Mathematics – 7-II

Chapter – 1

Work it Out—1

1. Yes, they are congruent.

- **Reason :** If you look at the two trapezoid-like shapes, they have the same dimensions. They are simply oriented the same way and appear to be identical copies of each other.

2. In this section, we compare pairs to see if they match exactly.

- **The Triangles : Congruent.** They are the same size and shape, even though one is rotated.
- **The Flower/Leaf shapes : Congruent.** Both have three "petals" of the same size and arrangement.
- **The Stars : Not Congruent.** If you count the points, the first star has 5 points, while the second star has 6 points. They are different shapes.
- **The Clouds : Not Congruent.** The two cloud shapes have different bumps and overall lengths.

3. Using the concept of congruence :

(a) Two circles are congruent if they have the same radius (or diameter). Since all circles are the same shape, only the size matters.

(b) How would you check if two rectangles are congruent?

- Two rectangles are congruent if their corresponding sides are equal. Specifically, the length of the first must equal the length of the second, and the breadth of the first must equal the breadth of the second.

(c) For irregular curved lines like these, the best way to check is to place one on top of the other (superposition). If every point of the first curve lands exactly on the second curve, they are congruent. You could also use a piece of tracing paper to see if the shapes match perfectly.

Work it Out—2

1. Rhombus WXYZ with diagonal XZ

(a) ● The two triangles are **ΔWXZ** and **ΔYXZ**.

- Yes, they are congruent.

Reason (SSS condition) :

- WX = XY (all sides of a rhombus are equal)
- WZ = YZ (all sides of a rhombus are equal)
- XZ = XZ (common side)

Since all three sides are equal, the triangles are congruent by **SSS (Side-Side-Side).**

(b) ● Yes, it does.

Reason :

- Since ΔWXZ ≅ ΔYXZ, their corresponding parts are equal (CPCT).
- So :
  - ❑ ∠WXZ = ∠YXZ → XZ bisects ∠X
  - ❑ ∠WZX = ∠YZX → XZ bisects ∠Z

2. Intersecting lines at point M

- Yes, they are congruent.

Reason (SAS condition) :

- AM = DM (given)
- BM = CM (given)
- ∠AMB = ∠DMC (vertically opposite angles are equal)

So, triangles are congruent by **SAS (Side-Angle-Side).**

3. Triangle ΔDOG and ΔCAT

- Yes, they are congrent by **SAS condition**.

Given :

- DO = CA = 5 cm
- ∠O = ∠A = 50°
- OG = AT = 6 cm

Correspondence of vertices :

- D ↔ C
- O ↔ A
- G ↔ T

Final statement :

- ΔDOG ≅ ΔCAT

Work It Out – 3

1. Comparing ΔABC and ΔDEF

Condition : SAS

AB = DE = 9 cm (given)

∠B = ∠E = 55°

BC = EF = 6 cm

∴ ΔABC ≅ ΔDEF (SAS)

2. Parallel lines WX || YZ

(a) Alternate interior angles

∠zoy = ∠xoy

∠zyo = ∠xwo
∠yzo = ∠wxo
(All are equal as alternate interior angles)

(b) Congruency of triangles Δwxo and Δyzo

∠xwo = ∠zyo {*wx* || *yz*}
wx = yz (given)
∠wxo = ∠yzo
∴ Δwxo ≅ Δyzo (asa)

3. ΔADB and ΔCDB

∠ABD = ∠CBD (given)
BD = BD (common)
∠ADB = ∠BDC (given)
∴ ΔADB ≅ ΔCDB (By ASA)
∴ ∠DAB = ∠DCB (By CPCT)

4. Prove AC = BD

Given : ΔABC ≅ ΔDCB
AC = BD (By CPCT)

Work It Out – 4

1. Corresponding parts of ΔPQR ≅ ΔXYZ

P ↔ X, Q ↔ Y, R ↔ Z
PQ = XY
QR = YZ
PR = XZ
∠P = ∠X
∠Q = ∠Y
∠R = ∠Z

2. Square PQRS with diagonal PR

To show : ΔPQR ≅ ΔPSR
PQ = PS {sides of square}
QR = SR {sides of square}
PR = PR {common}
∴ ΔPQR ≅ ΔPSR (SSS)

Is ΔPQS ≅ ΔQRS?

Yes

3. Intersecting lines at point O

To prove : ΔPQO ≅ ΔRSO
PO = OR {given}
∠POQ = ∠ROS {vertically opposite angle}
QO = SO {given}
∴ ΔPQO ≅ ΔRSO (SAS)

4. Circle with centre O and ∠POQ = 110°

OP = OQ {radii}
∠P = ∠Q {opposite angle of equal sides}
110° + ∠P + ∠Q = 180°
2∠P = 180° – 110°
2∠P = 70°
∠P = 35°
∠Q = 35°

Connect and Reflect

[A] Multiple Choice Questions

1. (c), **2.** (c), **3.** (c), **4.** (c), **5.** (c).

[B] Fill in the Blanks

1. **congruent**
2. **180°**.
3. **SAS**.
4. **equal**.
5. **Right angle-Hypotenuse-Side.**

[C] State True or False

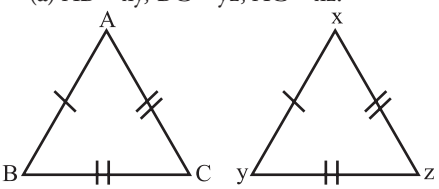
1. False, **2.** True, **3.** False, **4.** True, **5.** True.

[D] Subjective Questions

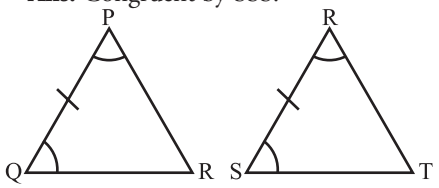
1. Congruent figures.
2. Hypotenuse.
3. SSS (Side-Side-Side).
4. 60°.
5. AAA or SSA.
6. It is given that : Δ PQR is congruent to Δ MNO.
(a) Corresponding vertices :
P and M, Q and N, R and O.
(b) One pair of corresponding sides :
PQ = MN.
(c) One pair of corresponding angles :
∠ P = ∠ M.

7 : Triangle Measurements

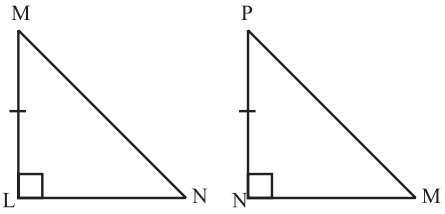
(a) AB = xy, BC = yz, AC = xz.



Ans. Congruent by SSS.



(b) PQ = RS, ∠P = ∠R, ∠Q = ∠S.
Ans. Congruent by ASA.
(c) LM = NO, ∠L = ∠N = 90°, LN = MO.



Ans. Congruent by RHS.

Section 8 : Proving AC = BD

In ΔAPC and ΔBPD :

1. AP = BP (Given)
2. CP = DP (Given)
3. ∠APC = ∠BPD (Vertically opposite angles are equal)

Conclusion : Δ APC is congruent to ΔBPD by **SAS rule**. Therefore, **AC = BD** (By CPCT)

9 : Circle Calculation

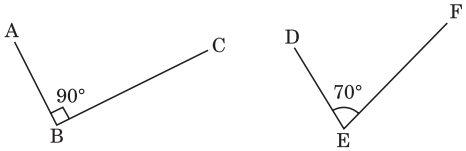
In the circle with center o :

1. ox and oy are radii, so ox = oy.
2. This means Δxoy is an isosceles triangle, so ∠ x = ∠ y.
3. Sum of angles in a triangle = 180°.
4. Calculation : 100 + ∠ x + ∠ y = 180.
5. ∠ x + ∠ y = 80.
   ∠ x = 40° and ∠ y = 40°.

Ncert Exercise

Page-3 Figure it Out

1. Let's measure the angles of given figure, with Protractor



Here ∠B is not congruent to ∠E
Thus, Given figures are not congruent.

2. From the given pairs,
figure (i) and (iv) are congruent, because they can be superimposed.

3. (a) We will measure radius or diameter of the given circle.

(b) We will measure length and breadth of the given rectangle using this.

(a) We place one circle over another circle. We check if they exactly superimpose, they are congruent, In this situation, both will have same radius.

(b) We place one rectangle over another rectangle. If they exactly superimpose they are congruent. In such case, both will have same length and breadth.

4. First we measure the length of line segments and angle between them of given figure. There check If the two figures are exactly superimpose.

Yes, each of the given figures are congruent.

Length of line segments in each figure are 2·2 cm and 1·2 cm and angle between them is 82°.

Page-8 Figure it Out

1. Given ΔHEN and ΔBIG are congruent.

If ΔHEN ≅ ΔBIG

It means H ↔ B, E ↔ I, N ↔ G

The other correct ways of expressing this congruence are:

ΔNEH ≅ ΔGIB, ΔNHE ≅ ΔGBI, ΔENH ≅ ΔIGB, ΔEHN ≅ ΔIBG, ΔHNE ≅ ΔBGI

2. From the given figure
In ΔRED and ΔJAM
RE = JA = 3·5 cm, ED = AM = 5 cm,
RD = JM = 6 cm
Thus, ΔRED ≅ ΔJAM (By SSS Rule)

3. In ΔABC and ΔADC,
AB = AD (given); BC = CD (given)
AC = AC (common)
Thus ΔABC ≅ ΔADC (By SSS Rule)
Again, since ΔABC ≅ ΔADC
⇒ ∠BAC = ∠DAC [By CPLT]
and ∠BCA = ∠DCA
⇒ AC bisects both ∠BAD and ∠BCD.

4. Given that, In ΔDFE and ΔDGE
DF = DG (Given)
FE = GE
DE = DE (common)
So ΔDFE ≅ ΔDGE (By SSS Rule)

The vertices must correspond correctly in congruence statements
In ΔDFE and ΔDGE
DF corresponds to DG; FE corresponds to GE and ED is common side
Given statements DF = DG, FE = GE does not support the congruency of ΔDFE and ΔGED, because corresponding sides are not equal.

Page-13 Figure it Out

1. In ΔABC and ΔXZY
BC = ZY = 5 cm (given)
AB = XZ = 7 cm (given)
∠ABC = ∠XZY = 47° (given)
Thus ΔABC ≅ ΔXZY (By SAS Rule)

2. In ΔCOD and ΔBOA
∠ABO = ∠CDO
∠AOB = ∠COD
AB = CD
So ΔCOD ≅ ΔAOD
∴ AO = CO, BO = DO (By CPCT)
∠BAO = ∠DCO (By CPCT)

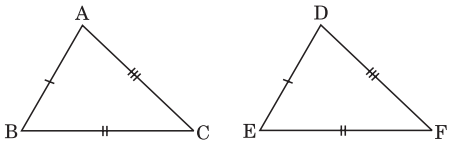
3. In ΔABC and ΔDBC
∠ABC = a = ∠DBC
and let ∠ACB = b = ∠DCB
BC is a common side of the two triangles, then ΔABC ≅ ΔDBC
Angle Side Angle Congruence:
When two triangles are congruent, their corresponding parts are equal [CPCT] Since ΔABC ≅ ΔDBC, their corresponding angles are equal.
Hence ∠BAC = ∠BDC
Yes, ΔBC ≅ ΔDBC.

5. Given ∠ABD = ∠DCA;
∠ACB = ∠DBC; ∠AOB = ∠DOC
∵ They are vertically opposite angles)
CO = BO; (∵∠OCB = ∠OBC)
ΔCOD ≅ ΔBOA
Angie-side-angle condition
∴ AB = DC (CPCT)
∠BAC = ∠CDB (CPCT)

Page-20 Figure it Out

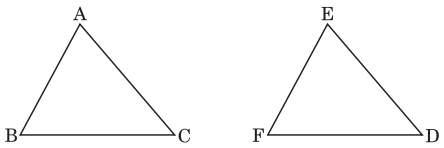
1. Given ΔAIR ≅ ΔFLY
Corresponding vertices
A ↔ F; I ↔ L; R ↔ Y
Corresponding Sides
Corresponding Angles
AI corresponds to FL
∠A corresponds to ∠F
IR corresponds to LY
∠I corresponds to ∠L
AR corresponds to FY
∠R corresponds to ∠Y

2.



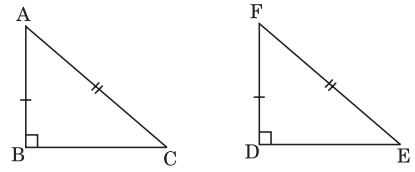
In ΔABC and ΔDEF
AB = DE (given);
BC = EF (given);
CA = FD (given)
So ΔABC ≅ ΔDEF By SSS Rule

(b)



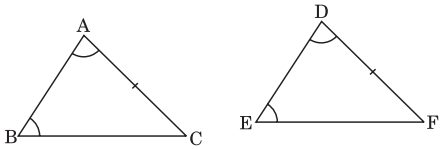
In ΔABC and ΔEFD
AB = EF; ∠A = ∠E; AC = ED
So ΔABC ≅ ΔEFD (By SAS Rule)

(c)



In ΔABC and ΔFDE
AB = FD (given)
∠B = ∠D = 90° (given)
AC = FE
So ΔABC ≅ ΔFDE (By RHS Rule)

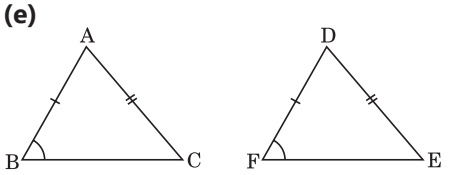
(d)



In ΔABC and ΔDEF
∠A = ∠D (given)
∠B = ∠E (given)
AC = DF (given)
So ΔABC ≅ ΔDEF (By AAS Rule)

6 Answer Math 7 (Part-II)

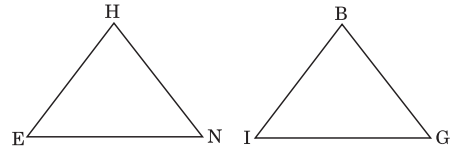
(e)



In ΔABC and ΔDFE
AB = DF; ∠B = ∠F; AC = DE
Here two corresponding sides and one non included angle are equal. So triangles satisfy SSA condition which is not a valid congruence rule.
Thus ΔABC need not to be congruent to ΔDFE.

3. In ΔAOB and ΔDOC
OA = OD (given); OB = OC (given)
∠AOB = ∠DOC
Thus ΔAOB ≅ ΔDOC. So ∠A = ∠D
∠B = ∠C (By CPCT)
But ∠A and ∠D, and ∠C and ∠B are alternate.
Hence AB is parallel to CD
Hence proved.

