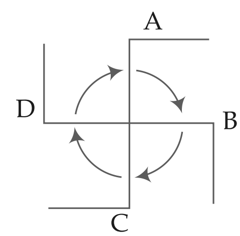
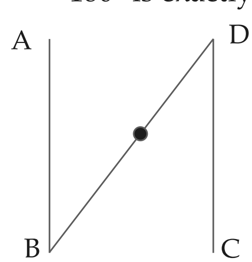
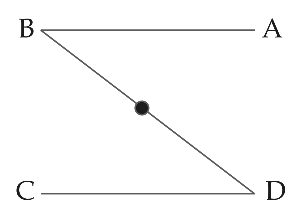


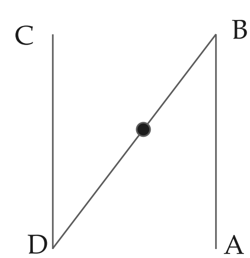
Figure after rotating at 90 is exactly the same

(b) Figure after rotating at an angle of 180 is exactly the same.



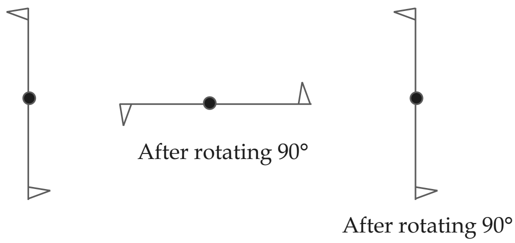


After rotating 90°



After rotating 90°

(c) Figure after rotating an angle of 180 is exactly the same as in the question.



2. Observing carefully it will be clear that the figures (b), (c), (d), (e) and (h) have more than one angle of symmetry. While the figure (a), (f) and (g) have only one angle of symmetry.

3. The order of rotational symmetry is the number of times a shape can be rotated around a full circle and still look the same. Here

(a) 2 (b) 2 (c) 1 (d) 6
(e) 3 (f) 4 (g) 3 (h) 2

Observing carefully it will be clear that all the figures except (c) have more than one angle of symmetry.

4. The order of rotational symmetry is the number of time a shape can be rotated around a full circle and still look the same.

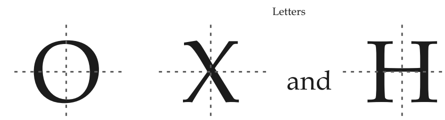
(a) 2 (b) 1
(c) 6 (d) 3
(e) 4 (f) 5

Assignment 9.4

1. The letters given below have the reflection symmetry :

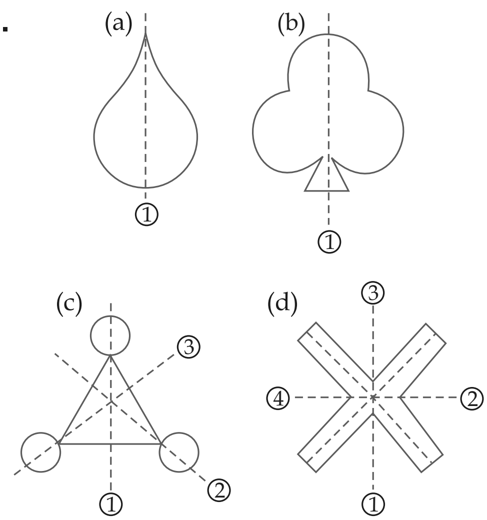
have reflection symmetry about vertical mirror letters.

have reflection symmetry about horizontal mirror.

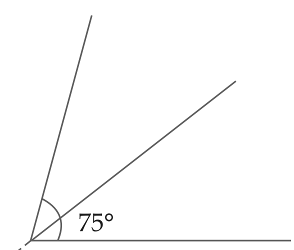


have reflection symmetry about both vertical and vertical mirror.

2.



3.



Hnce, the angle of symmetry 37.5 .

4. (a) Since, the wheel has 36 spokes, so pair of spokes $\frac{36}{2}$ 18

Thus, the number of line of symmetry 18

(b) Number of angles of symmetry Number of lines of symmetry.

Hence, number of angles of symmetry 18

(c) The value of smallest angle of symmetry $\frac{360}{18}$ 20

(d) The order of symmetry 18

5. F, G, J, L, N, P, Q, R, S, Z are the letters whose no line of symmetry can be drawn.

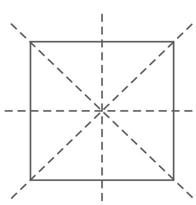
6. A shape with the smallest angle of 83° cannot have rotational symmetry because 83 is not a factor of 360.

   A shape with the smallest angle of 6° can have rotational symmetry because 360° 6 60, which means there are 60 angles of symmetry.

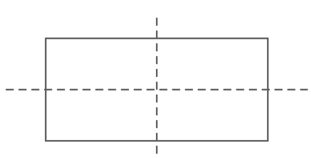
   There will be 60 lines in such symmetry.

7. A figure with a smallest angle of 83 cannot have rotational symmetry since 83 is not a factor of 360.

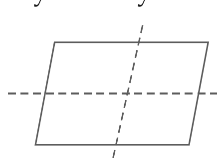
   A figure with a smallest angle of 6° can have rotational symmetry because $\frac{360}{6}$ 60, meaning it has 60 angles of symmetry.

(a) Square 

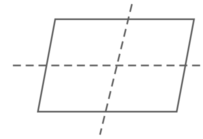
order of rotational symmetry = 4

(b) Rectangle 

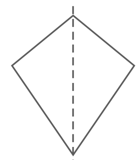
order of rotational symmetry = 2

(c) Parallelogram 

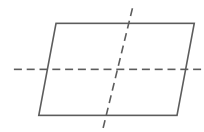
order of rotational symmetry = 2

(d) Rhombus 

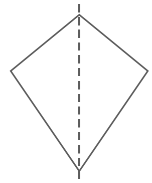
order of rotational symmetry = 2

(e) 

order of rotational symmetry = 1

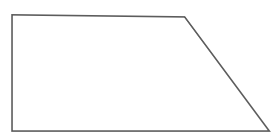
(d) Rhombus 

order of rotational symmetry = 2

(e) 

order of rotational symmetry = 1

(f) An irregular quadrilatural



order of rotational symmetry = 1

8. (i) (a), (ii) (a), (iii) (b), (iv) (b), (v) a, (vi) (b), (vii) (a), (viii) (b), (ix) (c), (x) (a), (xi) (a), (xii) (b), (xiii) (a), (xiv) (a), (xv) (a).

TEXTBOOK EXERCISES

Exercise 9.1

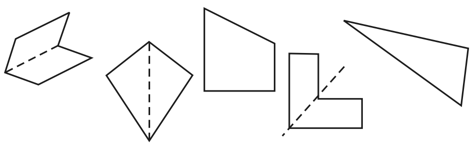
1. There are six lines of symmetry in flower.

There is only one line of symmetry in butterfly.

Rangoli has four lines of symmetry.

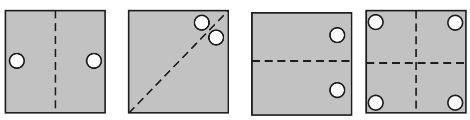
Pinwheel has no line of symmetry.

2. First two figures have one line of symmetry but next three figures have no line of symmetry, as shown in the figures given below :



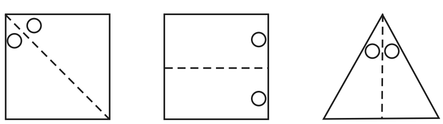
Exercise 9.2

1.

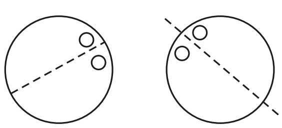


Since the figure (d), has single hole, the paper was folded twice-first to create a half and then again to create a quarter.

2.



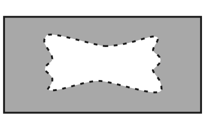
(a) (b) (c)



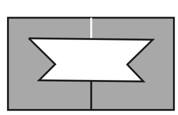
(d) (e)

3. The images that we get are given below.

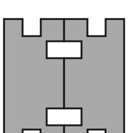
(a)



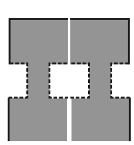
(b)



(c)



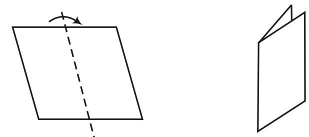
(d)



4. (a) To get each of these shapes, the following steps will be followed :

(i) Firstly fold the square paper in its middle line.