4. In ΔABC and ΔADC
AD = AB (Sides of square)
CD = CB (Sides of square)
AC = AC (Common)
So ΔABC ≅ ΔADC (By SSS condition)
Now In ΔABC and ΔCDA
AB = CD (sides of square are same)
BC = DA (sides of square)
AC = CA (Common)
So ΔABC ≅ ΔADC
Let us consider two congruent triangles ΔHEN and ΔBIG



According to questions, six different ways are

ΔNEH ≅ ΔGIB; ΔNHE ≅ ΔGBI
ΔENH ≅ ΔIGB; ΔEHN ≅ ΔIBG
ΔHNE ≅ ΔBGI; ΔHEN ≅ ΔBIG

5. In ΔBAC
AB = AC = Radius of the circle
∴ ∠ABC = ∠ACB = x (say)
then $x + x + 120° = 180°$
(Angle sum property of triangle)
$\Rightarrow 2x + 120° = 180° \Rightarrow 2x = 180° - 120° = 60°$
$\Rightarrow 2x = 60° \Rightarrow x = \frac{60°}{2} = 30°$
Thus ∠B = ∠C = 30° **Ans.**

6. In ΔCUR
CU = CR (given)
$\Rightarrow$ ∠CUR = ∠CRU = x (say)
$\therefore \quad x + x + 90º = 180º$
$\Rightarrow \quad 2x + 90º = 180º$
$\Rightarrow \quad 2x = 180º - 90º$
$\Rightarrow \quad x = \frac{90º}{2} = 45º$
$\therefore$ ∠CRU = ∠CUR = 45º
In ΔVRN
VR = VN
$\Rightarrow$ ∠VRN = ∠VNR = x (say)
$\Rightarrow \quad x + x + 68° = 180º$
$\Rightarrow \quad 2x + 68° = 180°$
$\Rightarrow \quad 2x = 180º - 68º = 112°$
$\Rightarrow \quad x = \frac{112º}{2} = 56º$
$\therefore$ ∠VRN = ∠VNR = 56º
In ΔAUP
AU = UP
$\Rightarrow$ ∠UAP = ∠UPA = 56°
$\therefore \quad 56° + 56° + ∠AUP = 180º$
$\Rightarrow$ ∠AUP = 180º – 112° = 68°
ΔBOF is an equilateral triangle
So OB = OF = BF
$\Rightarrow$ ∠FOB = ∠FBO
= ∠OFB = 60º
∠RVN + ∠DVN = 180º
(Linear Pair)
68° + ∠DVN = 180º
∠VND+ ∠VDN + ∠NVD = 180º
Since VN = VD
$\therefore$ ∠VND = ∠VDN = x (माना)
$\therefore \quad x + x + ∠NVD = 180º$
$\therefore \quad 2x + 112° = 180º$
$2x = 180º - 112° = 68°$

$$x = \frac{68^\circ}{2} = 34^\circ$$

$\therefore \quad \angle VND = \angle VDN = 34^\circ$

In ΔOLB

$\angle OBL = 90^\circ - 60^\circ = 30^\circ$

$\angle LOB = 60^\circ$

In ΔOPN,

$\angle OPN + \angle PON + \angle PNO = 180^\circ$

$\angle OPN + 56^\circ + 90^\circ = 180^\circ$

$\angle OPN = 180^\circ - 146^\circ = 34^\circ$

Now, $\angle APK + \angle KPO + \angle OPN = 180^\circ$

$44^\circ + \angle KPO + 34^\circ = 180^\circ$

$\Rightarrow \quad \angle KPO = 180^\circ - 78^\circ = 102^\circ$

In ΔKPO,

$\angle KPO + \angle POK + \angle PKO = 180^\circ$

$102^\circ + 30^\circ + \angle PIO = 180^\circ$

$\angle PKO = 180^\circ - (132^\circ) = 48^\circ$

$\angle KAP + \angle KPA + \angle AKP = 180^\circ$

$34^\circ + 44^\circ + \angle AKP = 180^\circ$

$78^\circ + \angle AKP = 180^\circ$

$\angle AKP = 180^\circ - 78^\circ = 102^\circ$

and $\angle PKO = 48^\circ$

So, $\angle AKP + \angle PKO + \angle OKL = 180^\circ$

$102^\circ + 48^\circ + \angle OKL = 180^\circ$

$150^\circ + \angle OKL = 180^\circ$

$\therefore \quad \angle OKL = 180^\circ - 150^\circ = 30^\circ$

n ΔKOL,

$\angle OKL + \angle OLK + \angle KOL = 180^\circ$

$30^\circ + 90^\circ + \angle KOL = 180^\circ$

$\therefore \quad \angle KOL = 180^\circ - 120^\circ = 60^\circ$

$\angle KOL = 60^\circ$

and $\Delta KOL \cong \Delta OBL$

$KL = LB$

$\angle OLK \cong OLB = 90^\circ$

(SAS Rule)

Chapter – 2

Work it out – 1

We find the two numbers (x and y) using the formulas :

x = (Sum + Difference) / 2

y = (Sum – Difference) / 2

(a) Sum = 50, Difference = 20

x = (50 + 20) / 2 = 35

y = (50 – 20) / 2 = 15

Check :

35 – 15 = 20 (Positive difference)

The pair is : (35, 15)

(b) Sum = 0, Difference = 14

x = (0 + 14) / 2 = 7

y = (0 – 14) / 2 = – 7

Check :

7 – (– 7) = 14 (Positive difference)

The pair is : (7, – 7)

(c) Sum = – 8, Difference = – 2

x = (– 8 + (– 2)) / 2 = – 5

y = (– 8 – (– 2)) / 2 = – 3

Check :

– 5 – (– 3) = – 2 (Negative difference because the first number is smaller)

Sum

– 5 + (– 3) = – 8

The pair is : (– 5, – 3)

(d) Sum = 18, Difference = – 6

x = (18 + (– 6)) / 2 = 6

y = (18 – (– 6)) / 2 = 12

Check :

6 – 12 = – 6 (Negative sign because the first number is smaller)

The pair is : (6, 12)

Sum

6 + 12 = 18

(e) Sum = 45, Difference = – 15

x = (45 + (– 15)) / 2 = 15

y = (45 – (– 15)) / 2 = 30

Check :

15 – 30 = – 15 (Magnitude 15, sign is negative)

The pair is : (15, 30)

Sum :

15 + 30 = 45

(f) Sum = – 15, Difference = – 5

x = (– 15 + (– 5)) / 2 = – 10

y = (– 15 – (– 5)) / 2 = – 5

Check :

– 10 – (– 5) = – 5 (Magnitude 5, sign is negative)

Sum :

(– 10) + (– 5) = – 15

The pair is : (– 10, – 5)

Work it out – 2

Case Analysis

1. Case 1

Direction of x : Points to the right (Positive direction)

Direction of y : Points to the left (Negative direction)

Magnitude :

|y| > |x| (y has a larger magnitude than x because its arrow is longer).

Comparison :

x is a positive integer, y is a negative integer, and |y| > |x|

2. Case 2

Direction of x : Points to the right (Positive direction)

Direction of y : Points to the left (Negative direction)

Magnitude :

|x| > |y| (x has a larger magnitude than y)

Comparison :

Both movements are on the positive side of the number line, but y represents a subtraction or a move back toward zero

3. Case 3

Direction of x : Points to the right (Positive direction)

Direction of y : Points to the left (Negative direction)

Magnitude :

|x| = |y|

Comparison :

x and y are additive inverses (like 5 and – 5)

x + y = 0

Work it out – 3

Additive Inverse Rule

The additive inverse rule is a simple way to handle subtraction with integers by turning every subtraction problem into an addition problem.

Rule :

To subtract an integer, add its opposite.

Solutions

(a) 7 – 12 = ?

Step 1 : Identify the opposite

The opposite of + 12 is – 12

Step 2 : Rewrite as addition

7 + (– 12)

Step 3 : Solve

Since the numbers have different signs, subtract the smaller magnitude from the larger :

12 – 7 = 5

Take the sign of the larger magnitude (– 12)

Ans. – 5

(b) – 3 – (– 8) = ?

Step 1 : Identify the opposite

The opposite of – 8 is + 8

Step 2 : Rewrite as addition

– 3 + 8

Step 3 : Solve

Different signs → subtract magnitudes :

8 – 3 = 5

Take the sign of the larger magnitude (+ 8)

Ans. + 5 (or simply 5)

Work it out – 4

Solutions :

(a) 4 × (– 3) = – 12 (Different signs)

(b) (– 6) × (– 3) = 18 (Same signs)

(c) (– 5) × (+ 2) = – 10 (Different signs)

(d) (– 8) × (– 1) = 8 (Same signs)

2. Using Logic with Large Numbers

Given :

200 × 50 = 10,000

Using sign rules :

(a) (– 200) × 50 = – 10,000 (One negative → negative result)

(b) (– 200) × (– 50) = 10,000 (Two negatives → positive result)

(c) 200 × (– 50) = – 10,000 (One negative → negative result)

3. Visual Patterns and the "Bag" Logic

The "bag" model helps to understand multiplication :

- Each set contains 3 negative chips → represents – 3

(a) 4 × (– 3) :

This means putting 4 sets of – 3 into the bag

Result : – 12

(b) (– 4) × (– 3) :

This means removing 4 sets of – 3 from the bag

Since removing a negative is the same as adding a positive :

Result : + 12

4. **Addition Logic for (– 5) × 3**

We can define multiplication using repeated addition :

(– 5) × 3 = (– 5) + (– 5) + (– 5)

Result : – 15

Alternatively, using commutative property :

3 × (– 5) = – 15

This means putting 3 sets of – 5 into the bag.

Work it out – 5

Eight Negative

1. An even number of negative integers gives a positive product.

   So, 8 negatives → positive, and multiplying by 3 positives keeps it positive.

2. Twenty-one negative integers :

   An odd number of negative integers gives a negative product.

3. (–) multiplied by itself 50 times :

   $(-1)^{50}$

   Since 50 is even, the product is positive.

   $(-1)^{50}$

   sign = positive

Work it out – 6

(a) Multiplicative Identity property.

(b) Commutative property of multiplication.

(c) Zero property of multiplication.

(d) Closure Property of Integers.

Work it out – 7

1. **(a)**– 4.

   (b) – 35

   (c) – 54

2. **(a)** Base comp of a mountaineer = 2,500 m.

   Rate, 150 metres per hours

   After 6 hours mountaineer climbs down.

   150 × 6 = 900 metres

   mountainer's altitude = 2500 – 900

   = 1600 metres.

   (b) Time taken to reach the valley at 1300 m.

   Decrease in altitude 2500 – 1300 = 1200

   Time : $\frac{1200}{150}$ = 5 hrs.

3. Given, straw berries profit = ₹ 6 percrate.

   percrate Grapes loss = ₹ 4 per crate

   (a) On Monday she sold straw barriers = 400

   crate 400 × 6 = 2400

   and Grapes sold loss of 700 × (– 4)

   = – 2800

   loss/profit = 2400 – 2800 = – 400 loss.

   (b) On Tuesday Grapes sold

   900 × (– 4) = 3600

   for No profit No loss. Let x be x + 6 = 5600 side.

   $x = \frac{3600}{6}$

   600 cratas of straw bere.

4. 6 × (– 2) × 5

   = (6 × – 2) × 5 = – 12 × 5 = – 60

Connect and reflect

[A] Multiple Choice Questions

1. (c), **2.** (b), **3.** (c), **4.** (b), **5.** (d).

[B] Fill in the blanks

1. 0, **2.** positive, **3.** adding, **4.** (-1) x a = **-a** for any integer a., **5.** distributive.

[C] State True or False

1. False, **2.** True, **3.** False, **4.** True, **5.** False.

[D] Subjective Questions

1. **Find the value of (– 6) × {7 + (– 4)}**

   (– 6) × 3 = **– 18**

2. **Find the value of (– 245) × 36 (without direct calculation)**

   Since one number is negative and the other is positive, the result is negative

   245 × 36 = 8820

   Ans. – 8820

3. **Number line movement**

   – 9 + x = 4

   x = 4 + 9 = **+ 13**

   (13 units to the right)

4. **Find the product : (– 2) × (– 2) × (– 2) × (– 2)**
   Even number of negative signs → result is positive
   2 × 2 × 2 × 2 = **16**
5. **Find the value of 48 ÷ (– 6)**
   Ans. – 8
6. **Temperature problem**
   Temperature falls by 4°C every hour
   Total fall in 7 hours = 7 × 4 = 28°C
   Final temperature = 10 – 28 = **– 18°C**
7. **Fill in the blank**
   (– 9) × ___ = 63
   63 ÷ (– 9) = **– 7**
8. **Find the value of (– 5) × 3 × (– 4)**
   (– 5 × 3) = – 15
   (– 15) × (– 4) = **60**
9. **If 64 ÷ (– 8) = – 8, then (– 64) ÷ (– 8) =?**
   Ans. 8
10. **Find the value of (– 18) + 25 – 12 + (– 5)**
    Combine negatives :
    (– 18) + (– 12) + (– 5) = – 35
    Then :
    – 35 + 25 = **– 10**
11. **Three consecutive integers have a product of – 120**
    Integers : – 6, – 5, – 4
12. **Using distributive property**
    (– 7) × [10 + (– 6)]
    = (– 7 × 10) + (– 7 × – 6)
    = – 70 + 42
    Ans. – 28

Ncert Exercise

Page-25 Figure it Out

1. (a)

Ist Number	IInd Number	Sum	Difference
16	11	27	5
17	10	27	7
18	9	27	9
20	7	27	13

Correct pair is (18, 9)

(b) Sum = 4, Difference = 12

Ist Number	IInd Number	Sum	Difference
2	2	4	0
4	0	4	4
8	– 4	4	12
10	– 6	4	16

Correct pair is (8, – 4)

(c) Sum = 0, Difference = 10

Ist Number	IInd Number	Sum	Difference
5	– 5	0	10
6	– 6	0	12
7	– 7	0	14
8	– 8	0	16

Correct pair is (5, – 5)

(d) Sum = 0, Difference = – 10

Ist Number	IInd Number	Sum	Difference
3	– 3	0	6
4	– 4	0	8
– 5	5	0	– 10
8	– 8	0	16

Correct pair is (–5, 5)

(e) Sum = – 7, Difference = – 1

Ist Number	IInd Number	Sum	Difference
1	– 8	– 7	9
– 4	– 3	– 7	– 1
– 2	– 5	– 7	3
– 6	– 1	– 7	– 5

Correct pair is (– 4, – 3)

(f) Sum = – 7, Difference = – 13

Ist Number	IInd Number	Sum	Difference
– 1	– 6	– 7	5
– 2	– 5	– 7	3
– 3	– 4	– 7	1
– 10	3	– 7	– 13

Correct pair is (–10, 3)

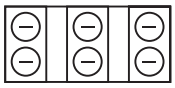
Page-31 Figure it Out

1. (a) 3 × (– 2)
Placing 2 negatives into an empty bag 3 times

i.e.,

$3 \times (-2) = -6$ — Product

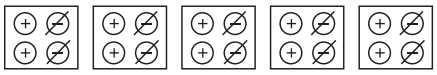
Multiplier — Multiplicand



(There are now 6 negatives in the bag)

(b) $(-5) \times (-2)$

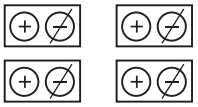
Remove 2 negatives from the bag 5 times



$\therefore (-5) \times (-2) = 10$

(c) $(-4) \times (-1)$

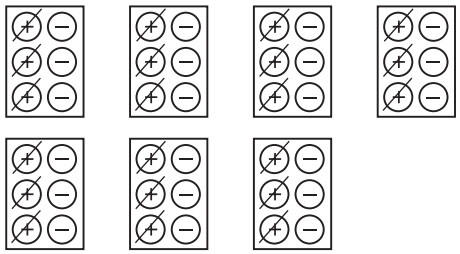
Remove 1 negative from the bag 4 times



$\therefore (-4) \times (-1) = 4$

(d) $(-7) \times 3$

Remove 3 positive from the bag 7 times



$\therefore (-7) \times 3 = -21$

2. Given that $123 \times 456 = 56088$

(a) We know that –ve × +ve = – ve

$\therefore (-123) \times 456 = -56088$

(b) We know that –ve × –ve = +ve

$\therefore (-123) \times (-456) = 56088$

(c) We know that +ve × –ve = –ve

$\therefore (123) \times (-456) = -56088$

3. Rules to Multiply two Integers

(1) If both the integers have the same sign then write their product with positive sign.

(2) If the integers have different sign then write their product with negative sign.

$(+) \times (+) = +$ $\quad (-) \times (-) = +$

$(+) \times (-) = -$ $\quad (-) \times (+) = -$

Here, $4 \times (-2) = -8$, $4 \times (-2 - 2 + 2) = -8$ and $4 \times (-4 - 2 + 4) = -8$

Page-33 Figure it Out

1. (a) $4 \times (-3) = -(4 \times 3) = -12$

(b) $(-6) \times (-3) = +(6 \times 3) = 18$

(c) $(-5) \times (-1) = +(5 \times 1) = 5$

(d) $(-8) \times (4) = -(8 \times 4) = -32$

(e) $(-9) \times 10 = -(9 \times 10) = -90$

(f) $10 \times (-17) = -(10 \times 17) = -170$

Page-39 Figure it Out

1. (a) $14 \times (-15) = -(14 \times 15)$

$= -210$

(b) $-16 \times (-5) = 80$

(c) $36 \div (-18) = -(36 \div 18) = -2$

(d) $(-46) \div (-23) = 2$

2. According to questions,

Total temperature drop

= 5°C per hour × 10 hrs = 50°C

Initially room temperature was 32°C

$\therefore$ Final room temperature

= 32°C – 50°C = – 18°C

3. (a) Profit on 1 white cement bag = ₹8

$\therefore$ Profit on 3,000 white cement bags

= ₹ 3,000 × 8 = ₹ 24,000

Loss on 1 grey cement bag = ₹ 5

$\therefore$ Loss on 5,000 grey cement bags

= ₹ 5,000 × 5 = ₹ 25,000

Clearly 25,000 > 24,000 i.e. Loss

Total Loss = 25,000 – 24,000 = ₹1,000

(b) Let number of grey cement bag sold = x

For neither profit nor loss

Profit from white cement bag + loss from grey cement bag = 0

i.e. $8 \times x + [(-5) \times 6400] = 0$

$\Rightarrow 8x - 32000 = 0 \Rightarrow 8x = 32000 \Rightarrow x = 4000$

Thus, company must sell 4,000 white cement bags.

4. (a) Let $(-3) \times x = 27$

Then $x = \frac{27}{-3} = -9$

(b) Let $5 \times x = (-35)$

Then $x = \dfrac{-35}{5} = -\left(\dfrac{35}{5}\right) = -7$

(c) $x \times (-8) = -56$

$x = \dfrac{-56}{-8} = 7$

(d) $x \times (-12) = 132$

$x = \dfrac{132}{-12} = -\left(\dfrac{132}{12}\right) = -11$

(e) $x \div (-8) = 7$

$x \times \dfrac{1}{(-8)} = 7$

$x = 7 \times (-8) = -(7 \times 8) = -56$

(f) $x \div 12 = -11$

$x \times \dfrac{1}{12} = -11$

$x = -11 \times 12 = -132$

Page-42 Figure it Out

1. (a) $(-5) \times [18 + (-3)]$

$= -5 \times 18 + (-5) \times (-3) = -90 + 15$

$= -75$

(b) $(-7) \times 4 \times (-1) = [(-7) \times 4] \times (-1)$

$= (-28) \times (-1) = 28$

(c) $[(-2) \times (-1)] \times [(-5) \times (-3)]$

$= 2 \times (-5) \times (-3) = 2 \times 15 = 30$

2. (a) $(-27) \div 9 = -\left(27 \times \dfrac{1}{9}\right) = -3$

(b) $84 \div (-4) = 84 \times \dfrac{1}{-4} = -\left(\dfrac{84}{4}\right)$

$= -21$

(c) $(-56) \div (-2) = -(56) \times \left(\dfrac{1}{-2}\right)$

$= 28$

3. (a) $(-1) \times (-27) = 27$

(b) $(-1) \times (31) = -31$

(c) $(-1) \times (1) = -1$

(d) $(-1) \times (-1) = 1$

(e) $(-1) \times 0 = 0$

4. $-47 + 56 - 14 + 8 - 2 + 8 - 5$

$= -(47 - 56 + 14 - 8 + 2 - 8 + 5) = -(-4)$ given $= 4$

5. The starting number – 21 (odd)

then $[(-21) \times (-3)] + 1 = 63 + 1 = 64$ (even)

$64 \div 2 = 32$ (even)

$32 \div 2 = 16$ (even)

$16 \div 2 = 8$ (even)

$8 \div 2 = 4$ (even)

$4 \div 2 = 2$ (even)

$2 \div 2 = 1$ (odd)

Now, – 21, 64, 32, 16, 8, 4, 2, 1,

Now for the starting number – 6 (even)

$-6 \div 2 = -3$ (odd)

$[(-3) \times (-3)] + 1 = 9 + 1 = 10$ (even)

$10 \div 2 = 5$ (odd)

$[5 \times (-3)] + 1 = -14$ (even)

$-14 \div 2 = -7$ (odd)

$[(-7) \times (-3)] + 1 = 22$ (even)

$22 \div 2 = 11$ (odd)

Hence the sequence is

– 6, – 3, 10, 5, – 14, – 7, 22, 11, ..., –1

6. (a) Let x answers were incorrect

Then according to question, $15 \times 4 - 2x = 40$

$\Rightarrow 60 - 2x = 40 \Rightarrow 60 - 40 = 2x$

$\Rightarrow x = \dfrac{20}{2} = 10$

So, Anita had 10 incorrect answers.

Total number of questions

= Sum of correct and incorrect answers

$= 15 + 10 = 25$ **Ans.**

(b) Let x answers be incorrect

Then, according to question,

$5 \times 4 - 2x = -10$

$\Rightarrow 20 - 2x = -10 \Rightarrow 20 + 10 = 2x$

$\Rightarrow 30 = 2x \Rightarrow x = \dfrac{30}{2} = 15$

Thus, Anil had 15 incorrect answers

yes, Anil leave some questions unanswered

Anil answered question

= (Total number of questions)

– (Anil's correct answers + Anil's incorrect answer) = 25 – (5 + 15) = 25 – 20 = 5 **Ans.**

7. Operation done by machine is

(I^{st} no.) – [II^{nd} no. × III^{rd} no.]

I^{st} Row 4 – [8 × (– 3)] = 4 – (– 24) = 28

II^{nd} Row 6 – (9 × 6) = 6 – 54 = – 48

III^{rd} Row 2 – [3 × (– 2)]

= 2 – (– 6) = 2 + 6 = 8

IV^{th} Row – 9 – [5 × (– 8)] = – 9 – (– 40)

= – 9 + 40 = 31

V^{th} Row 7 – [– 4 × (– 6)] = 7 – (24)

= 7 – 24 = –17

VI^{th} Row – 16 – [– 6 × (– 9)]

= – 16 – (54) = **– 70**

Thus missing number is – 70.

8. Current Temperature = 8°C

Temperature drop after 1 hr = 5°C

∴ Temperature drop after 4 hrs 8 – 4 × 5

Hence required expression = 8 – (5 × 4)

9. (a) Let three consecutive numbers are $n – 1, n, n + 1$

Then product $(n – 1)(n)(n + 1) = – 6$

$(n – 1)(n)(n + 1) = – (1 \times 2 \times 3)$

Three consecutive integers are – 1, – 2, – 3

(b) Let three consecutive number are

$n – 1, n, n + 1$

120 = 2 × 2 × 2 × 3 × 5

= (2 × 2) × 5 × (2 × 3) = 4 × 5 × 6

here, $(n – 1)(n)(n + 1) = 120$

Hence consecutive integers are 4, 5 and 6.

10. According to question,

$13x – 9y$ = total (where x and y are non-negative integers)

(a) (13 –9) × 5 = 13 × 5 – 9 × 5

(b) Take 10 coins of + 13 and 10 coins of – 9

10 × 13 – 10 × 9 = 130 – 90 = + 40 Pibs.

(c) Take 10 coins of + 13 and 20 coins of – 9

10 × 13 – 20 × 9 = 130 – 180 = – 50 Pibs.

(d) Take 2 coins of + 13 and 2 coins of – 9

2 × 13 – 2 × 9 = 26 – 18 = + 8 Pibs

(e) Take 7 coins of + 13 and 9 coins of – 9

7 × 13 – 9 × 9 = 91 – 81 = + 10 Pibs

(f) Take 13 coins of + 13 and 19 coins of – 9

13 × 13 – 19 × 9 = 169 – 171 = – 2 Pibs

(g) Take 7 coins of + 13 and 10 coins of – 9

7 × 13 – 10 × 9 = 91 – 90 = + 1 Pibs

(h) Yes, It is possible

Take 122 coins of + 13 and 2 coins of –9

122 × 13 – 2 × 9 = 1586 – 18 = 1568 Pibs.

11. (a) [32 × (– 18)] ÷ (– 36)

= (– 576) ÷ (– 36) = 16

(b) (32) ÷ [(– 36) × (– 18)]

$$= 32 \div 648 = \frac{32}{648} = \frac{4}{81}$$

(c) [25 × (– 12)] ÷ [(45) × (– 27)]

$$(– 300) \div (– 1215) = \frac{20}{81}$$

(d) [280 × (– 7)] ÷ [(– 8) × (– 35)] (– 1960) ÷ (280) =– 7

12. (a) (– 348) + (– 1064)

= – 348 – 1064 = – (348 + 1064) = – 1412

(b) (– 348) – (– 1064) = – 348 + 1064 = 716

(c) 348 – (– 1064) = 348 + 1064 = 1412

(d) (– 348) × (– 1064) = + (348 × 1064) = 370272

(e) (348) × (– 1064) = – (348 × 1064) = – 370272

(f) 348 × 964 = 335472

Arranging in increasing order, we get

– 370272 < – 1412 < 716 < 1412 < 335472 < 370272

i.e. (e) < (a) < (b) < (c) < (f) < (d)

13. Given that $(-548) \times 972 = -532656$

(a) $(-547) \times 972 = (-548 + 1) \times 972$

$= -548 \times 972 + 972 = -532656 + 972$

$= -531684$

(b) $(-548) \times 971 = -548 \times (972 - 1)$

$= -548 \times 972 + 548 = -532656 + 548$

$= -532108$

(c) $(-547) \times 971 = (-548 + 1) \times (972 - 1)$

$= -548 \times 972 + 548 + 972 - 1$

$= -532656 + 548 + 972 - 1 = -531137$

14. Given $207 \times (-33 + 7) = -5382$

$= 207 \times (-26) = -5382$

$\therefore -207 \times (33 - 7) = -207 \times 26 = -5382$

15. (a) Maximum possible value

$[-2 - (3 + 5)] \times (-6) = (-2 - 8) \times (-6)$

$= 60$

(b) Minimum possible value

$[3 - (-2) + 5] \times (-6) = (3 + 2 + 5) \times (-6) = -60$

16. (a) $\square + \square \times \square = -36$

5 different ways—

(i) $0 + (-6) \times (6) = -36$

(ii) $4 + (-5) \times (8) = -36$

(iii) $-4 + (-8) \times (4) = -36$

(iv) $-11 + (5) \times (-5) = -36$

(v) $-3 + (3) \times (-11) = -36$

Similarly we can find (b) and (c).

Chapter – 3

Work it out – 1

1. List all the factors of the following numbers

To find all factors, list all whole numbers that divide the given number exactly (without remainder).

(a) 75

Factor pairs :

1×75

3×25

5×15

Factors :

1, 3, 5, 15, 25, 75

(b) 144

Factor pairs :

1×144

2×72

3×48

4×36

6×24

8×18

9×16

12×12

Factors :

1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144

(c) 210

Factor pairs :

1×210

2×105

3×70

5×42

6×35

7×30

10×21

14×15

Factors :

1, 2, 3, 5, 6, 7, 10, 14, 15, 21, 30, 35, 42, 70, 105, 210

(d) 500

Factor pairs :

1×500

2×250

4×125

5×100

10×50

20×25

Factors :

1, 2, 4, 5, 10, 20, 25, 50, 100, 125, 250, 500

Work it out – 2

HCF Using Prime Factorisation

To find the Highest Common Factor (HCF) using prime factorisation :

- Break each number into its prime factors
- Take the common factors with the **lowest powers**
- **Multiply them**

(a) 36 and 48

Prime factorisation of 36 :

$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

Prime factorisation of 48 :
$48 = 2 \times 2 \times 2 \times 2 \times 3 = 2^4 \times 3$
Common factors :
2^2 and 3
HCF = 4×3 = **12**
(b) 150 and 210
Prime factorisation of 150 :
$150 = 2 \times 3 \times 5 \times 5 = 2 \times 3 \times 5^2$
Prime factorisation of 210 :
$210 = 2 \times 3 \times 5 \times 7$
Common factors :
2, 3, 5
HCF = $2 \times 3 \times 5$ = **30**
(c) 80 and 81
Prime factorisation of 80 :
$80 = 2 \times 2 \times 2 \times 2 \times 5 = 2^4 \times 5$
Prime factorisation of 81 :
$81 = 3 \times 3 \times 3 \times 3 = 3^4$
Common factors :
None
HCF = **1** (Numbers are co-prime)
(d) 144 and 198
Prime factorisation of 144 :
$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^4 \times 3^2$
Prime factorisation of 198 :
$198 = 2 \times 3 \times 3 \times 11 = 2 \times 3^2 \times 11$
Common factors :
2 and 3^2
HCF = 2×9 = **18**

Work it out – 3

1. Find the HCF (Highest Common Factor)
The HCF is the largest number that divides all given numbers exactly.
(a) 36, 90
Factors of 36 :
1, 2, 3, 4, 6, 9, 12, 18, 36
Factors of 90 :
1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
HCF = 18
(b) 45, 60, 75
Factors of 45 :
1, 3, 5, 9, 15, 45
Factors of 60 :
1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
Factors of 75 :
1, 3, 5, 15, 25, 75
HCF = 15
(c) 128, 251
$128 = 2^7$
251 is a prime number
They have no common prime factors
HCF = 1 (They are co-prime)
(d) 210, 315
$210 = 2 \times 3 \times 5 \times 7$
$315 = 3 \times 3 \times 5 \times 7$
Common factors :
$3 \times 5 \times 7 = 105$
HCF = 105
(e) 360, 480, 600
$360 = 120 \times 3$
$480 = 120 \times 4$
$600 = 120 \times 5$
HCF = 120

2. Reasoning Question
Question :
Consider the numbers 80 and 240. They are written as :
$80 = 8 \times 10$
$240 = 3 \times 5 \times 16$
Can we say that these numbers have no common factor other than 1?
Ans. No, we cannot say that.
Reason :
The given factorizations are not prime factorizations. Even though they look different, the numbers actually share many common factors.

Work it out – 4

Least Common Multiple (LCM)

1. Find the LCM of the following numbers
To find the LCM, we look for the **smallest number that is a multiple of all the given numbers**.
(a) 20 and 25
Multiples of 20 :
20, 40, 60, 80, 100, 120, …
Multiples of 25 :
25, 50, 75, 100, 125, …
LCM = 100
(b) 12, 16, and 24
Prime factorisation :
$12 = 2^2 \times 3$
$16 = 2^4$
$24 = 2^3 \times 3$

Take highest powers :
$2^4 \times 3 = 16 \times 3$
LCM = 48
(c) 15 and 20
Multiples of 15 :
15, 30, 45, 60, 75, …
Multiples of 20 :
20, 40, 60, 80, …
LCM = 60
(d) 60 and 150
Prime factorisation :
$60 = 2^2 \times 3 \times 5$
$150 = 2 \times 3 \times 5^2$
Take highest powers :
$2^2 \times 3 \times 5^2 = 4 \times 3 \times 25$
LCM = 300

Work it out – 5

HCF and LCM Using Prime Factorisation

To find both the **HCF (Highest Common Factor)** and **LCM (Least Common Multiple)**, the prime factorisation method is very useful.

(a) 180 and 270

Step 1 : Prime Factorisation

$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$
$270 = 2 \times 3 \times 3 \times 3 \times 5 = 2 \times 3^3 \times 5$

Step 2 : Find HCF

(Take lowest powers of common prime factors)
$HCF = 2^1 \times 3^2 \times 5^1$
$= 2 \times 9 \times 5$
= 90

Step 3 : Find LCM

(Take highest powers of all prime factors)
$LCM = 2^2 \times 3^3 \times 5^1$
$= 4 \times 27 \times 5$
= 540

(b) 132 and 198

Step 1 : Prime Factorisation

$132 = 2 \times 2 \times 3 \times 11 = 2^2 \times 3 \times 11$
$198 = 2 \times 3 \times 3 \times 11 = 2 \times 3^2 \times 11$

Step 2 : Find HCF

$HCF = 2^1 \times 3^1 \times 11^1$
$= 2 \times 3 \times 11$
= 66

Step 3 : Find LCM

$LCM = 2^2 \times 3^2 \times 11^1$
$= 4 \times 9 \times 11$
= 396

Work it Out–6

Verification of HCF and LCM Property

Property Used

$HCF(a, b) \times LCM(a, b) = a \times b$
(The product of the HCF and LCM of two numbers is equal to the product of the numbers.)