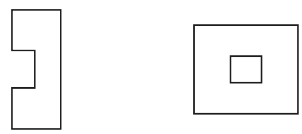
(ii) Now, pressing it make a crease.



(i) (ii)

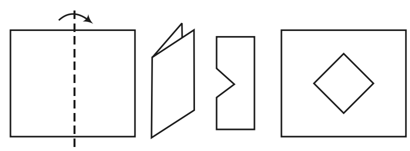
(iii) Now, cut it with the help of a scissors.

(iv) Now, open it

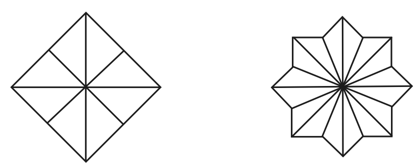


(iii) (iv)

(b) Similarly,

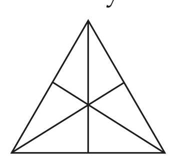


5. (a)

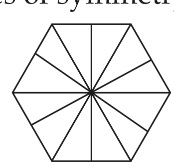


4-Lines symmetry 8-Lines of symmetry

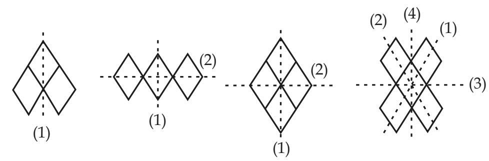
(b) Three lines of symmetry.



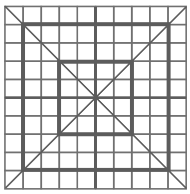
(c) Six lines of symmetry.



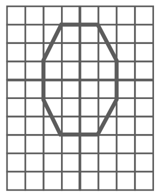
6.



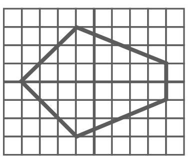
One line of symmetry | Two lines of symmetry | Two lines of symmetry | Four lines of symmetry



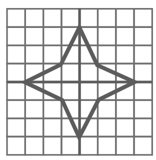
Four lines of Symmetry



Two lines of Symmetry



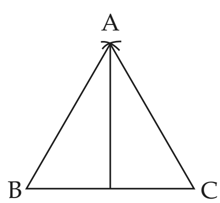
One line of Symmetry



Four lines of Symmetry

7. No line of symmetry is in this figure.

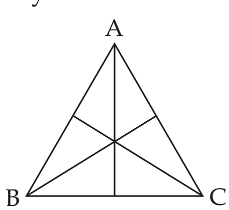
8. (a) If any two sides of a triangle are equal then one line of symmetry can be drawn.



Here,

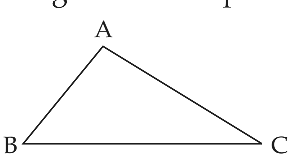
side *AB* side *AC*

(b) A triangle with three lines equal has three symmetric lines.



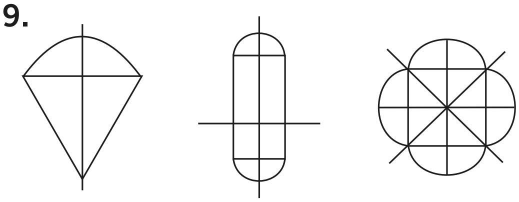
Here, *AB* *BC* *CA*

(c) No line of symmetry can be drawn for a triangle with unequal sides



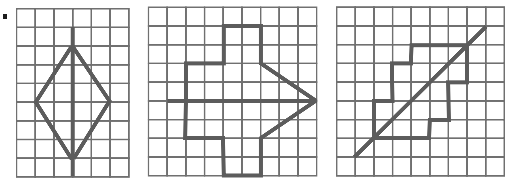
Here, *AB* *BC* *CA*

9.

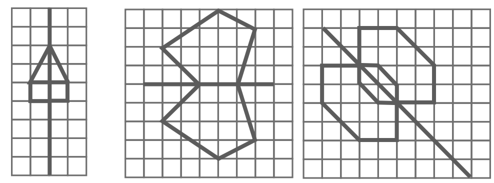


(a) (b) (c)

10.

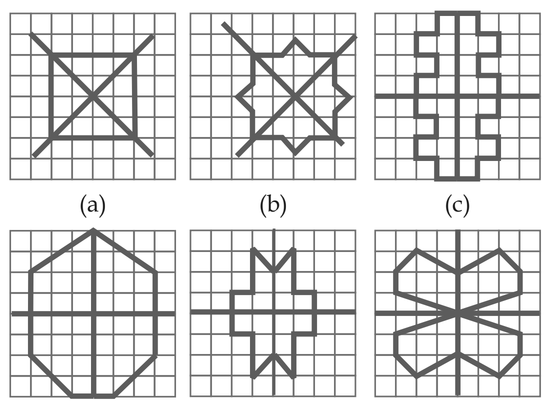


(a) (b) (c)



(d) (e) (f)

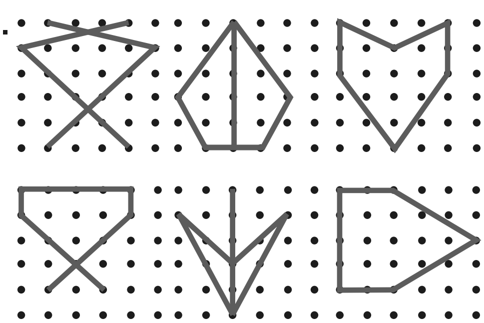
11.



(a) (b) (c)

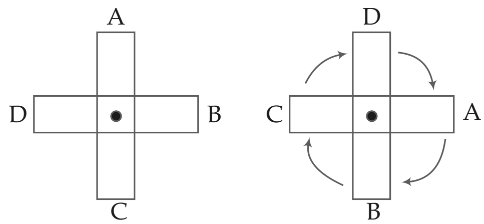
(d) (e) (f)

12.



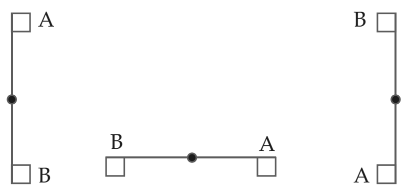
Exercise 9.3

1. (a) To find the angle of symmetry rotate the figure by 90 .



The figure after rotation of 90 is exactly the same.

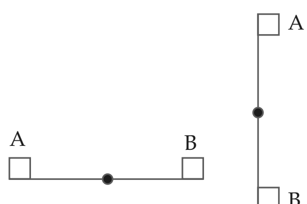
Hence, 90 is the angle of symmetry.



Initial figure

After one rotation of 90°

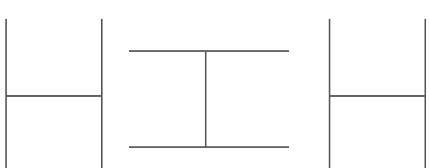
After two rotation of 90° or 180°



After another rotation of 90° i.e., 270°

A rotation of 90 result in the figure above. And it does not overlap the initial figure. The figure comes back to its original shape only after one complete rotation 90° + 90° + 90° + 90° = 360°

Hence, 360 is the angle of symmetry.



initial figure

after one rotation of 90°

after another rotation of 90°

The figure after rotation of 90 90 180 is exactly the same.

Hence, 180 is the angle of symmetry.

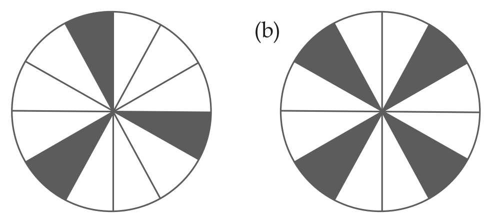
2. All options except (g) have multiple angles of symmetry. This indicates that these figures passes various ways to rotate and maintain their original appearance.

Exercise 9.4

1.

(a)

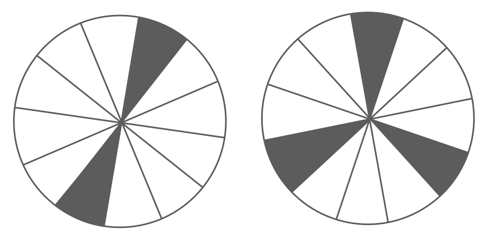
(b)



Will look same after every rotation of 120°

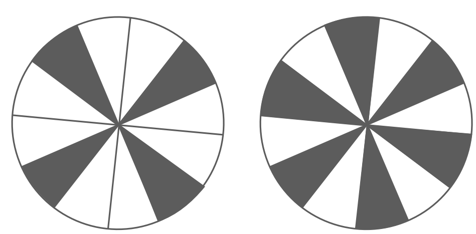
Will look the same after every rotation of 90°.