(a) 54 and 90

Prime Factorisation

$54 = 2 \times 3 \times 3 \times 3 = 2 \times 3^3$
$90 = 2 \times 3 \times 3 \times 5 = 2 \times 3^2 \times 5$

Find HCF and LCM

$HCF = 2^1 \times 3^2$
$= 2 \times 9$
= 18
$LCM = 2^1 \times 3^3 \times 5^1$
$= 2 \times 27 \times 5$
= 270

Verification

LHS (HCF × LCM) = 18 × 270 = **4860**
RHS (Product of numbers) = 54 × 90 = **4860**
Result : LHS = RHS ✓ (Verified)

(b) 160 and 120

Prime Factorisation

$160 = 2 \times 2 \times 2 \times 2 \times 2 \times 5 = 2^5 \times 5$
$120 = 2 \times 2 \times 2 \times 3 \times 5 = 2^3 \times 3 \times 5$

Find HCF and LCM

$HCF = 2^3 \times 5$
$= 8 \times 5$
= 40
$LCM = 2^5 \times 3 \times 5$
$= 32 \times 3 \times 5$
= 480

Verification

LHS (HCF × LCM) = 40 × 480 = **19,200**
RHS (Product of numbers) = 160 × 120 = **19,200**
Result : LHS = RHS ✓(Verified)

Connect and Reflect

[A] Multiple Choice

1. (b), **2.** (b), **3.** (c), **4.** (c), **5.** (d)

[B] Fill in the blanks

1. Highest common factor (HCF)
2. Prime
3. Minimum
4. Lowest common multiple (LCM)
5. Product

[C] State Ture or False

1. False, **2.** True, **3.** True, **4.** False, **5.** True.

[D] Subjective Type

1. (a) 72

Prime factorization :

$72 = 2^3 \times 3^2$

Now list all factors :

Factors of 72 :

1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

(b) 98

Prime factorization :

$98 = 2 \times 7^2$

Factors of 98 :

1, 2, 7, 14, 49, 98

2. (a) 60 and 90

Prime factorisation :

$60 = 2^2 \times 3 \times 5$

$90 = 2 \times 3^2 \times 5$

Take common factors with smallest powers :

- 2^1, 3^1, 5^1

So,

HCF = $2 \times 3 \times 5 = 30$

(b) 84 and 126

Prime factorisation :

$84 = 2^2 \times 3 \times 7$

$126 = 2 \times 3^2 \times 7$

Common factors (smallest powers) :

- 2^1, 3^1, 7^1

So,

HCF = $2 \times 3 \times 7 = 42$

3. Find the LCM

(a) 18 and 24

Prime factorization :

$18 = 2 \times 3^2$

$24 = 2^3 \times 3$

LCM = $2^3 \times 3^2 = 72$

(b) 20 and 25

$20 = 2^2 \times 5$

$25 = 5^2$

LCM = $2^2 \times 5^2 = 100$

4. Numbers with no common factor other than 1 are called coprime numbers.

Example : 8 and 15

5. If one number is a factor of another :

- HCF = smaller number
- LCM = larger number

Example : 6 and 48

HCF = 6

LCM = 48

6. Find the HCF of 36, 54, 90

Prime factors :

$36 = 2^2 \times 3^2$

$54 = 2 \times 3^3$

$90 = 2 \times 3^2 \times 5$

Common factors : $2^1 \times 3^2$

HCF = 18

7. Ribbon problem

Lengths : 15 cm and 20 cm

Shortest piece = LCM of 15 and 20

$15 = 3 \times 5$

$20 = 2^2 \times 5$

LCM = $2 \times 2 \times 3 \times 5 = 60$ cm

8. Statement check

"If two numbers are consecutive, their HCF is always 1."

True

Example : 5 and 6 $\rightarrow$ HCF = 1

9. Find two numbers

Given : HCF = 4

LCM = 96

Use formula :

Number1 × Number 2 = HCF × LCM

= $4 \times 96 = 384$

Number can be 24, 16.

10. For 28 and 70 :

LCM

2	28, 70
2	14, 35
7	7, 35
5	1, 5
	1, 1

$2 \times 2 \times 7 \times 5 = 140$

HCF

$28 = 2 \times 2 \times 7$

$70 = 2 \times 5 \times 7$

$= 2 \times 7 = 14$

HCF = 14

LCM = 140

Verification :

HCF × LCM = 14 × 140 = 1960

Product = 28 × 70 = 1960

Verified :

HCF × LCM = Product of numbers

Ncert Exercise

Page-51 Figure it Out

1. (a) Factors of 90 are 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45 and 90.

(b) Factors of 105 are 1, 3, 5, 7, 15, 21, 35, and 105.

(c) Factors of 132 are 1, 2, 3, 4, 6, 11,, 12, 22, 33, 44, 66, 132.

(d) Factors of 360 are 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 45, 60, 72, 90, 120, 180, 360.

(e) Factors of 840 are 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 20, 21, 24, 28, 30, 35, 40, 42, 56, 60, 70, 84, 105, 120, 140, 168, 210, 280, 420, 840.

Page-53 Figure it Out

1. (a) $\therefore 50 = 2 \times 5 \times 5$

$60 = 2 \times 2 \times 3 \times 5$

$\therefore$ Common Factors of 50, and 60 are 2, 5

(b) $\therefore 140 \times 2 \times 2 \times 5 \times 7$

$275 = 5 \times 5 \times 11$

$\therefore$ Common factors of 140 and 275 = 5

HCF (140, 275) = 5

(c) $77 = 7 \times 11$

$725 = 5 \times 5 \times 29$

$\therefore$ Common factor = 1

HCF (77, 725) = 1

(d) $370 = 2 \times 5 \times 37$

and $592 = 2 \times 2 \times 2 \times 2 \times 37$

$\therefore$ Common factors = 2, 37

HCF (370, 592) = $2 \times 37 = 74$

(e) $81 = 3 \times 3 \times 3 \times 3$

$243 = 3 \times 3 \times 3 \times 3 \times 3$

$\therefore$ Common factors = $3 \times 3 \times 3 \times 3$

HCF (81, 243) = $3 \times 3 \times 3 \times 3 = 81$

Page-54 Figure it Out

1. (a) $24 = 2 \times 2 \times 2 \times 3$

$180 = 2 \times 2 \times 3 \times 3 \times 5$

$\therefore$ HCF = $2 \times 2 \times 3 = 12$

(b) $42 = 2 \times 3 \times 7$

$75 = 3 \times 5 \times 5$; $24 = 2 \times 2 \times 2 \times 3$

HCF = (42, 75, 24) = 3

(c) $240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$378 = 2 \times 3 \times 3 \times 3 \times 7$

$\therefore$ HCF = (240, 378) = $2 \times 3 = 6$

(d) $400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5$

$2500 = 2 \times 2 \times 5 \times 5 \times 5 \times 5$

$\therefore$ HCF = (400, 2500) = $2 \times 2 \times 5 \times 5 = 100$

(e) $300 = 2 \times 2 \times 3 \times 5 \times 5$

$2500 = 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$

HCF = (300, 800) = $2 \times 2 \times 5 \times 5 = 100$

2. No, one cannot say that 72 and 144 have no common factor other than 1, because their factorisation have composite numbers.

$72 = 2 \times 2 \times 2 \times 3 \times 3$

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

HCF = (72, 144) = $2 \times 2 \times 2 \times 3 \times 3 =$ 72 which is greater than 1

Page-58 Figure it Out

1. (a) By Prime Factorisation.

$30 = 2 \times 3 \times 5$; $72 = 2 \times 2 \times 2 \times 3 \times 3$

$\therefore$ LCM = (30, 72) = $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$

(b) By Prime Factorisation

$36 = 2 \times 2 \times 3 \times 3$; $54 = 2 \times 3 \times 3 \times 3$

LCM = (36, 54) = $2 \times 2 \times 3 \times 3 \times 3 =$ 108

(c) $105 = 3 \times 5 \times 7$ and $195 = 5 \times 3 \times 13$

$65 = 5 \times 13$

$\therefore$ LCM (105, 195, 65) = $3 \times 5 \times 7 \times 13 = 1365$

(d) $\therefore 222 = 2 \times 3 \times 37$; $370 = 2 \times 5 \times 37$

$\therefore$ LCM (222, 370) = $2 \times 3 \times 5 \times 37 =$ 1110

Page-58 Figure it Out

1. (a) Two consecutive even numbers

(i) 2, 4 $2 = 2 \times 1$; $4 = 2 \times 2 \times 1$

HCF (2, 4) = 2

(ii) 6, 8 $6 = 2 \times 3$; $8 = 2 \times 2 \times 2$

HCF = 2

General Statement— HCF of any two consecutive even numbers is 2.

Since, all even numbers are divisible by 2 and consecutive even numbers differe by 2

(b) Two consecutive odd numbers

(i) 3, 5 HCF (3, 5) = 1

(ii) 7, 9 HCF (7, 9) = 1

General Statement— HCF of any two consecutive odd numbers is 1.

Since, consecutive odd numbers are not divisible by any common even or odd factor other than 1, So they are always co-prime.

(c) Two Even Numbers

(i) 4, 10

$4 = 2 \times 2$; $10 = 2 \times 5$

HCF (4, 10) = 2

(ii) 8, 12

$8 = 2 \times 2 \times 2$; $12 = 2 \times 2 \times 3$

HCF (8, 12) = $2 \times 2 = 4$

General Statement—HCF of two even numbers is always an even number.

Since, all even numbers are divisible by 2

(d) Two consecutive numbers

(i) (7, 8) HCF (7, 8) = 1

(ii) (14, 15) $14 = 2 \times 7$; $15 = 3 \times 5$

HCF (14, 15) = 1

General Statement— HCF of any two consecutive numbers is 1

Since, consecutive numbers can never share any common factor other than 1, because every next number is exactly 1 more than the previous one.

(e) Two Co-prime Number

e.g. (i) 4, 9 HCF (4, 9) = 1

(ii) 5, 8 HCF (5, 8) = 1

General Statment—The HCF of two co-prime numbers is always 1.

Since co-prime numbers are defined as numbers that have no common factor other than 1.

2. (a) According to question, more such number pairs are

(i) LCM of 3 and 24

$3 = 3 \times 1$; $24 = 2 \times 2 \times 2 \times 3$

$\therefore$ LCM = $2 \times 2 \times 2 \times 3 = 24$

(ii) LCM of 4 and 12

$4 = 2 \times 2$; $12 = 2 \times 2 \times 3$

LCM (4, 12) = $2 \times 2 \times 3 = 12$

(iii) LCM of 5 and 15

$5 = 5 \times 1$; $15 = 3 \times 5$

LCM (5, 15) = $3 \times 5 = 15$

(b) General Statement—For any two positive integers, LCM of these numbers will be equal to one of the numbers (specially larger no.) If and only if the smaller number is a factor of the larger number.

Algebraic Description—Let a and b be two positive integers,

where $a < b$

The LCM of a and b will be b, if and only if b is a multiple of a. Thus

LCM (a, b) = b, If and only If $b = k \times a$, Where k is a positive integer.

3. (a) Two multiples of 3

e.g. **(i)** (6, 9)

LCM (6, 9) = $2 \times 3 \times 3 = 18$

(ii) 9, 12

$9 = 3 \times 3$; $12 = 2 \times 2 \times 3$

LCM = $2 \times 2 \times 3 \times 3 = 36$

Observation—The LCM of two multiples of 3 is also a multiple of 3.

Since, both numbers are divisible by 3

So, their common multiple will also be divisible by 3

General Statment—The LCM of two multiples of 3 is also a multiple of 3.

(b) Two Consecutive Even Numbers—

e.g. (i) 2, 4

$2 = 2 \times 1$; $4 = 2 \times 2$

LCM (2, 4) = 4

(ii) 6, 8

$6 = 2 \times 3$; $8 = 2 \times 2 \times 2$

LCM = $2 \times 2 \times 2 \times 3 = 24$

Observation—The LCM of two consecutive even numbers is half of their product.

Since, Consecutive even numbers always share a common factor of 2, but not more. So, when finding the LCM, One factor of 2 overlaps, so the LCM becomes smaller than their product.

General Statment—The LCM of two consecutive even numbers say $2n$ and $2n + 2$ is always equal to half of their product. i.e.

$$\text{LCM}(2n, 2n + 2) = \frac{2n \times (2n + 2)}{2}$$

$$= n(2n + 2) = 2n^2 + 2n$$

(c) Two Consecutive Numbers

e.g. (i) 7, 8 LCM (7, 8) = 56

(ii) 8, 9 LCM (8, 9) = 72

Observation—The LCM of two consecutive numbers is equal to their product.

Since consecutive numbers have no common factors other than 1.

So, their product is the smallest number divisible by both.

General Statement—The LCM of two consecutive numbers is their product.

(d) Two Co-prime Numbers

e.g. (i) 4, 9 LCM (4, 9) = 36

(ii) 7, 10 LCM (7, 10) = 70

Observation—The LCM of two co-prime numbers is equal to their product.

Since, Co-prime numbers do not share any common factors except 1, so the smallest number that contains both is simply their product.

General Statment—The LCM of two co-prime numbers is equal to their product.

Page-63 Figure it Out

1. In Ist Row, Blue Star's position 4 and 10 Difference in the position = 10 – 4 = 6

So, next position of Blue Star in Ist Row are

4, 10, 16, 22, ...

Now In IInd Row, Blue Star's Position 4 and 8

Difference in the position = 8 – 4 = 4

So, the next position of Blue Star in IInd Row are 4, 8, 12, 16, ...

Here we see that 16th position is common in both Rows.

Therefore Blue Star meet again at the 16th position. **Ans.**

2. (a) $5 \times 7 \times 11 \times 11$ and $5 \times 7 \times 7 \times 11 \times 2$

Here we see that all prime factors of $5 \times 7 \times 7 \times 11 \times 2$ are not present in $5 \times 7 \times 11 \times 11$

So not multiple of given number

(b) $5 \times 7 \times 11 \times 11$ and $5 \times 7 \times 7 \times 11 \times 2$

$5 \times 7 \times 11 \times 11 \times 2$ does not contain all the prime factors of $5 \times 7 \times 11 \times 11$

So not a factor of given number

3. (a) $3 \times 3 \times 5 \times 7 \times 7$ and $12 \times 7 \times 11 = 2 \times 2 \times 3 \times 7 \times 11$

$\therefore$ HCF $= 3 \times 7$

LCM $= 3 \times 3 \times 5 \times 7 \times 7 \times 2 \times 2 \times 11$

(b) $45 = 3 \times 3 \times 5$; $36 = 2 \times 2 \times 3 \times 3$

$\therefore$ HCF $= 3 \times 3$

LCM $= 3 \times 3 \times 5 \times 2 \times 2$

4. Let a and b be two numbers set

HCF $(a, b) = 1$ and LCM $(a, b) = 66$

we know that

HCF × LCM = Product of two numbers

i.e. $1 \times 66 = a \times b$

Possible pairs of factors of 66 are

(1, 66), (2, 33), (3, 22), (6, 11)

Any of these pairs of number will satisfy the conditions.

5. According to question

Number of cows = multiple of LCM (3, 5, 7)

LCM (3, 5, 7) = $3 \times 5 \times 7 = 105$

Given that number of cows is less than 200

multiples of 105 are 105, 210.....

but number of cows is < 200

so, cowherd had 105 cows.

6. Given $l = 12$ cm, $b = 18$ cm, $h = 36$ cm.

According to question, we have to find HCF of 12, 18, 36

$12 = 2 \times 2 \times 3$; $18 = 2 \times 3 \times 3$;
$36 = 2 \times 2 \times 3 \times 3$
HCF $= 2 \times 3 = 6$ cm
Required cubes are (b), (d) and (e).
Ans

7. For required number we have to find HCF (306, 36)
$\therefore 306 = 2 \times 3 \times 3 \times 17$
$36 = 2 \times 2 \times 3 \times 3$
HCF $= 2 \times 3 \times 3 = 18$
Ans. (c)

8. LCM of 3, 4, 5 and $7 = 3 \times 4 \times 5 \times 7 = 420$
So, number must be multiple of 420
i.e. 420 K (where K is a whole number)
when $420 \div 11$, leaves remainder 2
$11 \times 38 + 2 = 420$
But remainder should be 10
$\therefore 2K = 10 \Rightarrow K = 5$
Thus required number $= 420$ K
$= 420 \times 5 = 2100$ **Ans.**

9. LCM of 6 and 9
$6 = 2 \times 3$; $9 = 3 \times 3$
LCM $= 2 \times 3 \times 3 = 18$
According to question number is divisible by 6 and 9 but not by 10.

10. LCM is always quater than both individual numbers option (c) is correct.

11. Distance gained per leap
= Dog's leap distance – Rabbit's leap distance
$= 9 - 7 = 2$
Dog needs to close a 150 foot head start
Number of leaps

$$= \frac{\text{Head Start Distance}}{\text{Distance Gained per Leap}}$$

$$= \frac{150}{2} = 75 \text{ leaps}$$

12.

$1 = 1$	$2 = 2$
$3 = 3$	$4 = 2 \times 2$
$5 = 5$	$6 = 2 \times 3$
$8 = 2 \times 2 \times 2$	$9 = 3 \times 3$
$10 = 2 \times 5$	

$\therefore$ LCM $(1, 2, 3, 4, 5, 6, 8, 9, 10) = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$
Yes, this is the same answer.