(c) There are four possible ways



2 angles of rotation

3 angles of rotation



4 angles of rotation

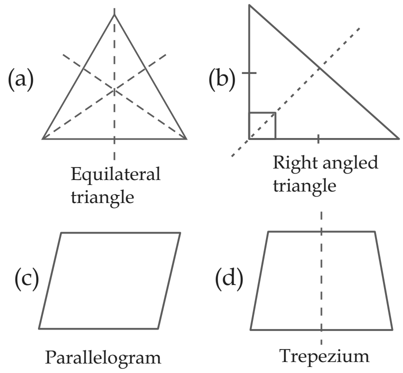
6 angles of rotation

2.

Oval

Rectangle

3.

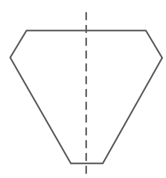


4. As 60 is the smallest angle, other angles of symmetry will be the multiple of 60 upto 360 . Here, the angles are 120 ,180 ,240 ,300 and 360 .

5. (a) Yes, as 360 is a multiple of 45 .

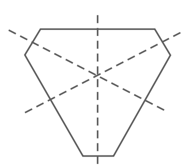
(b) No, as 360 is not a multiple of 17 .

6. (a) The outer boundary of the picture shows reflection symmetry. It has only one line of symmetry.



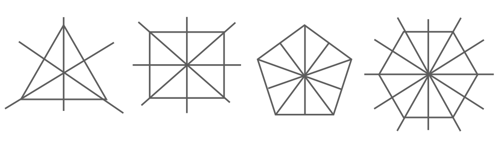
Picture shows the line of reflection symmetry.

(b) Yes, it has rotational symmetry.



It has 3 lines of symmetry.

7.



A 3-sided regular polygon that is called equilateral triangle has 3 lines of symmetry.

A 4-sided regular polygon that is called a square has 4 lines of symmetry.

A 5-sided regular polygon that is called regular pentagon has 5 lines of symmetry.

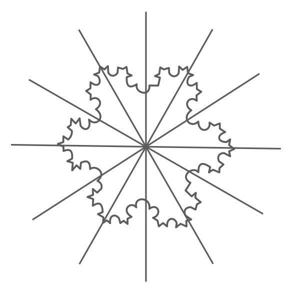
A 6-sided regular polygon that is called a regular hexagon has 6 lines of symmetry

Hence, number sides in a regular polygon Number of lines of symmetry.

So a regular octagon has 7 lines of symmetry, a regular octagon has 8 lines of symmetry, a regular nonagon has 9 lines of symmetry and a regular decagon has 10 lines of symmetry.

We can see a clear pattern : the number of sides in a regular polygon equals the number of lines of symmetry, the number sequence is : 3, 4, 5, 6, 7, …… .

8.



9. The Ashoka Chakra has 24 spokes at an equal distance in the circle. 24 spokes make 12 pairs. Line through the circle joining to two points is a line of symmetry.

Hence, the Ashoka Chakra has 12 lines of symmetry.

The number of angle of symmetry Number of lines of symmetry

Hence, Ashoka Chakra has 12 angles of symmetry. The smallest angle of symmetry 360 12 30

CHAPTER 10

The Other Side of Zero

Assignment 10.1

1. The starting floor is 4 (The Ice cream centre) and the number of button pressed is (5)

Therefore, Target floor

starting floor + movement

(4) (5)

1 (The toys centre)

2. (a) (2) (4) …

Given the starting floor is (2) (The Art Centre) and the number of button pressed 4

Therefore, Target floor

Starting floor + Movement

(2) (4)

6 (The space centre)

(b) (5) (3) …

Given, the starting floor is 5 (The Sports) and the number of button pressed is 3

Therefore, Target floor

Starting floor + movement

(5) (3)

2 (The Art centre)

(c) (6) (4) ….

Given the starting floor is 6 (The space centre) and the number of button pressed is 4.

Therefore, Target floor

starting floor movement

(6) (4)

2 (The Art Centre)

(d) 0 (3) …

Given the starting floor is 0 (The Reception Hall at ground floor) and other button pressed 3

Therefore, Target floor

= starting floor + movement

0 (3)

3 (The Cinema Theater)

(e) 0 5 …

Given the starting floor is 0 (The Reception Hall at ground floor) and the button pressed is 5

Therefore, The Target floor

Starting floor + movement

0 (5)

5 (The Dinosour)

(f) (2) (2) …

Given, the starting floor is 2 (The Art Centre) and the button pressed is 2

Therefore, The Target floor

Starting floor + Movement

(2) (2)

0 (The Reception Hall on the Ground floor)

(g) (5) (5) ….

Given, the starting floor is 5 (Sport Centre) and the button pressed is 5

Therefore, Target floor

= Starting floor + Movement

(5) (5)

0 (The Reception Hall at the Ground Floor)

3. Since all five girls enter on the ground floor and go in the lift. So the starting floor for all five girls is 0.

First girl presses the button of 5

So, her destination 0 (5)

5

(The Dinosours Centre)

So her destination 0 (4) 4

(The Ice Cream Centre)

The third girl presses the button of 1

So, her destination 0 (1)

1 (The Food Court)

The fourth girl presses the button of 3

So, her destination 0 (3) 3

(The Cinema Theater)

The fifth girl presses the button of 6

So, her destination 0 (6)

6 (The Space)

4. (a) (23) (23) 46

(b) (8) (15) 7

(c) (17) (24) 7

(d) (68) (68) 0

(e) (149) (151) 2

(f) (30) (45) 15

(g) (124) (69) 55

(h) (58) (29) 87

(i) (17) (28) 11

(j) (65) (96) 31

5. (a) Given, (50) … 40

Let (50) x 40

or x 40 50 90

Hence (50) (90) 40

(b) Given (30) … 0

Let (30) x 0 or x 0 (30)

x (30)

Hence (30) (30) 0

(c) Given (300) … 100

Let (300) x 100

or x (100) (300)

x 200

Hence (300) (200) 100

(d) Given, (800) … 100

Let (800) x 100

or x (100) (800)

x 900

Hence, (800) (900) 100

(e) Given (700) … 300

Let (700) x 300

or x (300) (700)

x 1000

Hence, (700) (1000) 300

(f) Given (650) … 1000

Let (650) x 1000

or x 1000 (650) 1650

Hence (650) (1650) 1000

6. (a) Given, (229) …. (550)

Let (229) x (550)

or x (550) (229)

x 321

229 (321) (550)

(b) Given, (345) … (246)

Let (345) x (246)

or x 246 (345)

246 345 (99)

(345) (99) 246

(c) Given, (314) …. (314)

Let (314) x (314)

or x (314) (314)

x (314) 314 628

(314) (628) 314

(d) Given, (216) … (739)

Let (216) x (739)

or x (739) (216) 523

Hence, (216) (523) (739)

(e) (564) … (126)

Let (564) x (126)

or x 126 (564) (690)

Hence, (564) (690) (126)

(f) Given, (764) … (524)

Let (764) (x) (524)

or x (524) (764)

x 524 764

x (240)

Hence, (764) (240) (524)

(g) Given, (313) … (224)

Let (313) x (224)

or x (224) (313)

x 224 313 (89)

Hence, (313) (89) (224)

(h) Given, (924) … (648)

Let (924) x (648)

or x (648) (924)

648 924 276

Hence, (924) (276) (648)

Assignment 10.2

1. (a) Both the numbers 2 and 2 are at the equal distance from 0, 2 is to the right and 2 is to the left of the 0.

(b) A positive number is always greater than all the negative numbers.

Hence 10 100

(c) Since, 0 has no sign with it, so the additive inverse of 0.

(d) The distance between 2 and +2 is

2 (2) 2 2 4 units.

(e) Let x be added to 19 to get 10 therefore

19 x 10

or x 10 19

x 29

Hence, +29 should be added.

(f) The distance between (12) and (12) is

(12) (12)

12 12 24 units.

2. If the sum of two numbers is 0, then two numbers are additive inverse of each other. For example :

(12) (12) 0

Hence, 12 is the additive inverse of 12 and (12) is the additive inverse of (12).

3. (a) Given 100 0

On adding 0 to any number does not change the value of the number.

Hence, 100 0 100

(b) Given, 25 (25)

Adding a number to its negative counter part gives the result 0

Hence, 25 (25) 0

(c) Given, 100 (200)

To add numbers with different signs, subtract smaller absolute value from larger absolute value and take the sign from the larger absolute value.

Hence, 100 (200) 100

(d) Given, 500 700

On subtracting a larger number from a smaller number gives a negative result.

Hence, 500 700 200

(e) Given, 38 (38)

Subtracting a negative number is the same as adding the positive counter part of the number.

Hence, 38 (38) 38 38 76

(f) Given, 80 (100)

On subtracting a negative number is the same as adding the positive counter part of the number

80 (100) 80 (100) 20

4. Given (8) (6)

On Representing the given number as tokens, we get

On combining two groups, we get

Hence, (8) (6) 14

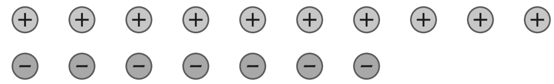
(b) Given, (9) (18)

On representing the given numbers as tokens we get

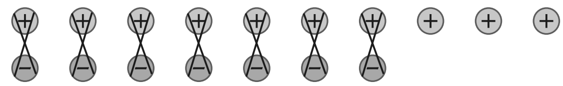
Hence (9) (8) 17

(c) Given, (10) (7)

On representing the given numbers as tokens, we get



On combining two groups, we get

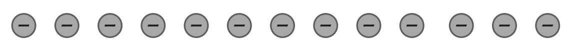


Hence, (10) (2) 3

(d) Given (10) (3)

On representing the given numbers as tokens, we get

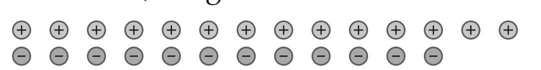
On combining these two groups of tokens, we get



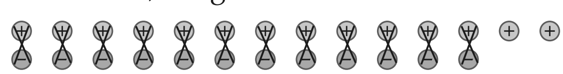
Hence (10) (3) 13

(e) Given, (14) (12)

On representing the given numbers as tokens, we get



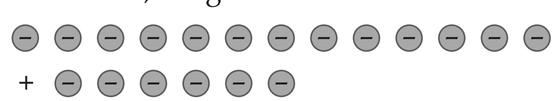
On combining these two groups of tokens, we get



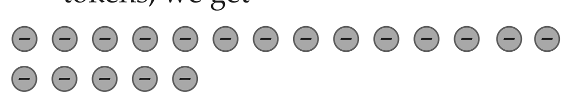
Hence (14) (12) 2

(f) Given (13) (6)

On representing given numbers as tokens, we get



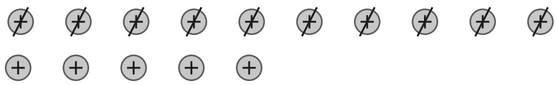
On combining these two groups of tokens, we get



Hence (13) (6) 19

5. (a) Given (15) (10)

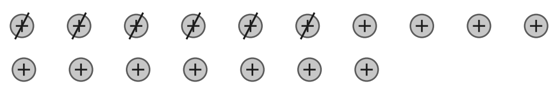
Here, from 15 positives take away 10 positives



Hence, (15) (10) 5

(b) Given (17) (6)

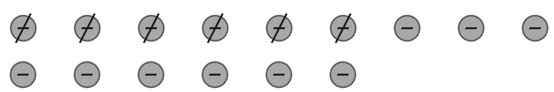
Here, from 17 positives tokens take away 6 positive tokens.



Hence, (17) (6) 11

(c) Given (15) (6)

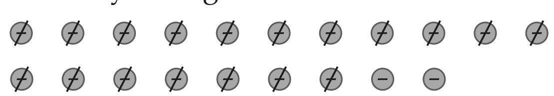
Here, from 15 negatives tokens take away 6 negative tokens.



Hence, (15) (6) 11

(d) Given (20) (18)

Here, from 20 negative tokens take away 18 negative tokens.



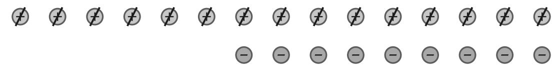
Hence, (20) (18) 2

(e) Given (6) (15)

Here, from 6 positive tokens take away 15 positive tokens. But there are not enough tokens to take out 15 positive tokens from 6 positive tokens.

So, put an extra 9 zero pairs of positive tokens and 8 negative tokens.

Now we can take away 15 positive tokens.

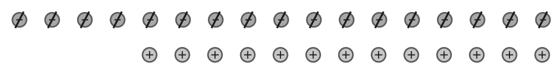


Hence, (6) (15) 9

(f) (4) (17)

Here, from 4 negative take away 17 negatives but there are not enough negative tokens to take away 17 negatives from 4 negatives

So, put an extra 13 zero pairs of negative tokens and positive tokens.

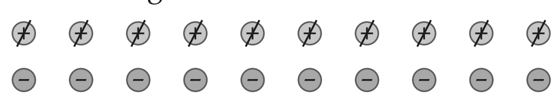


Now, we can take away 17 negative tokens.

Hence, (4) (17) 13

6. (a) Given, 0 (10)

Here, from 0 tokens take out 10 positive tokens. But there is no token to take away 10 positive tokens so, put an extra 10 zero pairs of positive and negative tokens.



Now we can take away to positive tokens.

Hence, 0 (10) 10

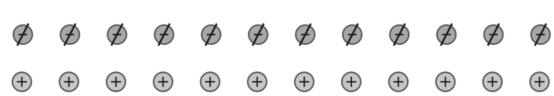
(b) Given, 0 (12)

Here, from zero tokens take away 12 negative tokens.

But there are not enough tokens to take away 12 negative tokens.

So put an extra 12 zero pairs of negative and positive tokens.

Now, we can take away 12 negative tokens.

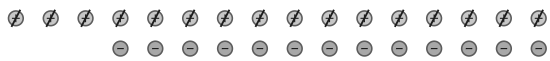


Hence, 0 (12) 12

(c) Given (3) (16)

Here, from 3 positive tokens take away 16 positive tokens.

But there are not enough tokens to take away 16 positive token from 3 positive tokens. So, put an extra 13 zero pairs of positive and negative tokens.



Hence (3) (16) 13

(d) Given (15) (17)

Here, from 15 positive take away 17 positives. But there are not enough tokens to take away 17 positive from 15 positive tokens.

So, put an extra 2 pairs of positive and negative tokens.

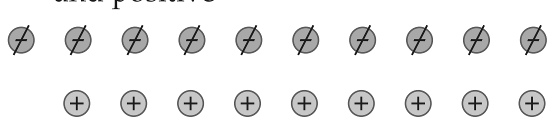
Now, we can take away 17 positive tokens.

Hence, (15) (17) 2

(e) Given, (1) (10)

Here, from 1 negative take away 10 negative. But there are not enough tokens to take away 10 negative from 1 negative token.

So, put an extra 9 pairs of negative and positive



Now, we can take away 10 negative tokens.

Hence, (1) (10) 9

(f) Given, (19) (20)

Here, from 19 negatives take away 20 negatives. But there are not enough tokens to take away 20 negative tokens from 19 negative tokens. So put an extra on zero pair of negative and positive tokens.

Now, we can take away 20 negatives

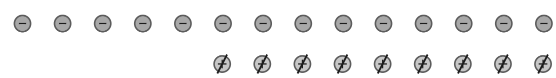
Hence (19) (20) 1

7. (a) Given, (5) (9)

Here, from 5 negatives tokens take away 9 positive tokens.

But there is no positive token to be taken out in the set so we put an extra 9 zero pairs of negative and positive token.

Thus, we get



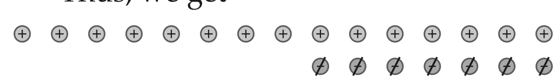
Now, we can take out 9 positive tokens.

Hence, (5) (9) 14

(b) Given, (8) (7)

Here, from 8 positive tokens take away 7 negative tokens. But there is no positive token to be taken out in the set. So, we put an extra 7 zero pairs of negatives and positives tokens.

Thus, we get



Now, we can take out 7 negative tokens

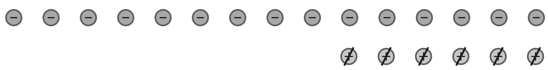
Hence, (8) (7) 15

(c) Given, (9) (6)

Here, from 9 negative tokens take out 6 positive tokens. But there is no positive token to be token out in the set

So, we put an extra 6 zero pairs of negatives and positive tokens.