13. $\frac{8}{15} + \frac{1}{20} + \frac{7}{36} + \frac{11}{63} + \frac{1}{21}$

Now, $15 = 3 \times 5$;
$20 = 2 \times 2 \times 5$;
$36 = 2 \times 2 \times 3 \times 3$;
$63 = 3 \times 3 \times 7$;
$21 = 3 \times 7$

LCM $(15, 20, 36, 63, 21) = 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 1260$

Now $\frac{8}{15} + \frac{1}{20} + \frac{7}{36} + \frac{11}{63} + \frac{1}{21}$

$$= \frac{8 \times 84 + 1 \times 63 + 7 \times 35 + 11 \times 20 + 1 \times 60}{1260}$$

$$= \frac{1260}{1260} = 1$$

Chapter – 4

Work it Out - 1

1. (a) $24 \times 31 = 744$
Part calculation.
Tenth $744 \div 10 = 74.4$
Hundredth $744 \div 100 = 7.44$
Thousandth $744 \div 1000 = 0.744$
(b) 38×40.5
$= 153.9$
Calculation
$153.9 \div 10 = 15.39$
Hundreth $153.9 \div 100$
$= 1.539$
Thousandth $153.9 \div 1000$
$=$ **0.1539**

2. Multiply decimals
(a) 24.43×10
Move decimal 1 place right
= 244.3
(b) 356.82×100
Move decimal 2 places right
= 35682

3. Using given result
Given :
$985 \times 653 = 643205$

(a) 9.85 × 653
= (985 × 653) ÷ 100
= 643205 ÷ 100
= 6432.05
(b) 98.5 × 65.3
Convert :
= (985 × 653) ÷ 100
= 643205 ÷ 100
= 6432.05

4. Milk problem
Milk per day = 3.5 litres
Days = 31
Total = 3.5 × 31
= 3.5 × (30 + 1)
= 105 + 3.5 = **108.5 litres**

5. Convert into decimals
(a) $\frac{35}{100}$ **= 0.35**
(b) $\frac{213}{1000}$ **= 0.213**
(c) $\frac{38}{1000}$ **= 0.038**
(d) $\frac{13}{1000}$ **= 0.013**

Work it Out - 2

1. Bags of rice
Total weight = 682.5 kg
Weight of 1 bag = 97.05 kg
Number of bags = 682.5 ÷ 97.05 kg
Multiply both by 1000 :
= 682500 ÷ 9705
= ≈ 7.033
Since bags must be whole,
7 bags (approx)

2. Water per day
Total = 203.52 litres
Days = 24
Per day = 203.52 ÷ 24
= 8.48 litres
She drank water 4.48 l every day.

3. Using 56 × 92 = 5152
(a) 0.56 × 92
= 5152 ÷ 100
= 51.52
(b) 5.6 × 9.2
= 5152 ÷ 10
= 51.52
(c) 0.056 × 92
= 5152 ÷ 1000
= 5.152
(d) 0.56 × 0.92
= 5152 ÷ 10000
= 0.5152

4. Find missing numbers
(a) 35 ÷ ___ = 0.035
Let x = ?
35 ÷ x = 0.035
x = 35 ÷ 0.035 = **1000**
(b) 832 ÷ ___ = 8.32
x = 832 ÷ 8.32 = **100**
(c) 2968 ÷ ___ = 0.2968
x = 2968 ÷ 0.2968 = **10000**

5. Quotients
(a) 23.5 ÷ 2.5
= 235 ÷ 25 = **9.4**
(b) 3.6 ÷ 0.25
= 3.6 × 4 = **14.4**
(c) 296 ÷ 0.025
= 296 × 40 = **11840**
(d) 999.8 ÷ 0.005
= 999.8 × $\frac{1000}{5}$
= 999.8 × 200 = **199960**

6. Cost per gift
Total cost = ₹ 525.69
Number of gifts = 24
Cost per gift = 525.69 ÷ 24
= ₹ 21.903 ≈ ₹ 21.03

Connect and Reflect

[A] MCQs
1. (b), **2.** (c), **3.** (c), **4.** (c), **5.** (b).

[B] Fill in the blanks
1. Decimal moves **2 places** to the left.
2. Product is **less than** or (smallar) both numbers.
3. 0.75 × 8 = **6.**
4. **terminating** decimal.
5. continues into **tenths**, hundredths and thousandths.

[C] True / False

1. False, **2.** False, **3.** True, **4.** True, **5.** False.

[D] Subjective Questions

1. Find the products

(a) 8 × 0.4

0.4 = 4/10

8 × 4/10 = 32/10 = **3.2**

Multiply normally, then place decimal (1 decimal place)

(b) 6 × 0.07

0.07 = 7/100

6 × 7/100 = 42/100 = **0.42**

2 decimal places in 0.07 → **Ans.** has 2 decimal places

(c) 9 × 0.03

0.03 = 3/100

9 × 3/100 = 27/100 = **0.27**

2. Products

(a) 14.6 × 5

= (146 × 5) ÷ 10

= 730 ÷ 10 = **73**

(b) 3.75 × 8

= 375 × 8 ÷ 100

= 3000 ÷ 100 = **30**

(c) 0.84 × 0.6

= 84 × 6 ÷ 1000

= 504 ÷ 1000 = **0.504**

3. Cloth required

One dress = 2.35 m

For 4 dresses :

2.35 × 4 = **9.4 m**

4. Cost of 12 notebooks

Cost of 1 = ₹ 18.75

18.75 × 12 =

= 18.75 × (10 + 2)

= 187.5 + 37.5

= **₹ 225**

5. Stack height

Thickness of 1 coin = 1.6 mm

25 coins :

1.6 × 25 = 40 mm

Convert mm → cm :

10 mm = 1 cm

40 mm = **4 cm**

6. Table (3.7)

Decimal shift rule :

- ×10 → move 1 place → **37**
- ×100 → move 2 places → **370**
- ×1000 → move 3 places → **3700**

7. Division by powers of 10

(a) 24.6 ÷ 10

Move decimal left → **2.46**

(b) 24.6 ÷ 100

Move 2 places → **0.246**

8. Ribbon problem

Total length = 6.3 m

Pieces = 7

6.3 ÷ 7 = **0.9 m**

9. Convert 7/20 to decimal

Make denominator 100 :

$\frac{7}{20} = \frac{35}{100}$ = **0.35**

10. Quotients

(a) 15 ÷ 4 = 3.75

(b) 1.5 ÷ 4

= 15 ÷ 40 = **0.375**

11. Sugar per bag

Total = 7.2 kg

Bags = 6

7.2 ÷ 6 = **1.2 kg**

12. Division with decimals

(a) 18 ÷ 0.6 = 180 ÷ 6 = **30**

(b) 4.5 ÷ 0.3 = 45 ÷ 3 = **15**

Note : Multiply both by 10 to remove decimal

13. Product less than 1

(a) 0.4 × 0.8 = 0.32

Both numbers < 1 → product becomes smaller

14. Using given relation

Given : 24 × 5 = 120

(a) 2.4 × 0.5

= 24 × 5 ÷ 100

= 120 ÷ 100 = **1.2**

(b) 12 ÷ 0.5 = 12 ÷ (5/10)

= 12 ÷ (1/2) = 12 × 2 = **24**

15. Juice per child

3.6 ÷ 9 = **0.4 L**

16. Average speed

Distance = 135 km

Time = 2.5 h

Speed = distance ÷ time

= 135 ÷ 2.5 = **54 km/h**

17. Flour per family

12.5 ÷ 10 = **1.25 kg**

18. Conversion

(a) 4.5 km → m

1 km = 1000 m

4.5 × 1000 = **4500 m**

(b) 375 g → kg

1000 g = 1 kg

375 ÷ 1000 = **0.375 kg**

19. Decimal type of 3/8

3 ÷ 8 = 0.375 terminating

Terminating decimal

20. Compare

5 ÷ 0.5 = 10

5 × 0.5 = 2.5

10 > 2.5

5 ÷ 0.5 is greater.

Ncert Exercise

Page-73 Figure it Out

1. (a) 6 × 4 tenths = 24 tenths

(b) 7 × 0·3 = 7 × 3 tenths = 21 tenths

(c) 9 × 5 hundredths = 45 hundredths

2. (a) 27·34 × 6

$= \frac{2734}{100} \times 6 = \frac{16404}{100} = 164{\cdot}04$

(b) 4·23 × 3·7

$= \frac{423}{100} \times \frac{37}{10} = \frac{423 \times 37}{1000}$

$= \frac{15651}{1000} = 15{\cdot}651$

(c) 0·432 × 0·23

$= \frac{432}{1000} \times \frac{0{\cdot}23}{100} = \frac{9936}{100000} = 0{\cdot}09936$

3. Cloth required for 1 shirt = 1·65 m

∴ Cloth required for 3 shirts = 3 × 1·65 m

$= \frac{3 \times 165}{100}\text{m} = \frac{495}{100}\text{m} = 4{\cdot}95$ m

Ans.

4. Cost of 1 book = ₹15·50

∴ Cost of 4 books = ₹4 × 15·50

$= \frac{4 \times 1550}{100} = \frac{6200}{100} = ₹62$

Cost of 1 Eraser = ₹2·75

∴ Cost of 3 Erasers = 3 × ₹2·75

$= \frac{3 \times 275}{100} = \frac{825}{100} = ₹8{\cdot}25$

Total amount spend = ₹(62 + 8·25) = ₹70·25

5. Given that,

Thickness of 1 coin = 1·45 mm

Height of the cylinder

= Total thickness of 36 coins = 36 × 1·45

$= \frac{36 \times 145}{100} = \frac{5220}{100} = 52{\cdot}2$ mm

We know that 10 mm = 1 cm

$1 \text{ mm} = \frac{1}{10}\text{cm}$

$\therefore 52{\cdot}2 \text{ mm} = \frac{52{\cdot}2}{10}\text{cm}$

= 5·22 cm **Ans.**

6. Price of 1 kg of oranges

= ₹56·50

Price of 2·250 kg of oranges = ₹ 56·50 × 2·250

$= \frac{5650 \times 2250}{100 \times 1000} = \frac{12712\cancel{5}\cancel{0}\cancel{0}}{100\cancel{0}\cancel{0}}$

$= \frac{12712\cancel{5}\cancel{0}\cancel{0}}{100\cancel{0}\cancel{0}} = 127{\cdot}125$

Again, If we write 56·50 as 56·5 and 2·250 as 2·25

then 56·5 × 2·25

$= \frac{565 \times 225}{10 \times 100} = \frac{127125}{1000}$

= 127·125, we get same product.

7. Purchase cost of 1 note book

= ₹23·6

Selling cost of 1 note book = 30

Profit per note book = Selling price – Purchase Cost = ₹(30 – 23·6) = ₹6·4

∴ Total profit on 50 note books = ₹6·4 × 50

$= \frac{64}{10} \times 50 = \frac{3200}{10} = ₹320$

8. Given that 18 × 12 = 216

(a) $18 \times 1{\cdot}2 = \frac{18 \times 12}{10} = \frac{216}{10}$

= 21·6 > 1

(b) $18 \times 0{\cdot}12 = \frac{18 \times 12}{100} = \frac{216}{10}$

$= 2{\cdot}16 > 1$

(c) $1{\cdot}8 \times 1{\cdot}2 = \frac{18 \times 12}{10 \times 10} = \frac{216}{100}$

$= 2{\cdot}16 > 1$

(d) $0{\cdot}18 \times 0{\cdot}12 = \frac{18 \times 12}{100 \times 100}$

$= \frac{216}{10000} = 0{\cdot}0216 < 1$

(e) $0{\cdot}018 \times 0{\cdot}012 = \frac{18 \times 12}{1000 \times 1000}$

$= \frac{216}{1000000} = 0{\cdot}000216 < 1$

(Also, we know that when we multiply two positive numbers, both are less than 1 then their product will be less than 1)

Thus, (d) and (e) are less than one.

9. Yes, by monitoring decimal place value, we can find the answer without actual multiplication.

Rules: (i) If one of the two numbers is greater than 1 then their product will be greater than the original number.

(ii) Multiplying by a number between 0 and 1 then product will be less than the original number.

(iii) Multiplying two numbers between 0 and 1, then product will be less than both factors, less than 1.

Here (a) $7 \times 0{\cdot}6$ (Greater than 1)

(b) $0{\cdot}7 \times 0{\cdot}6$ (less than 1)

(c) $0{\cdot}7 \times 6$ (Greater than 1)

(d) $0{\cdot}07 \times 0{\cdot}06$ (less than 1)

10.

	× 10	× 100	× 1000
5·7	57	570	5700
23·02	230·2	2302	23020
0·92	9·2	92	920
0·306	3·06	30·6	306
24·67	246·7	2467	24670

Page-83 Figure it Out

1. (a) $\frac{18 \times 2}{5 \times 2} = \frac{36}{10} = 3{\cdot}6$

Verification

```
                T O Tenths
5 ) 18 ( 0 3 · 6
   − 15
     30
   − 30
      0
```

Hence Proved

(b) $\frac{415 \times 25}{4 \times 25} = \frac{10375}{100}$

$= 103{\cdot}75$ **Verification**

```
                H T O  Tenths  Hundredth
4 ) 415 ( 1 0 3 ·   7      5
  −4
  15
 −12
  30
 −28
  20
 −20
  ×
```

$\therefore \quad \frac{415}{4} = 103{\cdot}75$ **Hence Proved**

(c) $\frac{1217 \times 5}{2 \times 5} = \frac{6085}{10}$

$= 608{\cdot}5$ **Verification**

```
                H T O  Tenths
2 ) 1217 ( 6 0 8 ·  5
 −12
  017
 −16
  10
 −10
   0
```

$\therefore \quad \frac{1217}{2} = 608{\cdot}5$

(d) $\frac{4827 \times 125}{8 \times 125} = \frac{603375}{1000}$

$= 603{\cdot}375$

Verification

$$8\overline{)4827}\,(0\,6\,0\,3\cdot3\,7\,5$$
$$-48$$
$$027$$
$$-24$$
$$30$$
$$-24$$
$$60$$
$$-56$$
$$40$$
$$-40$$
$$\times$$

$4827 \div 8 = 0603{\cdot}375$ **Hence proved**

2. (a) $\frac{1526}{4}$

Using long division method

$$4\overline{)1526}\,(381{\cdot}5$$
$$-12$$
$$32$$
$$-32$$
$$06$$
$$-4$$
$$20$$
$$-20$$
$$\times$$

option (iii) is correct.

(b) $\frac{3567}{8}$

By Long division method

$$8\overline{)3567}\,(4\,4\,5\cdot8\;\;7\;\;5 \quad (\text{H T O } T^{th}\ H^{th}\ Th^{th})$$
$$-32$$
$$36$$
$$-32$$
$$47$$
$$-40$$
$$70$$
$$-64$$
$$60$$
$$-56$$
$$40$$
$$-40$$
$$\times$$

option (iii) is correct.

3. (a) $\frac{132}{4}$

$$4\overline{)132}\,(33$$
$$-12$$
$$12$$
$$-12$$
$$0$$

$\therefore$ Quotient (Q) = 33

(b) $\frac{13{\cdot}2}{4} = \frac{132}{4\times10}$

$$40\overline{)132}\,(3\cdot3 \quad (\text{O } Th^{th})$$
$$-120$$
$$120$$
$$-120$$
$$\times$$

$\therefore$ Q = 3·3

(c) $1{\cdot}32 \div 4$

$\frac{132}{4\times100} = \frac{132}{400}$

$$400\overline{)1320}\,(0\cdot3\;\;3 \quad (\text{O } T^{th}\ H^{th})$$
$$-1200$$
$$1200$$
$$-1200$$
$$0$$

$\therefore$ Q = 0·33

(d) $\frac{0{\cdot}132}{4} = \frac{0132}{4\times1000} = \frac{132}{4000}$

$$4000\overline{)132000}\,(0\cdot0\;\;3\;\;3 \quad (\text{O } T^{th}\ H^{th}\ Th^{th})$$
$$12000$$
$$12000$$
$$-12000$$
$$0$$

$\therefore$ Q = 0·033

4. (a) $\frac{126}{8}$

$$8\overline{)126}\,(15\cdot7\;\;5 \quad (\text{T O } T^{th}\ H^{th})$$
$$-8$$
$$46$$
$$-40$$
$$60$$
$$-56$$
$$40$$
$$-40$$
$$\times$$

(b) 12·6 ÷ 8

```
          T  O Tth Hth
8) 12·6 ( 1 · 5  7  5
  −8
   46
  −40
    60
   −56
     40
    −40
      ×
```

(b) Similarly 1.26 ÷ 8 = 0.1575

(d) 0·126 ÷ 8 =

```
              O  Tth Hth Tth THth
8) 01·26 ( 0 · 0  1   5   7   5
 −0
   12
  −8
    46
   −40
     60
    −56
      40
     −40
       ×
```

(e) 0·0126 ÷ 8

```
               O  Tth Hth Tth THth
8) 0·0126 ( 0 · 0  0   1   5   7   5
 −0
   00
  −00
   12
   −8
    46
   −40
     60
    −56
      40
     −40
       ×
```

Q = 0·001575

Page-86 Figure it Out

1. (a) $\frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0{\cdot}4$

(b) $\frac{13 \times 25}{4 \times 25} = \frac{325}{100} = 3{\cdot}25$

(c) $\frac{4 \times 2}{50 \times 2} = \frac{8}{100} = 0{\cdot}08$

(d) $\frac{5 \times 125}{8 \times 125} = \frac{625}{1000} = 0{\cdot}625$

2. $\frac{24{\cdot}86}{1{\cdot}2} = \frac{2486 \times 10}{100 \times 12} = \frac{2486}{120}$

```
120) 2486 ( 20·7166
    −240
       860
      −840
        200
       −120
         800
        −720
          80
```

Q = 20·7166...