Thus, we get



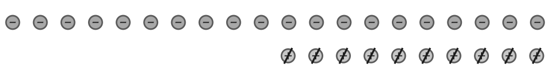
Now, we can take away 6 positive tokens

Hence, (9) (6) 15

(d) Given, (10) (10)

Here from 10 negative tokens take away 10 positive tokens. But there is no positive token to be taken away in the set. So we put an extra 10 zero pairs of negative and positive tokens.

Thus, we get



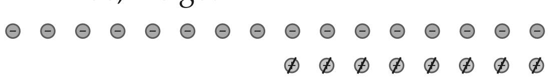
Now, we can take away 10 positive tokens.

Hence, (10) (10) 20

(e) Given, (8) (8)

Here, from 8 negative tokens take out 8 negative tokens. But there is no negative to be taken out in the set. So we put an extra 8 zero pairs of negative and positive tokens.

Thus, we get



Now, we can take away 8 positive tokens. Hence, (8) (8) 16

(f) Given, (12) (6)

Here, from 12 positive tokens take away 6 negative tokens. But there is no negative token to be taken out in the set. So, we put an extra 6 zero pairs of positive and negative tokens.

Thus, we get

Now, we can take out 6 negative tokens

Hence, (12) (6) 18

Assignment 10.3

1. Bhavya starts his bank account with ₹0. He respective deposits are ₹2000, ₹5000 and ₹7000.

Total value of credits

₹2000 ₹5000 ₹7000

₹14000

Bhavya's debits are ₹6000, ₹8000 and ₹9000

₹23000

So Bhavya's bank account balance

Credit debits

₹14000 ₹23000

₹9000

Hence Bhavya's bank account balance ₹9000

2. Shruti's credits ₹3000, ₹2000, ₹5000, ₹10000 and ₹1000 ₹21,000

Her debits are ₹7000 and ₹4000

Total amount of debits

₹7000 ₹4000 ₹11000

So, Shruti's bank account balance after the year

Credit debits

₹21000 ₹11000 ₹10000

Hence, Shruti's bank account balance ₹10000

3. The puzzle is given below

2	7	6
9	–2	8
4	10	1

13	3	2
–1	10	9
6	5	7

4.

(a)

8	–21	6
–18		2
3	–11	1

(b)

–5	1	–2
–9		4
8	–6	–8

(c)

5	2	–8
–7		3
1	–6	4

(d)

8	–11	9
–5		–2
3	4	–1

(e)

–16	5	6
7		0
4	2	–11

(f)

2	5	–10
–9		–1
4	–15	8

5. (a) 4, 3, 2, 1, 0, 1, 2, 3, 4

(b) (8), (7), (6), (5), (4), (3), (2), (1)

(c) (3), (4), (5), (6), (7), (8), (9)

(d) (2), (1), 0, 1, 2, 3, 4, 5, 6

(e) (40), (39), (38), (37), (36)

(f) (82), (81), (80)

6. (i) (13) (10) (6) (2) (5)

24

(ii) 29 (22) (8) (10) (13)

24

(iii) (8) (7) (3) (3) (17)

24

7. The faces of two dice have same numbers : 1, 2, 3, 4, 5, 6. First of all we will find the possible numbers on rolling both the dice. Very first we list the sum of two negative numbers,

(2) (2) 4
(2) (4) 6
(2) (6) 8
(4) (4) 8
(4) (6) 10
(6) (6) 12

Secondly we list the sum of one negative and one positive.

2 1 1
2 3 1
2 5 3
4 1 3
4 3 1
4 5 1
6 1 5
6 3 3
6 5 1

Now, we find the list of sum of two positive numbers

1 1 2
1 3 4
1 5 6
3 3 6
3 5 8
5 5 10

Now, list all the possible number sequence in increasing order

(1), (3), (4), (5), (6), (8), (10), (12), 1, 2, 3, 4, 6, 8, 10

Hence, the sum of numbers that are not possible between (12) and 10 are (11), (9), (7), (2), 0, 5, 7 and 9.

8. (a) 130 175 45

(b) (130) (175)

(130) (175) 305

(c) (175) (130)

(175) (130) 45

(d) (175) (130) 305

(e) 180 (175) 5

(f) 175 (130) 175 130 305

9. (a) Present year is 2025. So 223 years ago from the year 2025

2025 223 1802

Hence, it was the year of 1802

(b) Present year is 2025. So, 2200 years ago from the year 2025

2025 2200 176

Hence, it was the year of 176.

But the year can not be calculated by negative terms.

Thus, 176 corresponding to 177 BCE (Before the Common Era)

Hence, 2200 years ago it was the year 177 BCE.

10. (a) The difference between two consecutive numbers are (73) (80) 7

(66) (73) 7

(59) (66) 7

(52) (59) 7

So, the next 4 terms will be

(52) 7 45,

(45) 7 38, (38) 7 31

and 31 7 24.

Hence, the sequence 80, 73, 66,

59, 52, 45, 38, 31, 24.

(b) The difference between two consecutive numbers is 40 35 5

35 29 6

29 22 7

22 14 8

14 5 9

In the sequence difference between two consecutive numbers is increasing by 1.

Hence, the term before 40 4 44

and the first term 44 3 47

and the term of 5 10 5, the term after 5 11 16, 16 12 28,

28 13 41

Hence, the sequence is **47, 44, 40, 35, 29, 22, 14, 5, 5, 16, 28, 41.**

11. The cards can be picked up as below :

(i) (31) (9) (6) (5)

51 closer to 50

(ii) (31) (1) (8) (6) (5)

49 49 closer to 50.

(iii) (31) (9) (1) (8)

49 closer to 50

12. (a) Positive + Positive + Negative.

It may be positive or negative or zero depends on the absolute values of integers. For example :

(20) (30) (35) 15 (Positive)

(30) (25) (60) 5 (Negative)

(40) (35) (75) 0 (Zero)

(b) Positive + Negative + Negative.

It may be positive or negative or zero depends on the absolute values of integers. For example :

(80) (60) (15) 5 (Positive)

(80) (70) (15) 5 (Negative)

(80) (65) (15) 0 (Zero)

(c) Positive Negative Negative.

Since to subtract a negative numbers. its five counter part is added. So, it is always positive. For example :

(80) (65) (15)

(80) (65) (15)

160 (Positive)

(d) Negative Positive Positive.

Since to subtract a positive integer its negative counter part is added. So it is always negative. For example :

(150) (210) (90)

150 210 90 450

(Negative)

(e) Negative Positive + Negative.

It is always a negative integer as subtracting a positive integers, its negative counter part is added. For example.

(89) (11) (120)

89 (11) (120)

220 (Negative)

(f) Negative + Positive + Positive.

It may be positive or negative or zero, depends on the absolute values of integers. For example :

(100) (29) (41) 30 (Negative)

(100) (89) (41) 30 (Positive)

(100) (89) (11) 0 (Zero)

13. The value of one black token (5)

So the value of 5 black tokens

5 5 25

The value of one red token 8

So the value 4 red token

8 4 32

The value of one white token 3

So the value of 7 white token

3 7 21

The value of one green token 6

So the value of 4 green tokens

6 4 24

Total value of tokens in a bag

(25) (32) (21) (24)

(53) (49)

(53) (49) 4

The total value of 30 bags

4 30 120

Hence, the total value of tokens in the store 120

14. Brahmagupta's rules for addition :

(i) The sum of two positive is positive. For examples :

(2120) (5816) (7936)

(5124) (3684) (8808)

(9684) (3296) (12980)

(ii) The sum of two negatives is negative. To add two negatives, add the numbers (without the sign) and the place a minus sign to the obtained result.

For example :

(2873) (9842) (12715)

(7624) (8396) (16020)

(5286) (764) (6050)

(iii) To add a positive number and a negative number subtract smaller number (without sign) from greater number (without the sign) and place the sign of greater number to the result obtained.

For example :

(8752) (4658) (4094)

(7653) (7899) (246)

(6428) (5964) (464)

(iv) The sum of a number and its additive inverse is always zero.

For example :

(8564) (8564) 0

(7290) (7290) 0

(5824) (5824) 0

(v) The sum of zero and a number is the same as the number.

For example :

(8564) 0 8564

(3984) 0 (3984)

0 2463 2463

Brahmagupta's rules for subtraction :

(i) If a smaller positive is subtracted from a larger positive, then the result is positive.

For example :

(9621) (8938) (683)

(7289) (5864) (1425)

(9346) (2999) (6347)

(ii) If a larger positive is subtracted from a smaller positive, the result is negative.