(b) 5·728 ÷ 1·52

$= \frac{5728 \times 100}{152 \times 1000} = \frac{5728}{1520}$

```
1520) 5728 ( 3·76
     −4560
      11680
     −10640
       10400
       −9120
        1280
```

∴ Q = 3·76

3. Given that 156 × 12 = 1872 ...(i)

(a) $15{\cdot}6 \times 1{\cdot}2 = \frac{156}{10} \times \frac{12}{10} = \frac{156 \times 12}{100}$

= 18·72, using (i)

(b) 187·2 ÷ 1·2

$\frac{187{\cdot}2}{1{\cdot}2} = \frac{1872}{12} = 156$ using (i)

(c) 18·72 ÷ 15·5

$= \frac{18{\cdot}72}{15{\cdot}6} = \frac{1872 \times 10}{156 \times 100} = \frac{12}{10} = 1{\cdot}2$

(d) $0{\cdot}156 \times 0{\cdot}12$

$$= \frac{156 \times 12}{1000 \times 100} = \frac{1872}{100000}$$

$$= 0{\cdot}01872$$

4. (a) Let $25 \div x = 0{\cdot}25$

$$\Rightarrow x = \frac{25}{0{\cdot}025} = \frac{25 \times 1000}{25} = 1000$$

(b) Let $25 \div x = 250$

$$\Rightarrow x = \frac{25}{250} = \frac{1}{10} = 0{\cdot}1$$

(c) Let $25 \div x = 2{\cdot}5$

$$\Rightarrow x = \frac{25}{2{\cdot}5} = \frac{25 \times 10}{25} = 10$$

(d) $25 \div 10 = 25 \times .....$

Let $25 \div 10 = 25 \times x$

$$\Rightarrow \frac{25}{25 \times 10} = \frac{1}{10} = 0{\cdot}1$$

(e) Let $25 \div 0{\cdot}10 = 25 \times x$

$$\Rightarrow \frac{25}{0{\cdot}10} = 25 \times x$$

$$\Rightarrow x = \frac{25}{25 \times 0{\cdot}10} = \frac{100}{0{\cdot}10} = 10$$

(f) Let $25 \div 0.01 \times x \Rightarrow \frac{25}{0{\cdot}01} = 25 \times x$

$$\Rightarrow x = \frac{25}{25 \times 0{\cdot}01} = \frac{1}{001} = \frac{100}{001} = 100$$

5. (a) $2{\cdot}46 \div 1{\cdot}5$

$$= \frac{2{\cdot}46}{1{\cdot}5} = \frac{246 \times 10}{100 \times 15} = \frac{246}{150}$$

$$\begin{array}{r|l} 150 & 246 \\ -150 & \hline 960 & 1{\cdot}64 \\ -900 & \\ \hline 600 & \\ -600 & \\ \hline \times & \end{array}$$

$\therefore$ Q $= 1{\cdot}64$

(b) $2{\cdot}46 \div 0{\cdot}15$

$$= \frac{2{\cdot}46}{0{\cdot}15} = \frac{246 \times 100}{100 \times 15} = \frac{246}{15}$$

$$\begin{array}{r|l} 15 & 246 \\ -15 & \hline 96 & 16.4 \\ -90 & \\ \hline 60 & \\ -60 & \\ \hline \times & \end{array}$$

(c) $2{\cdot}46 \div 0{\cdot}015$

$$= \frac{2{\cdot}46}{0{\cdot}015}$$

$$= \frac{246 \times 1000}{100 \times 15} = \frac{2460}{15}$$

$$\begin{array}{r|l} 15 & 2460 \\ -15 & \hline 96 & 164 \\ -90 & \\ \hline 60 & \\ -60 & \\ \hline \times & \end{array}$$

$\therefore$ Q $= 164$

In $24{\cdot}6 \div 1{\cdot}5$

$$= \frac{246 \times 10}{15 \times 10} = \frac{246}{15} = 16.4$$

and $\frac{2{\cdot}46}{0{\cdot}15} = \frac{246 \times 100}{15 \times 100} = \frac{246}{15}$

$= 16.4$

Both have same quotient

6. Total length of wooden block $= 4$ m

No. of pieces $= 5$

Thus length of each piece

$$= \frac{4}{5}$$

$$= \frac{4 \times 2}{5 \times 2} = \frac{8}{10} = 0{\cdot}8 \text{ m}$$ **Ans.**

7. Perimeter of regular polygon $= 208{\cdot}8$ cm

Number of sides $= 12$

Thus length of each side

$$= \frac{\text{Perimeter}}{\text{Number of sides}} = \frac{208{\cdot}8}{12} = 17{\cdot}4 \text{ cm}$$

$$12\overline{)208{\cdot}8}\,(17{\cdot}4$$
$$-12$$
$$88$$
$$-84$$
$$48$$
$$-48$$
$$\times$$

Thus, 17·4 cm. is required length.

8. Total quantity of juice = 3 L

Number of friends = 8

Juice distributed per friend $= \frac{3}{8}$ L

$\therefore \frac{3}{8}\text{ L} = \frac{3}{8} \times 1000\text{ mL} = \frac{3000}{8}\text{ml}$

= 375 ml

$$8\overline{)3000}\,(375$$
$$-24$$
$$60$$
$$-56$$
$$40$$
$$-40$$
$$\times$$

Thus, 375 mL is required quantity.

9. Distance covered by car using 12·6 L petrol = 234·45 km

$\therefore$ Distance covered by car using 1 L petrol

$= \frac{234{\cdot}45}{12{\cdot}6}\text{km}$

$\frac{234{\cdot}45}{12{\cdot}6} = \frac{23445 \times 10}{100 \times 126}$

$= \frac{23445}{1260} = 18{\cdot}607$ km

$$1260\overline{)23445}\,(18{\cdot}607$$
$$-1260$$
$$10845$$
$$-10080$$
$$7650$$
$$-7560$$
$$9000$$
$$-8820$$
$$180$$

Thus distance travelled per litre = 18·607 km **Ans.**

10. Total quantity of flour = 13·5 kg

Number of students = 15

Quantity of flour each student receive

$= \frac{13{\cdot}5}{15}\text{kg} = 0{\cdot}9$ kg

$$15\overline{)13{\cdot}5}\,(0{\cdot}9$$
$$-13{\cdot}5$$
$$\times$$

Ans. 0·9 kg

Page-93 Figure it Out

1. Step 1 : Cost per gram of Peanut Chikki: = Total cost ÷ Total weight

= ₹70.5 ÷ 210 g = ₹0.3357 per gram (approx.)

Step 2 : Cost per gram of Potato Chips:

= Total cost ÷ Total weight

= ₹33.25 ÷ 110 g = ₹0.3023 per gram (approx.)

Step 3 : Comparison:

Peanut Chikki: ₹0.3357 per gram

Potato Chips: ₹0.3023 per gram

Since ₹0.3023 < ₹0.3357, Potato Chips is cheaper.

Thus, Potato Chips is cheaper. Its cost per gram (₹0.302) is less than that of Peanut Chikki (₹0.336).

2. The Indian calendar is a solar-lunar calendar.

Months are based on moon phases.

Year length is based on the sun's movement.

The lunar year is 354 days.

The solar year is 365 days.

There is an 11-day difference between them.

An extra month is added every 2-3 years.

This month is called Adhik Mass.

It is like a leap year in the Gregorian calendar.

The sky is divided into 27 constellations. Dates and festivals are decided using them.

Sun's zodiac change is called Sankranti.

For example, Makar Sankranti.

Mathematicians like Aryabhata calculated year length accurately.

These methods kept the calendar aligned with seasons and astronomy.

3. Step 1 : Cost Price (CP):

Bananas bought = 3 kg

Rate = ₹30 per kg

Cost Price = 3 × ₹30 = ₹90

Step 2 : Selling Price (SP):

Number of bananas = 35

Selling price per banana = ₹5

Selling Price = 35 × ₹5 = ₹175

Step 3 : Profit:

Profit = Selling Price − Cost Price

Profit = ₹175 − ₹90 = ₹85

Verification: CP + Profit = ₹90 + ₹85 = ₹175 = SP

Thus, Shyamala makes a profit of ₹85 by selling all the bananas.

4. Step 1 : Number of books that can be placed:

Number of books = Length of shelf ÷ Thickness of each book = 160 cm ÷ 2.5 cm

= 64 books

Step 2 : Space left:

Space occupied by 64 books = 64 × 2.5 cm = 160 cm

Total shelf length = 160 cm

Space left = 160 − 160 = 0 cm

Step 3 : Comparison with teacher's wish:

Teacher wanted to place 80 books.

Only 64 books can fit on the shelf.

Verification: 64 × 2.5 cm = 160 cm = shelf length

Thus, 64 books can be placed on the shelf. No space is left. Only 64 out of 80 books can be placed.

5.

Blank	Calculation	Answer
5.5 km = ___ m	5.5 × 1000 = 5500	5500 m
35 cm = ___ m	35 ÷ 100 = 0.35	0.35 m
14.5 cm = __ mm	14.5 × 10 = 145	145 mm
68 g = ___ kg	68 ÷ 1000 = 0.068	0.068 kg
9.02 m = __ mm	9.02 × 1000 = 9020	9020 mm
125.5 ml = __ l	125.5 ÷ 1000 = 0.1255	0.1255 l

Ans: All answers are given in the table above (highlighted in green).

6. Part (i): 6¼ ÷ 2½

6¼ = 6.25

2½ = 2.5

6.25 ÷ 2.5 = 625 ÷ 250 (multiply both by 100) = 2.5

Verification: 2.5 × 2.5 = 6.25

Thus, 6¼ ÷ 2½ = 2.5

Part (ii): 60¼ ÷ 3½

60¼ = 60.25

3½ = 3.5

60.25 ÷ 3.5

= 6025 ÷ 350 (multiply both by 100)

= 17.214... ≈ 17.21

Verification: 17.21 × 3.5 ≈ 60.24 ≈ 60.25 □

Thus, 60¼ ÷ 3½ ≈ 17.21

7. (a) □ × □ = 2.4

Way 1 : 1.2 × 2.0 = 2.4

Way 2 : 0.6 × 4.0 = 2.4

Way 3 : 0.8 × 3.0 = 2.4

Ans: (a) 1.2 × 2 = 2.4 | 0.6 × 4 = 2.4 | 0.8 × 3 = 2.4

(b) □ × □ = 14.5
Way 1 : 2.9 × 5.0 = 14.5
Way 2 : 29.0 × 0.5 = 14.5
Way 3 : 1.45 × 10 = 14.5
Ans: (b) 2.9 × 5 = 14.5 | 29 × 0.5 = 14.5 | 1.45 × 10 = 14.5

8. Key Rule: Multiplying or dividing both dividend and divisor by the same power of 10 does not change the quotient.
(a) 75.6 ÷ 3.6 = (756 ÷ 10) ÷ (36 ÷ 10)
= 756 ÷ 36 = 21
(b) 7.56 ÷ 0.36
= (756 ÷ 100) ÷ (36 ÷ 100) = 756 ÷ 36 = 21
(c) 756 ÷ 0.36 = 756 ÷ (36 ÷ 100)
= (756 × 100) ÷ 36
= 75600 ÷ 36 = 21 × 100 = 2100
(d) 75.6 ÷ 360
= (756 ÷ 10) ÷ (36 × 10) = 756 ÷ (36 × 100)
= 21 ÷ 100 = 0.21
(e) 7560 ÷ 3.6
= (756 × 10) ÷ (36 ÷ 10)
= 21 × 10 × 10 = 21 × 100 = 2100
Ans.
(f) 7.56 ÷ 0.36 = (756 ÷ 100) ÷ (36 ÷ 100)
= 756 ÷ 36 = 21

9. Rule 1: If a is multiplied by 10, the quotient is also multiplied by 10.
Rule 2: If b is multiplied by 10, the quotient is divided by 10.

b a®	1517	151.7	15.17	1.517	15170
37	41	**5**	**0.41**	**0.041**	**410**
3.7	**410**	**41**	4.1	**0.41**	**4100**
0.37	**4100**	**410**	**41**	**4.1**	**41000**
0.037	**41000**	4100	**410**	**41**	**410000**
370	**4.1**	**0.41**	**0.041**	**0.0041**	**41**

Ans: All missing cells are filled in the table above.

10. (a) Maximum product:
Place largest digits in highest place values.
82.0 × 5.4 = 442.8 (maximum) **Ans.**

(b) Minimum product:
Place 0 in the tens place □ 02.4 = 2.4
2.4 × 5.8 = 13.92 (using digits 2,4,5,8,0)
2.4 × 5.8 = 13.92 (minimum) **Ans.**
(c) Product greater than 150:
85.0 × 2.4 = 204.0 > 150
85.0 × 2.4 = 204 > 150
Ans.
(d) Product nearest to 100:
20.5 × 4.8 = 98.4
(only 1.6 less than 100)
25.8 × 4.0 = 103.2 (3.2 more than 100)
Since |98.4 − 100| = 1.6 < |103.2 − 100| = 3.2,
20.5 × 4.8 = 98.4 is nearer to 100.
20.5 × 4.8 = 98.4 (nearest to 100) **Ans.**
(e) Product nearest to 5:
5.8 × 0.4 = 2.32 □ difference from 5: |5 − 2.32| = 2.68
4.0 × 0.2 = 0.80 □ difference: |5 − 0.80| = 4.20
Best option: 5.8 × 0.4 = 2.32 (closest to 2 with given digits)
5.8 × 0.4 = 2.32 (nearest to 5)
Ans.