For example :

(2321) (5634) (3313)

(5628) (9202) (3578)

(1216) (3101) (1885)

(iii) Subtracting a negative number is the same as adding a positive number.

For example :

(5683) (2862)

(5683) (2862) (8545)

(7384) (6548)

(7384) (6548) (836)

(2568) (9913)

(2568) (9913) (12481)

(iv) Subtracting a number from itself result is 0.

For example :

(5869) (5869) 0

(3010) (3010) 0

(3010) (3010) 0

(5964) (5964) 0

(v) Subtracting zero from a number gives the same number.

For example :

5642 0 5642

(342) 0 (342)

(6428) 0 (6428)

(vi) Subtracting a number from zero gives the inverse of the number.

For example :

0 (8646) (8646)

0 (7521) 7521

0 (8764) 8764

TEXTBOOK EXERCISES

Exercise 10.1

1. The starting floor is 2 (Art centre) and the number of button pressed is (3)

Therefore, target floor

Starting floor Movement

2 (3) 1 (The Toys Store)

2. (a) (1) (4) ....

Given, the starting floor is 1 (Food corner) and the number of button pressed is +4.

Therefore, target floor

Starting floor + Movement

( ) (4)

5 (The Sport Centre)

(b) (4) (1) …

Given the starting floor is 4 (*i.e.*, cream centre) and number of button is 1 (The food court)

Therefore, Target

Starting floor Movement

(4) (1)

(5) (The Sport Centre)

(c) (4) (3)

Given, the starting floor is 4 (ice cream centre) and the number of button pressed is 3. Therefore,

Targer floor

Starting floor + Movement

(4) (3)

1 (The Food Court)

(d) (1) (2) …

Given the starting floor is (1) (Toys centre) and the number of button pressed is 2

Therefore, target floor

Starting floor + Movement

(1) (2)

1 (The Food Court)

(e) (1) (1) …

Given, the starting floor is 1 (Toys centre) and the number of button pressed is 1

Therefore, Target floor

Starting floor + Movement

(1) (1) 0

(The Reception hall *i.e.*, Ground floor)

(f) 0 (2) …

Given the starting floor is 0 (The ground floor) and the number of button pressed is 2

Therefore, Target floor

Starting floor + Movement

0 (2)

2 (The Art Centre)

(g) 0 (2) ….

Given, the starting floor is 0 (The ground floor) and the number of button pressed is +2

Therefore, target floor

starting floor + Movement

0 (2)

2 (The Video Games)

3. Starting from different floors, find the movements required to reach floor –5.

Example 1. If you start at floor +2, press –7 to reach floor –5.

Sol. 2 (7) 5

Example 2. Start at floor +4, press –9 to reach floor –5.

Sol. 4 (9) 5.

Example 3. Start at floor 0, press –5 to reach floor –5.

Sol. 0 (5) 5.

Example 4. Start at floor –3, press –2 to reach floor –5.

Sol. 3 (2) 5.

4. (a) (1) (4) 3 (b) (0) (2) 2

(c) (4) (1) 3 (d) (0) (2) 2

(e) (4) (3) 7 (f) (4) (3) 1

(g) (1) (2) 3 (h) (2) (2) 0

(i) (1) (1) 2 (j) (3) (3) 6

5. (a) Given (40) … 200

Let (40) x 200

or x 200 (40)

x 160

Hence (40) (160) 200

(b) Given, (40) … 200

Let (40) x 200

or x 200 (40) 240

Hence (40) (240) 200

(c) Given (50) … 200

Let (50) x 200

or x 200 (50) 250

Hence (50) (250) 200

(d) Given (50) … 200

Let (50) x 200

or x 200 (50) 150

Hence (50) (150) 200

(e) Given (200) (40)

(200) 40 160

(f) Given (200) (40) …

(200) (40) 160

(g) Given, (200) (40) …

200 40 160

6. (a) 125 (30) 155

(b) 105 (55) 105 55 160

(c) (105) (55) 160

(d) 80 (150) 80 150 230

(e) 80 (150) 230

(f) 99 (200) 99 200 101

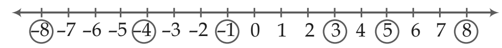
(g) 99 (200) 101

(h) 1500 (1500) 1500 1500

3000

Exercise 10.2

1.



The positive numbers are right to 0 and they are 3, 5, 7.

The negative numbers are left to 0, and they are 1, 4, 8.

2. Yes, we know that a positive number is greater than any negative number.

Hence 2 is greater than 3.

Yes, 2 is less than 3. Because 2 is a negative number and 3 is a positive number.

Hence, 2 3.

3. (i) Given 5 0 ?

On adding 0 to a number or a number to 0, the result is always that number

Hence, 5 0 5

(ii) Given, 7 (7)

If the inverse of a number is added to it then the result is always 0.

Hence, 7 (7) 0

(iii) Given 10 20

For adding the numbers with different signs, subtract the smaller absolute value from the larger absolute value and mark the sign from the larger absolute value.

Hence, 10 20 10

(iv) Given, 10 20.

On subtracting a larger number from a smaller number gives a negative value.

Hence, 10 20 10

(v) Given, 7 (7)

On subtracting a negative number is the same as adding the counter part of the number.

Hence 7 (7) 7 7 14

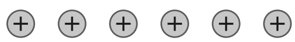
(vi) Given, 8 (10)

On subtracting a negative number is the same as adding the positive counter part of the number

Hence 8 (10) 8 10 2.

4. (a) Given (6) (4)

To show (6) we use 4 positive (red) tokens



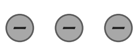
On combining these two groups, we get

Counting all these tokens, we get 10

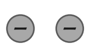
Hence (6) (4) 10

(b) Given (3) (2)

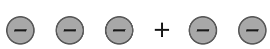
To show 3, we use 3 negative tokens



To show 2 we use 2 negative tokens



Combining these two groups, we get



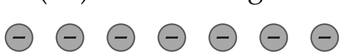
Counting these all we get (5)

Hence (3) (2) 5

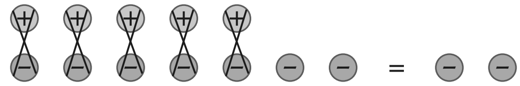
(c) Given, (5) (7)

To show (5) we use 5 positive tokens.

To show (7) we use 7 negative tokens



Combining these two groups of token, we get



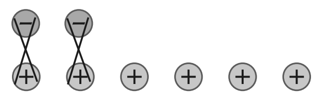
Hence, (5) (7) 2

(d) Given, (2) (6)

To show 2, we use 2 negative (black) tokens.

To show +6, we use 6 positive (red) tokens.

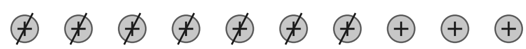
On combining these two groups of tokens, we get



Hence, (2) (6) 4

5. (a) Given (10) (7)

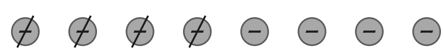
Here, from 10 positives take away 7 positives



Hence, (10) (7) 3

(b) Given (8) (4)

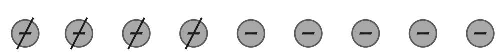
Here, from 8 negatives take away 4 negatives



Hence, (8) (4) 4

(c) Given, (9) (4)

Here, from 9 negatives take away 4 negatives



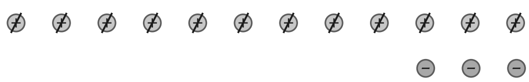
Hence, (9) (4) 5

(d) Given, (9) (12)

Here, from 9 positives take away 12 positive

But there are not enough tokens to take out 12 positives from 9 positives.

So, put an extra zero pairs of positives and negatives should be added.



Now, we can take out 12 positives

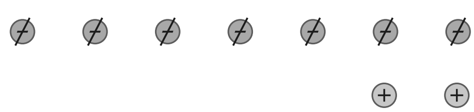
Hence (9) (12) 3

(e) Given, (5) (7)

Here, from 5 negatives take away 7 negatives.

But there are not enough tokens to take out 7 negatives from 5 negatives

So put an extra 2 zero pairs of negatives and positives should be added



Hence, (5) (7) 2

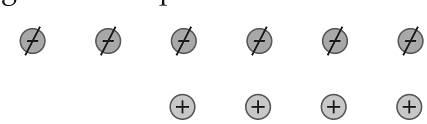
Now we can take out 7 negatives

(f) (2) (6)

Here, from 2 negatives take away 6 negatives.

But there are not enough tokens to take away 6 negatives from 2 negatives

So, put an extra 4 zero pairs of negatives and positives



Now, we can take out 6 negatives

Hence, (2) (6) 4

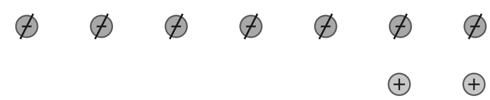
6. (a) Given (5) (7)

Here, from 5 negatives take away 7 negatives

But there are not enough tokens to take away 7 negatives from 5 negatives.

So, we put an extra 2 zero pairs of negatives and positives.

Now, we can take out 7 negatives



Hence (5) (7) 2

(b) Given (10) (13)

Here from 10 positives take away 13 positives.

But there are not enough tokens to take away 13 positives from 10 positives.

So, put an extra 3 zero pairs of positives and negatives.

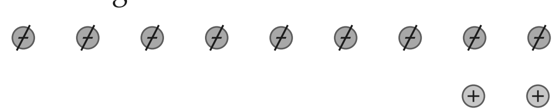
Now, we can take out 13 positives.

Hence, (10) (13) 3

(c) Given, (7) (9)

Here from 7 negatives take away 9 negatives. But there are not enough tokens to take away 9 negatives from 7 negatives

So, put an extra two zero pairs of negatives and now, we can take away a negatives



Hence, (7) (9) 2

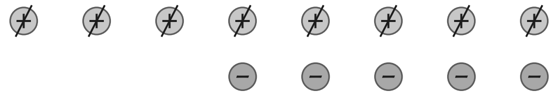
Now, we can take away 9 negatives.

(d) Given (3) (8)

Here, from 3 positives take away 8 positives. But there are not enough tokens to take away 8 positives from 3 positives.

So, we put an extra 5 zero pairs of positives and negatives.

Now, we can take away 8 positives



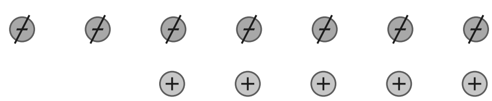
Hence, (3) (8) 5

(e) Given (2) (7)

Here, from 2 negatives take away 7 negatives.

But there are not enough tokens to take away 7 negatives from 3 negatives.

So, put an extra 5 zero pairs of negatives and positives.



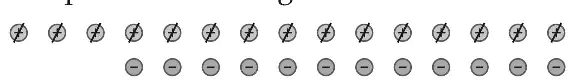
Now we can take away 7 negatives

Hence (2) (7) 5

(f) Given (3) (15)

Here, from 3 positives take away 15 positives. But there are not enough tokens to take out 15 positives from 3 positives.

So, put an extra 12 zero pairs of positives and negatives.



Now we can take away 15 positive tokens

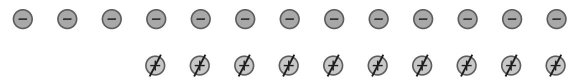
Hence, (3) (15) 12

7. (a) Given, (3) (10)

Here, from 3 negatives tokens take out 10 positives tokens. But there is no positive token in to take out in the set.

So, we put an extra 10 zero pairs of negatives and positive tokens.

Thus, we get



Now, we can take away 10 positive tokens.

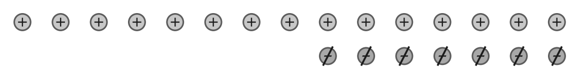
Hence, (3) (10) 13

(b) Given, (8) (7)

Here, from 8 positives tokens, take away 7 negatives tokens. But there is no negative token in the set.

So, we put an extra 7 zero pairs of negatives and positives tokens.

Thus, we get



Now, we can take away 7 negative tokens

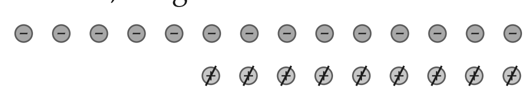
Hence, (8) (7) 15

(c) Given, (5) (9)

Here, from 5 negative tokens take away 9 positive tokens. But there is no negative token in the set to take out.

So, we put an extra 7 zero pairs of negatives and positive tokens.

Thus, we get



Now, we can take away 9 positive tokens.

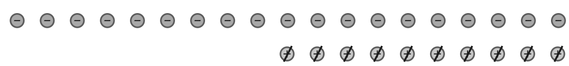
Hence, (5) (9) 14

(d) Given, (9) (10)

Here, from 9 negative tokens take away 10 positives tokens. But there is no positive token in the set to take out.

So, we put an extra zero pairs of negatives and positive tokens.

Thus, we get



Now, we can take away 10 positive tokens

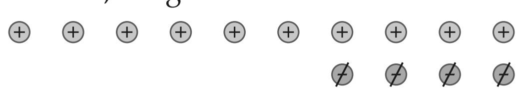
Hence, (9) (10) 19

(e) Given, (6) (4)

Here, from 6 positive tokens take away 4 negatives token. But there is no negative token to take away in the set.

So, we put an extra 4 zero pairs of negatives and positive token to take away.

Thus, we get



Now, we can take away 4 negative tokens

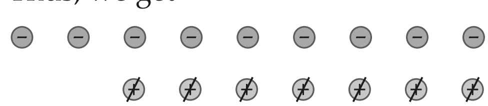
Hence, (6) (4) 10

(f) Given, (2) (7)

Here, from 2 negative tokens take out 7 positive tokens.

But there is no positive token to take away. So we put an extra 7 zero pairs of negatives and positive tokens.

Thus, we get



Now, we can take away 7 positive tokens.

Hence, (2) (7) 9

Exercise 10.3

1. Given, credits are ₹30, ₹40 and ₹50

Total value of credits ₹256

Total value of debits

₹1 ₹2 ₹4 ₹8 ₹16

₹32 ₹64 ₹128

₹255

So, Balance = Credits Debits

₹256 ₹255

₹1

Hence, your bank account balance ₹1

2. Keeping a positive bank account balance is normally good because :

1. In case of having a negative bank account balance. We have to pay extra charges to the bank. We can avoid this if our bank account balance is positive.
2. We find ourselves able to cape with any unexpected disaster in the future because we have some savings in the bank.
3. If your bank account balance is positive, then it can be helpful for you when you want to borrow money from the bank for any work or business.

There might be a few specific situations where temporarily having a negative balance could be considered.

1. Most of the banks offer overdraft protection which can help avoid bounced checks or declared transactions.

2. If you know you will have a large income soon and need to make essential purchases a temporary negative.

From the above description it becomes clear that both positive and negative numbers along with zero are extremely useful in the word of banking and accounting.

3. Based on the heights the sequence of decreasing order is A, E, C, G, F, B, D

And the sequence of increasing order is

$$D, B, F, G, C, E, A$$

4. The Mount Everest is the highest point above the sea level on Earth. It's height is 8,848 meters above the sea level.

5. The lowest point on land in the world is the shoreline of the 'Dead Sea'.

The height of this point is about 413 meters.

6. Here are completed grids.

(a)

–10	–2	16
5		–5
9	2	–7

Border sum is +4

(b)

6	8	–16
11		–5
–19	–2	19

Border sum is –2

(c)

7	–4	–7
–2		–5
–9	–3	8

Border sum is –4

The missing numbers are filled to ensure the sum of each row and column is equal to the given border sum.

(a) In the first grid to get a border sum of +4. The missing numbers in top row –2 and +16 and 9. The missing number is the bottom row are 2 and 7.

The missing number in the left column is 5, and 9. The missing numbers in the right column are 7 and 16.

(b) To get the border sum of –2.

The missing number in the top row is –16.

The missing number in the bottom row are –19 and 19.

The missing number in left column are 11 and –19.

The missing numbers in right column are –16 and 19.

(c) To get the border sum –4.

The missing number in the top row are –4 and –7.

The missing numbers in the bottom row are 8, –9 and –3.

The missing number in the left column are –2 and –9.

The missing number in the right column are –7 and 8.

7. There are many ways to fill the last grid with a border sum of –4. Two of them are given below.

8	–19	7
–3		–4
–9	12	–7

7	6	–17
9		8
–20	11	5

8. (a) The integers between 0 and 7 in increasing order are

6, 5, 4, 3, 2, 1.

(b) The integers between 4 and 4 in increasing order are

3, 2, 1, 0, 1, 2, 3.

(c) The integers between 8 and 15 in increasing order are

14, 13, 12, 11, 10, 9.

(d) The integers between 30 and 23 in increasing order are

29, 28, 27, 26, 25, 24.