11. Step 1 : Calculate approximate values:
(a) 245.05 × 0.942368 ≈ 230.93
[multiplier < 1 → result < 245.05]
(b) 245.05 × 7.9682 ≈ 1952.23
[multiplier > 1 → result >> 245.05]
(c) 245.05 ÷ 7.9682 ≈ 30.75
[divisor > 1 □ result << 245.05]
(d) 245.05 ÷ 0.942368 ≈ 260.06 [divisor < 1 □ result > 245.05]
(e) 245.05 = 245.05
(f) 7.9682 = 7.9682
Step 2 : Arrange in increasing order:
(f) 7.97 < (c) 30.75 < (a) 230.93 <
(e) 245.05 < (d) 260.06 < (b) 1952.23
Multiplying by a number less than 1 makes it smaller; dividing by a number less than 1 makes it larger.
Thus, Increasing order: (f) < (c) < (a) < (e) < (d) < (b)

Chapter – 5

Work it Out–1

1. Only one **Ans.** Paris
   Not statistical
2. Different students → different answers
   Statistical
3. Only one fixed value
   Not statistical
4. Different teachers → different choices
   Statistical
5. Fixed **Ans.** (32)
   Not statistical
6. Data changes daily / counts needed
   Statistical

Work it Out–2

1. **Skipping rope (Average)**
   Numbers : 12, 20, 15, 8, 25, 10
   Step 1 : Find sum
   12 + 20 + 15 + 8 + 25 + 10 = **90**
   Step 2 : Divide by number of attempts (6)
   Average = 90 ÷ 6 = **15**
   Simran's average skips = 15
2. **Temperature question**
   This is activity-based (you record your city data)
   Method :
   - Add all 7 days' temperatures
   - Divide by 7

Average = (sum of temperatures) ÷ 7

3. **Reading average (Ali vs Zara)**
   Ali :
   10 + 15 + 12 + 20 + 18 = **75**
   Average = 75 ÷ 5 = **15**
   Zara :
   25 + 5 + 10 + 30 + 15 = **85**
   Average = 85 ÷ 5 = **17**

Zara has higher average (17 pages)

4. **Books borrowed (5 months)**
   Numbers : 120, 145, 110, 160, 155
   Step 1 : Sum
   = 690
   Step 2 : Average
   = 690 ÷ 5 = **138**
   Average books per month = 138
5. **Students over 6 years**
   Numbers : 1420, 1490, 1580, 1650, 1720, 1800
   Step 1 : Sum = 9660
   Step 2 : Average = 9660 ÷ 6 = **1610**
   Mean enrolment = 1610 students

Work it Out–3

1. **Mean and Median**
   Given data :
   5, 10, 15, 20, 100

Step 1 : Mean (Average)
Mean = (sum of all values) ÷ (number of values)
Sum = 5 + 10 + 15 + 20 + 100 = **150**
Total numbers = 5
Mean = 150 ÷ 5 = **30**

Step 2 : Median
Data is already sorted
Middle value = **15**
Median = **15**

Which represents the group better?
Look at values :
5, 10, 15, 20 are close, but **100 is very large (outlier)**

- Mean = 30 (affected by 100)
- Median = 15 (central value)

Ans. Median represents the group better

2. **Find x (Median given)**
   Given data (sorted) :
   x, 10, 12, 15
   Median = **11**

Step 1 : Formula for even number of values
Median = (middle two values) ÷ 2
Middle values = 10 and 12
Median = (10 + 12) ÷ 2 = **11**

Step 2 : Compare
Median is already 11 without x
So **x must be ≤ 10** to keep order correct

Final Ans.
x ≤ 10
(Any value ≤ 10 will keep median = 11)

Work it Out–4

1. **Median price (two markets)**
   Green market prices :
   20, 25, 22, 30, 28
   Arrange : 20, 22, 25, 28, 30
   Middle value = **25**
   Median (Green market) = ₹ 25
   Fresh market prices :
   18, 40, 22, 25, 25

Arrange : 18, 22, 25, 25, 40
Middle value = **25**
Median (Fresh market) = ₹ 25

2. Books data (with missing students)
Data : 3, 5, 0, 1, __, 4, 2, 0, __, 6, 2
Ignore blanks → take available values

Step 1 : Arrange
0, 0, 1, 2, 2, 3, 4, 5, 6

Median
Middle = **2**

Mean
Sum = 23
Count = 9
Mean = 23 ÷ 9 = **≈ 2.56** or 2.55.....

Description
Most students read **2–3 books**
Few read very low (0) or high (6)
Data is **slightly spread but centered near 2–3**

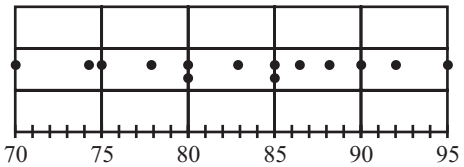
3. Sunflower heights
Data :
80, 85, 75, 90, 82, 88, 70, 95, 85, 80, 84, 78, 86, 92, 74

Step 1 : Arrange
70, 74, 75, 78, 80, 80, 82, 84, 85, 85, 86, 88, 90, 92, 95

Median
Middle (8th value) = **84 cm**

Mean
Sum = 1244
Count = 15
Mean = 1244 ÷ 15 = **≈ 82.93 cm**

Comparison
Median = 84
Mean ≈ 82.93



Meam ≈ 82.93 cm
Median = 84 cm

More flowers are **slightly taller than average**

4. Temperature data
35.5, 38.0, 36.2, 40.1, 39.5, 34.0, 37.5
Arrange
34.0, 35.5, 36.2, 37.5, 38.0, 39.5, 40.1
Median
Middle = **37.5°C**
Mean
Sum = 260.8
Mean = 260.8 ÷ 7 = **≈ 37.26°C**
(a) Can mean/median be outside range?
No
Mean/median always lie between **minimum (34°C)** and **maximum (40.1°C)**
(b) Why important?
If average is outside range → calculation is wrong
It helps **check correctness of data.**

5. Pumpkin weights
3.5, 4.2, 5.0, 3.8, 4.5, 5.2, 4.0
Mean
Sum = 30.2
(Average) or Mean = 30.2 ÷ 7 **≈ 4.31 kg**

6. Trucks vs Cycles
Trucks :
12000, 15500, 11200, 14000
Mean = (52700 ÷ 4) = **13175 kg**
Cycles :
12, 10, 14, 11, 13
Mean = (60 ÷ 5) = **12 kg**
So, Approximately 1,100 bicycles would equal the weight of one construction truck.
The mean is not a good way to compare these two groups.
So, trucks carry **much heavier loads than cycles**

Work it Out–5

Given Data (in thousands)

Company	2023	2024	2025
Fun Bricks	25	35	50
Robo Toys	60	45	55
Doll House	30	31	30
Speed Racers	85	90	95
Puzzle Pro	40	42	45

1. Check statements
(a) **Check :** 2024 2025
- Fun Bricks : 35 → 50
- Robo Toys : 45 → 55
- Doll House : 31 → 30 (decrease)
- Speed Racers : 90 → 95
- Puzzle Pro : 42 → 45

False

(b) Only one company (speed Racers) produced more than 80,000 toys. **True**

(c) Total toys by Doll House < 20,000

Total = 30 + 31 + 30 = **91 (thousand)**

91,000 > 20,000 **False**

(d) Average of Fun Bricks ≈ 50,000

Average = (25 + 35 + 50) ÷ 3

= 110 ÷ 3 ≈ **36.7**

Not close to 50 **False**

(e) Speed Racers > Robo Toys in all 3 years

Check : Speed Racers Robo Toys

- 2023 : 85 > 60
- 2024 : 90 > 45
- 2025 : 95 > 55 **True**

1. **(b), (e)**
2. **Companies with consistent growth**

Growth means increasing every year :

- Fun Bricks : 25 → 35 → 50
- Puzzle Pro : 40 → 42 → 45

Others don't follow strictly.

Ans. Fun Bricks, Puzzle Pro

3. **Total production in 2023**

Add all :

25 + 60 + 30 + 85 + 40 = **240 (thousand) = 2,40,000**

Range : **(b) 2,00,000 to 4,00,000**

Connect and Reflect

[A] Multiple Choice Questions

1. (b), **2.** (b), **3.** (c), **4.** (c), **5.** (c).

[B] Fill in the Blanks

1. **statistical**
2. **number**
3. **arranged (in order)**
4. **outlier**
5. **value (or frequency)**

[C] True / False

1. False, **2.** False, **3.** True, **4.** True, **5.** True.

[D] Subjective Questions

1. A **statistical question** is a question that can be answered by collecting data and has **different possible answers (variation)**.

   Example : heights of students in a class.
2. **Example of a statistical statement**

   "The average height of students in Class 7 is 150 cm."
3. **Mean of data : 2, 4, 6, 3, 5, 4**

   Sum = 2 + 4 + 6 + 3 + 5 + 4 = **24**

   Number of values = 6

   Mean = 24 ÷ 6 = **4**
4. **Arrange & find median**

   Data : 9, 2, 7, 5, 4

   Arrange → 2, 4, 5, 7, 9

   Median = **5**
5. **Median of 10, 12, 8, 6, 14, 16**

   Arrange → 6, 8, 10, 12, 14, 16

   Even number → take middle two : 10, 12

   Median = (10 + 12) ÷ 2 = **11**
6. An **outlier** is a value that is **very different (extremely high or low)** compared to other values in the data.
7. **Identify outlier (3, 4, 5, 6, 25)**

   25 is much larger than others

   Outlier = 25
8. Because mean is **affected by extreme values (outliers)**.

   Example : 2, 3, 4, 100 → mean becomes very high and does not represent most values.
9. **Median**

   Because it depends on position, not value size.
10. **Mean of heights**

    Data : 140, 142, 145, 147, 190

    Sum = 764

    Mean = 764 ÷ 5 = **152.8 cm**

    190 is very large (outlier)

    Mean is **not suitable representation**
11. **What does a dot plot show?**

    A dot plot shows :

    - distribution of data
    - how values are **spread or clustered**
12. **Two ways to compare data**

    Bar graph and using mean or median.
13. **Use of bar graph**

    A bar graph is used to **represent and compare quantities visually**.
14. Used to compare **two related data sets** (e.g., rainfall in two cities).
15. Marks : 40, 50, 0, 60

    Yes, zero must be included

    Because it is a **valid data value** and affects total

16. Average rainfall
Data : 12, 15, 18, 14, 16
Sum = 75
Mean = 75 ÷ 5 = **15 mm**

17. No
Mean always lies between **minimum and maximum**

18. Because median is the **middle value**, and we can find it only when data is in **ascending or descending order**

19. Variability means how much the data values **differ or spread out** from each other.

20. Real-life use of averages
Example :
Average marks of students in a class
Average temperature of a city

Ncert Exercise

Page-101 Figure it Out

1. Number of attempts = 8
Number of bounces of the ball in 8 attempts
= 6, 2, 9, 5, 4, 6, 3, 5
Average number of bounces of the ball

$$= \frac{\text{Sum of all the bounces}}{\text{Number of attempts}}$$

$$= \frac{6+2+9+5+4+6+3+5}{8}$$

$$= \frac{40}{8} = 5$$ **Ans.**

2. Do yourself.

3. Do yourself.

4. Nikhil's running times over the past week in seconds 17, 18, 17, 16, 19, 17, 18
Number of days in a week = 7
∴ Average running time of Nikhil

$$= \frac{\text{Total number of seconds}}{\text{Number of days}}$$

$$= \frac{17+18+17+16+19+17+18}{7}$$

$$= \frac{122}{7} = 17{\cdot}43 \text{ seconds}$$

Sunil's running time over the past week in seconds 20, 18, 18, 17, 16, 16, 17

$$= \frac{20+18+18+17+16+16+17}{7}$$

$$= \frac{122}{7} = 17{\cdot}43 \text{ seconds}$$

Both Nikhil and Sunil have the same average running time.

5. The enrolment in a school during six consecutive years = 1555, 1670, 1750, 2013, 2040, 2126
Number of years = 6
∴ Average

$$= \frac{\text{Sum of all the enrolments}}{\text{Number of years}}$$

$$= \frac{1555+1670+1750+2013+2040+2126}{6}$$

$$= \frac{11{,}154}{6} = 1{,}859$$ **Ans.**

Page-112 Figure it Out

1. Monthly onion prices in Yahapur in ascending order 24, 25, 26, 28, 30, 35, 39, 43, 44, 49, 56, 59
Number of observation = 12 (even)

$$\therefore \text{Median} = \frac{1}{2}\left[\frac{n}{2} + \left(\frac{n}{2}+1\right)\right]^{\text{th}} \text{ term}$$

$$= \frac{1}{2}\left[\frac{12}{2} + \left(\frac{12}{2}+1\right)\right]^{\text{th}} \text{ term}$$

$$= \frac{2}{2}\left[6^{\text{th}} + 7^{\text{th}}\right] \text{ term} = \frac{1}{2}(35+39)$$

$$= \frac{74}{2} = 37$$

∴ Median of onion price in Yahapur = ₹37/kg

Monthly onion price in Wahapur in ascending order!
17, 19, 23, 30, 35, 38, 39, 42, 42, 52, 53, 60
Number of observations = 12 (even)

$$\text{Median} = \frac{1}{2}[6^{\text{th}} + 7^{\text{th}}] \text{ term}$$

$$= \frac{1}{2}(38+39) = \frac{1}{2} \times 77 = 38{\cdot}5$$

Median = ₹38·5/kg Ans.

2. Total number of observation = 20
(Ignoring the mising values)
Arranging the given data in ascending order,
we get 0, 0, 0, 0, 0, 0, 1, 1, 1, 2, 2, 2, 3, 4, 4, 4, 5, 8, 10, 25
Since number of observation = 20 (even)
So Median

$$= \frac{1}{2}\left[\frac{n}{2} + \left(\frac{n}{2}+1\right)\right]^{\text{th}} \text{ term}$$

$$= \frac{1}{2}\left[\frac{20}{2} + \left(\frac{20}{2}+1\right)\right]^{\text{th}} \text{ term}$$

$$= \frac{1}{2}(10^{\text{th}} + 11^{\text{th}}) \text{ term} = \frac{1}{2}(2+2)$$

$$= 2$$

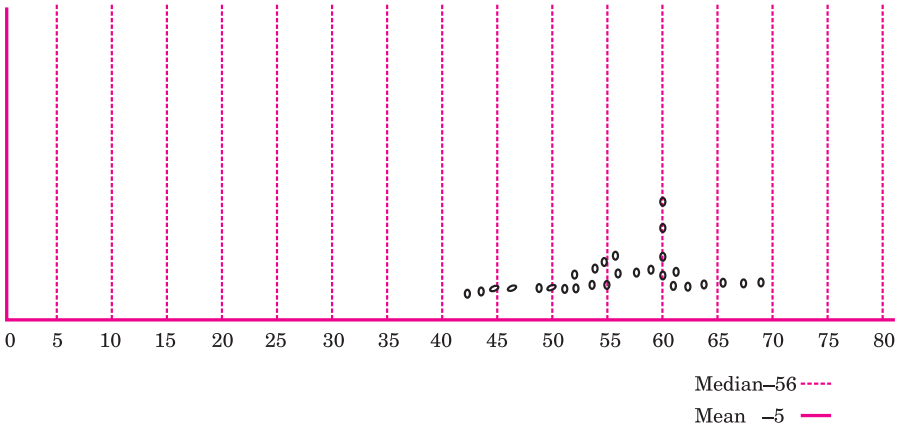
$$\text{Mean} = \frac{\text{Sum of observations}}{\text{No. of observations}}$$

$$= \frac{0+0+0+0+0+0+1+1+1+2+2+2+3+4+4+4+5+8+10+25}{20}$$

$$= \frac{72}{20} = 3{\cdot}7, \text{ median} = 2$$

The data shows the no. of domestic animals and pets students have at home. Most students have 0-4 pets.

3. The dot plot of height of trees



Arrange the given data in ascending order

43, 44, 45, 46, 49, 50, 51, 52, 52, 54, 54, 55, 55, 56, 56, 57, 58, 59, 60, 60, 60, 60, 61, 61, 62, 62, 63, 65, 66, 67

Number of observation = 29 (odd)

$$\therefore \quad \text{Median} = \left(\frac{29+1}{2}\right)^{\text{th}} \text{ term} = 15^{\text{th}} \text{ term} = 56$$

So, median feet is 56 feet

$$\text{Mean} = \frac{\text{Sum of all the observations}}{\text{No. of observations}}$$

$$= \frac{43+44+45+46+49+50+51+52+52+54+54+55+55+56+56+57+58+59+60+60+60+60+61+61+62+63+65+66+67}{29}$$

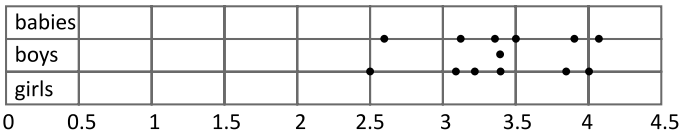
$$= \frac{1621}{29} = 55{\cdot}896$$

The height of the date palm trees range from 43 – 67 ft.
with most trees clustere around 55 – 60 ft.

Their Median height of trees = 56 feet and mean = 55·89 (approx)
13 Trees are shorter than the average height

4. Data: 5.6, 8, 3.09, 12.9, 6.5, 12.1, 11.3, 20.5, 7.4 (n = 9)
5.6 + 8 + 3.09 + 12.9 + 6.5 + 12.1 + 11.3 + 20.5 + 7.4 = 87.39
Mean = 87.39 ÷ 9 = 9.71 litres
Ascending order: 3.09, 5.6, 6.5, 7.4, 8, 11.3, 12.1, 12.9, 20.5
n = 9, median = 5th value = 8 litres
(a) Maximum value = 20.5 litres
Mean always lies between minimum and maximum.
Median also always lies within the data.
No. Mean = 9.71 and median = 8 cannot both lie between 25–30.
(b) No. Mean and median always lie between minimum and maximum values.