9. Three numbers whose sum is 8 are 6, 5 and 3.

10. The faces of two given dice have same numbers 1, 2, 3, 4, 5, 6. First of all we will find the possible numbers on rolling both the dice. First of all we list the sum of two negative numbers.

(1) (1) 2, (1) (3) 4

(1) (5) 6, (3) (3) 6

(3) (5) 8 and (5) (5) 10

Secondly we list the sum of one negative and one positive numbers

(1) 2 1, (1) 4 3

(1) 6 5, (3) 2 1

(3) 4 1, (3) 6 3

(5) 2 3, (5) 4 1

(5) 6 1

Now, we find the list sum of two positive numbers.

2 2 4, 2 4 6

2 6 8, 4 4 8

4 6 10, 6 6 12

Now, list all the possible number sequence in increasing order.

10, 8, 6, 4, 3, 2, 1,
1, 3, 4, 5, 6, 8, 10, 12

Hence, the sum of numbers that are not possible between –10 and +12 are 9, 7, 5, 0, 2, 7, 9 and 11

11. (a) 8 13 5

(b) (8) (13) 8 13 5

(c) (13) (8) 13 8 5

(d) (13) (8) 21

(e) (8) (13) 5

(f) (8) (13) 8 13 5

(g) 13 8 5

(h) 13 (8) 13 8 21

12. (a) Present year is 2025, so 150 years ago from the year 2025

2025 150 1875

Hence, it was the year of 1875.

(b) Present year is 2025, so 2200 years ago from the year 2025

2025 2200 175.

Hence, it was the year of 175.

But the year can not be calculated in negative terms.

Thus, the year 175 corresponding to 176 BCE (Before the common Era)

Hence, 2200 years ago, it was the year 176 BCE .

(c) We can regard the year christ birth as 0 year. Thus, the year 680 BCE can be written as 680.

Hence, the year before 320 often BCE is

680 320 360 360 BCE.

13. (a) The difference between two consecutive numbers that are given is

(34) (40) (34) 40 6

and (28) (34) 28 34 6

So, next three terms will be

(22) 6 (16)

(16) 6 10

and (10) 6 4

Hence, the sequence is

(40), (34), (28), (22), (16),

(10), (4).

(b) Let us split the sequence into two interleaved patterns :

❖ odd position : 3, 2, 1, 0 decreasing by 1, next –1, –2, –3.

❖ even position : 4, 5, 6, 7 increasing by 1, next 8, 9, 10.

Hence, the sequence is 3, 4, 2, 5, 1, 6, 0, 7, 1, 8, 2, 9, –3, 10.

(c) In the sequence, difference between 2 consecutive terms of the sequence ..., ..., 12, 6, 1, 3, 6, ..., ..., ...

6 12 6

1 6 5

(3) 1 4

(6) (3) 6 3 3

So, the difference between two consecutive numbers of the sequence is decreasing by 1. The difference of 1st, 2 pairs of the two groups must be 7 and 8.

Now, let the first number of the sequence be x and second number is y.

Thus, 12 y 7 y 12 7 19

and 19 x 8 x 19 8 27

Hence, the sequence takes the form as 27, 19, 12, 6, 1, (3), (6)

In this way, we can find next three terms

a (6) 2 a 2 6 8

b (8) 1 b 1 8 9

c (9) 0 c 9

Hence, the given sequence is

27, 19, 12, 6, 1, (3), (6), (8), (9), (9)

14. The cards can be picked as below

(i) (7) (18) (5)

(7) (18) 5 30

(ii) (18) (5) (9)

(18) 5 9 32 closer to 30

(iii) (18) (1) (7) (2)

= 18 1 7 2 28

(iv) (18) (9) (5) (2)

(18) (9) (5) (2)

32 2 30

(v) (18) (7) (5) (18) (7)

(1) (5) 31 closer to 30

15. (a) (Positive) (Negative)

Subtracting a negative number is the same as adding its positive counter part.

Thus, it will be always positive. For example :

(100) (100) 100 (100) 200

(b) (Positive) + (Negative)

The result depends on the value of given numbers. If the absolute value of negative is greater than it will be negative otherwise positive and if equal then 0. For example :

(800) (900) 100

(800) (700) 100

(800) (800) 0

(c) (Negative) + (Negative)

The sum of two negative numbers is always a negative number. For example :

(800) (800) 1600

(d) (Negative) (Negative)

Subtracting a negative number is the same as adding its positive counter part. Its result depends on the absolute value of given number.

For example :

(500) (700) (500) 700 200

(600) (400) (600) 400 200

(800) (800) (800) 800 0

(e) (Negative) (Positive)

Subtracting a positive number is the same as adding its negative counter part. So, there result is always negative. For example :

(800) (800) 800 (800) 1600

(f) (Negative) + (Positive)

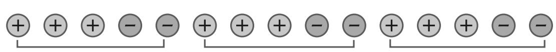
The result depends on the absolute value of the number subtracted. It may be positive, negative or zero. For example :

(555) (450) 105 (Negative)

(332) (400) 68 (Positive)

(350) (350) 0 (zero)

16.



There are a total of 100 tokens in string which are divided into sets. Each set has five tokens, three positives and two negatives. Thus there are $\frac{100}{5}$ 20 sets of 5 tokens in the string.

The value of Ist set (3) (2) 1

Hence, the total value of the string

Value of one set Number of sets

1 20 20

17. Yes, each of Brahmangupta's rules in terms of Annebelle's Building of fun or in term of a number line can be used as below :

(i) Adding two positive numbers, results in a positive number.

In Annebelle's Building of fun, if we starts on the 2nd floor and move up 3 floors, we end up with 5 floor. *i.e.*, (2) (3) 5, on a number line we can move 11 to 18 by adding 7.

i.e., (11) (7) 18

(ii) Adding two negative numbers results in a negative number.

In Annebelle's Building of fun, if we starts from 2 floors below the ground level (2) and move down 2 more floors (–2), we end up 4 floors below the ground floor (4).

On a number line moving from (8) to (15) by adding (7)

i.e., (8) (7) 15

(iii) Subtract the smaller absolute value from the larger absolute value and keep the sign of the larger absolute value.

In Annebelle's Building of fun if we start on the 3rd above the ground level and moves down 5 floors, we end up below 2 floors below the ground floor (2), on a number line starting from (+5) we move 11 by adding (16)

(*i.e.*,) 5 (16) 11

(iv) Subtracting a positive number from a negative number is the same as adding the two numbers and keeping the negative sign.

In Annebelle's Building of fun, if we are 3 floors below the ground floor (3) and move down 2 more floors we end up 5 floors below the ground floor (5).

On a number line, 13 12 25

(v) Subtracting a negative from a positive number is the same as adding two positive numbers.

In Annebelle's Building of fun, if we start from the 3rd floor above the ground floor (3) and go up 2 floors. We end up on the 5th floor above the ground floor (5).

On number line,

19 (20) 19 20 39

(vi) Subtracting a negative number from another negative number is the same adding the absolute values and keeping the negative sign.

In Annebelle's Building of fun, if we are at 3rd floor below the ground floor (3) and moves up 2 floor (2). We end up one floor below the ground floor (1).

Let us understand rule behind these,

(i) Addition of positive numbers.

(19) (29) (48)

(ii) Addition of Negative number.

(49) (21) (70)

(iii) Addition of a positive and a negative number.

(39) (40) 1

(iv) Subtraction of a positive number from a negative number.

38 (86) 38 86 124

(v) Subtraction of a negative number from a positive number.

39 (38) 39 38 77

(vi) Subtraction of a number from a negative number.

(87) (96) (87) 96 9

Brahmagupta was the first mathematician to describe zero as a number on an equal footing with positive numbers and with negative numbers. He was the first to give explicit rule for performing arithmatic operations on all such numbers including positive, negative and zero-forming, what is now called a ring. It changed the way the word of mathematics.

However it took many centuries to adopt zero and negative integers as numbers. These numbers were transmitted to be accepted by and further studied by the Arab world by the 9th centuries, before making this way to Europe by the 13th century.

It was a great surprise that negative numbers were still not accepted by many of the European mathematicians even in the 18th century. Lazar Carnot, a French mathematician in the 18th century, called negative numbers **absured**. But over time, zero and negative numbers proved to be indispensable to be critical numbers just as Brahmagupta had recommended and explicity described way back in the year 628 BCE for the modern development of Algebra, which will be learnt by us in the next classes.