5.



The weight of boys lie between 2·6 kg to 4·1 kg.
The height of girls lie between 2·5 kg and 4 kg.
The heaviest is baby boy and the lightest is baby girl

Ans.

6. We infer from the dot plots and the central tendency measures:

(i) Boy's height lie between 130 – 148
Girl's height lie between 126 – 158

(ii) Both the tallest and shortest in the class are girls.

(iii)

	Whole Class	Girls	Boys
Mean	141·21	140·14	142·05

So we can say that boys are teller than girls in the class

	Whole Class	Girls	Boys
Median	142·5	140	143
		140.14	142.05
		Mean > Median	Mean < Median

If indicate for boys heights small inference of values on the lower side and for girls heights small inference of values on the higher side on comparing data of heights we find that boys and girls of this section are shorter in the height.

7. Given that

Weights of some sumo wrestlers are 295.2 kg 250.7 kg, 234.1 kg, 221.0 kg, 200.9 kg

$\therefore$ Average weight

$$= \frac{\text{Sum of Weights}}{\text{No. of Sumo Wrestlers}}$$

$$= \frac{(295.2 + 250.7 + 234.1 + 221.0 + 200.9)\text{kg}}{5}$$

$$= \frac{1201.9}{5}\text{kg} = 240.38 \text{ kg}$$

Weights of Ballet Dancers are
40.3 kg, 37.6 kg, 38.8 kg, 45.5 kg, 44.1 kg, 48.2 kg

$\therefore$ Average weight

$$= \frac{40.3 + 37.6 + 38.8 + 45.5 + 44.1 + 48.2}{6}$$

$$= \frac{254.5}{6} = 42.417 \text{ kg}$$

Comparison

$$\frac{\text{Average wt. of Sumo wrestler}}{\text{Average wt of Ballet Dancer}}$$

$$= \frac{240.38 \text{ kg}}{42.417 \text{ kg}} = 5.6 \text{ times} \approx 6 \text{ (round off)}$$

Thus, Sumo wrestler is approx. 6 times heavier as compared to a Ballet Dancer.

Page-122 Figure it Out

1. (a) Scale 1 unit = 16 km/hr

(b) Do yourself

(c) Speed of green darner dragonfly = 64 km/hr

and speed of gentoo penguin = 35 km/hr

So we can say that speed of green darner dragonfly is approximately twice of the gentoo penguin.

(d) Since speed of sailfish = 109 km/hr

and speed of humpback whale = 26 km/hr

$26 \times 4 = 104$ km/hr

So, we can say that sailfish is about 4 times faster than a humpback whale.

Yes, according to given data, sailfish is the fastest aquatic animal in the world.

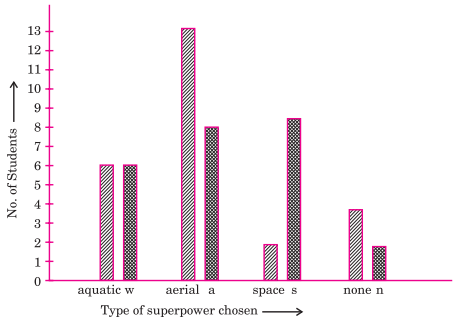
2. From the given observation, we prepare a table:

	w	*a*	*s*	*n*
Grade 5	6	13	2	4
Grade 9	6	8	9	2

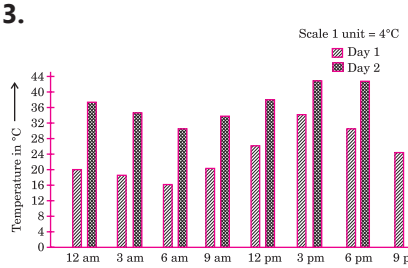
Following is a double bar graph with scale 1 unit = 1 student

Grade 5

Grade 9

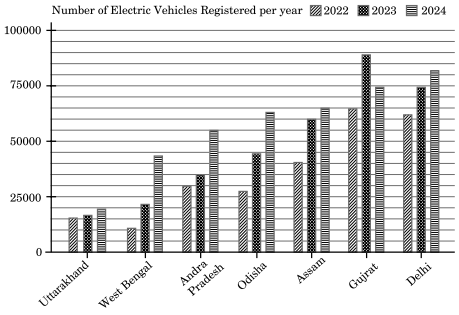


3.



These days might belong to december and may.

4. (a)



(b) Scale 1 unit = 25000 Electric Vehicles

(c) (i) Mostly increase in vehicle registrations from 2022 and 2024.

(ii) Lowest no. of registration in uttrakhand highest no. of registration in Delhi and Gujarat.

(iii) On an average vehicle registration are increasing year by year.

(iv) Assam and Andhra Pradesh show significant growth in registrations.

(d) Registration in Assam

In 2022—27,000 (approx.)

In 2023—40,000 (approx.)

More registration = 40,000 – 27,000 = 13,000

Assam has approx 20,000 more registration in 2023 as compared to 2022.

(e) Registration in West Bengal

In 2022—12,000 (approx.)

In 2024—38,000 (approx.)

More registration = 38,000 – 22,000 = 38,000

Increase 3 times (approx)

(f) Yes, given statement is correct.

Page-129 Figure it Out

1. (a) False, (b) True, (c) False, (d) True

2. (a) Average no. scored per game by A

$$= \frac{\text{Sum of points}}{\text{No. of games played}}$$

$$= \frac{14+16+10+10}{4} = \frac{50}{4}$$

$$= 12{\cdot}5$$

(b) Player C play only 3 games, So to find mean total points will be divided by 3. Player B play all 4 games, so to find mean total points will be divided by 4.

(c) Player A is the best performer.

3. Given Total marks = 100

Marks obtained by group A are

85, 76, 90, 85, 39, 48, 56, 95, 81 and 75

$$\therefore \quad \text{Mean} = \frac{\text{Sum of observations}}{\text{No. of observations}}$$

$$= \frac{85+76+90+85+39+48+56+95+81+75}{10}$$

$$= \frac{730}{10} = 73$$

Median

Arranging the marks in ascending order

39, 48, 56, 75, 76, 81, 85, 85, 90, 95

No. of observations = 10 even

$$\therefore \text{ Median} = \frac{1}{2}\left[\frac{10}{2} + \left(\frac{10}{2}+2\right)\right]^{\text{th}} \text{ term}$$

$$= \frac{1}{2}(5^{\text{th}} + 6^{\text{th}}) \text{ term} = \frac{1}{2}(76+81)$$

$$= \frac{157}{2} = 78{\cdot}5$$

Group 2. No of students = 9

$$\text{Mean} = \frac{\text{Sum of marks}}{\text{No. of students}}$$

$$= \frac{68+59+73+86+47+79+90+93+86}{9}$$

$$= \frac{681}{9} = 75{\cdot}67$$

Meadian

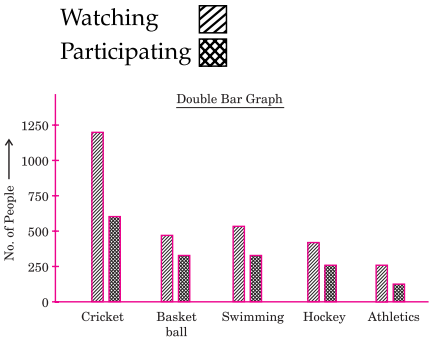
Arranging the given data in ascending order, we get 47, 59, 68, 73, 79, 86, 86, 90, 93

No. of observations = 9 (odd)

$$\therefore \text{ Median} = \left(\frac{9+1}{2}\right)^{\text{th}} \text{ term}$$

$= 5^{\text{th}}$ term = 79

4. Scale I unit length = 250 people



Observations

(1) More people watch sports than participate in them.

(2) Athleties has the lowest numbers for both watching and participating.

(3) Basket ball and swimming have almost similar watching and participating.

5. To solve given problem first we have to find median. Arrange the given observations in ascending order, we get 101, 102, 106, 109, 110, 110, 112, 115, 115, 115, 115, 115, 117, 120, 120, 123, 125.

$$\text{Median} = \left(\frac{n+1}{2}\right)^{\text{th}} \text{item}$$

$$= \left(\frac{17+1}{2}\right)^{\text{th}} \text{item}, \text{ here } n = 17$$

$= 9^{\text{th}}$ item $= 115$ cm.

According to condition, two groups be

$$112 < \text{height} < 115$$

If we consider 114 cm as required height, then

Group 1 (less than 114 cm)

101, 102, 106, 109, 110, 112

Total Students = 7

Group 2 (more than 114 cm)

115, 115, 115, 115, 115, 117, 120, 120, 123, 125

Total Students = 10

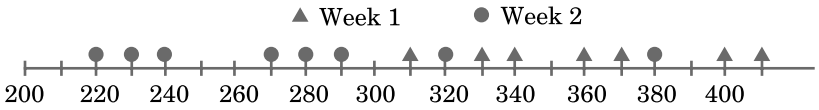
6. Do yourself.

7. (d) is correct option.
(Since, there is no data avaiblable about other section student's height.)

8. (a) Estimated values for the number of sky-scrapers in new york–295
Tokyo – 169
London – 35
(b) (i) Valid, (ii) Valid, (iii) Invalid

9. Do Yourself.

10.



$$\text{Mean} = \frac{\text{Sum of values}}{\text{Total no. of values}}$$

$$= \frac{\begin{array}{l}410+400+370+340+360\\+400+320+330+310\\+320+290+380+280\\+270+230+220+240\end{array}}{17}$$

$$= \frac{5470}{17} = 321{\cdot}76 \approx 322 \text{ sec.}$$

Median

Arranging the given observations in ascending order, we get

220, 230, 240, 270, 280, 290, 310, 320, 320, 330, 340, 360, 370, 380, 400, 400, 410,

here $n = 17$ (odd)

$$\therefore \text{ Median } = \left(\frac{17+1}{2}\right)^{\text{th}} \text{term}$$

$= 9^{\text{th}}$ term $= 320$ sec.

11. Do yourself.

12. Do yourself.

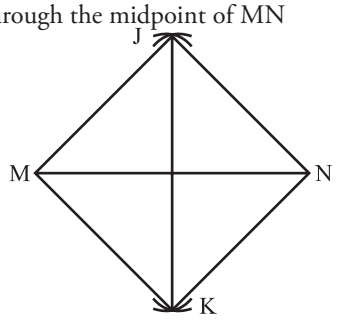
13. Do yourself.

Chapter – 6

Work it Out–1

1. Prove why J and K are the perpendicular bisector of MN

- Points J and K lie on the line drawn through the midpoint of MN



- MJ = JN and MK = KN (each point is equidistant from M and N)
This means J and K lie on the **perpendicular bisector of MN**
Also, the line JK makes a **right angle (90°)** with MN

Conclusion :

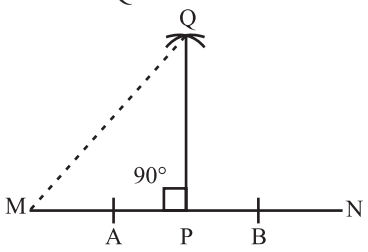
JK is perpendicular to MN and passes through its midpoint

JK is the **perpendicular bisector of MN**

2. Another method to draw a 90° angle on a given line segment

Method (Using compass and ruler) :

1. Take a point P on the given line MN
2. With P as center, draw an arc cutting MN at two points A and B
3. With A and B as centers, draw arcs above the line intersecting at point Q
4. Join P and Q



$\angle QPM$ = **90°**

Conclusion :

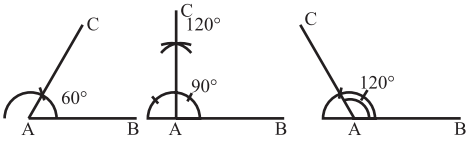
This method constructs a perpendicular line using equal arcs, forming a right angle.

Work it Out–2

1. Construct any three angles and draw their bisectors

Example angles you can draw your self :

- 60°
- 90°
- 120°



How to draw angle bisector (steps) :

(i) Draw the angle (say 60°).

(ii) With compass, draw an arc cutting both arms of the angle.

(iii) From those two points, draw arcs of equal radius that intersect.

(iv) Join the vertex to the intersection point.

This line divides the angle into **two equal parts**

60° → 30° + 30°

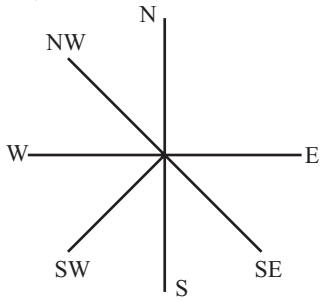
2. Find directions

Given :

- Up = North
- Down = South
- Left = West
- Right = East

So :

- **North-West (NW)** → between North & West (top-left)
- **South-West (SW)** → between South & West (bottom-left)



- **South-East (SE)** → between South & East (bottom-right)

These are **diagonal directions**

3. No

Reason :

Angle bisector must divide angle into **two equal parts.**

If arcs are drawn on the **other side incorrectly**, the line may not pass through the correct midpoint.

So **Dz is NOT a true angle bisector.**

4. Yes

Reason :

Angle bisector works for **any angle (even decimals)**

55.5° ÷ 2 = **27.75°**

So it can be bisected.

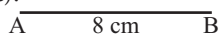
Work it Out–3

1. Draw a pointed arch using different baselines

A **pointed arch** is made using **two arcs** that meet at the top.

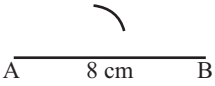
Steps :

1. Draw a horizontal line **AB** (this is your baseline).



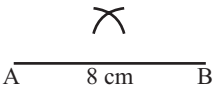
❑ Try different lengths (e.g., 6 cm, 8 cm, 10 cm).

2. Place compass on point **A**, radius = length AB



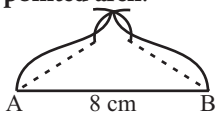
→ Draw an arc above the line.

3. Now place compass on point **B**, same radius



→ Draw another arc that intersects the first one.

4. The arcs meet at a point above → this forms a **pointed arch**.



Repeat with different baseline lengths to see different shapes.

2. Do yourself

Work it Out–4

Construct a regular hexagon (side = 6 cm)

A regular hexagon has :

- All sides = 6 cm
- All interior angles = 120°

Step-by-step construction

Step 1 : Draw base

Draw a line segment **AB = 6 cm**

Step 2 : Construct 120° at A

Using arc method :

1. First construct **60° at A** (like shown in your image)
2. Extend it to make **120°** (i.e., take the outer angle)

Draw a ray from A → mark point **F** such that **AF = 6 cm**

Step 3 : Construct 120° at B

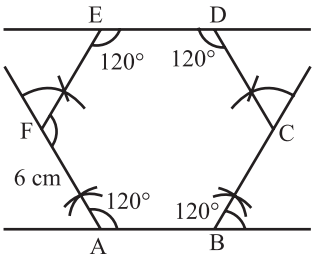
Repeat same steps at point **B**

Draw a ray → mark point **C** such that **BC = 6 cm**

Step 4 : Continue construction

Now repeat same process :

- From **C**, construct 120° → mark **D (CD = 6 cm)**
- From **D**, construct 120° → mark **E (DE = 6 cm)**
- From **E**, construct 120° → it should meet point **F**



Step 5 : Join all points

Join : A → B → C → D → E → F → A

Result

You get a **regular hexagon ABCDEF**

All sides = 6 cm

All angles = 120°

Work it Out–5

1. Three regular polygons that tile a plane

A shape tiles (tessellates) a plane if it covers it **without gaps or overlaps**

The only regular polygons that do this are :

- **Equilateral triangle**
- **Square**
- **Regular hexagon**

2. Circles leave **gaps** when placed together. So they cannot tile a plane perfectly.

Bees use **hexagons** because :

- They **fit perfectly without gaps**.
- Use **less wax (material efficient).**
- Provide **maximum storage space.**

So hexagons are the **most efficient shape**

3. The "Magic Tile" (discovered in the 2020s) is special because :

It can **tile the plane without repeating pattern** (called **aperiodic tiling**).

Earlier, tiling patterns were always repeating.

This tile breaks that rule.

Connect and Reflect

[A] Multiple Choice Questions

1. (c), **2.** (b), **3.** (c), **4.** (c), **5.** (c)

[B] Fill in the Blanks

1. bisector
2. right angle
3. hexagon
4. tessellation or tiling
5. 60°

[C] True / False

1. → True, 2. → False
3. → True 4. → False
5. → False

Subjective Questions (Detailed)

1. Equal radius ensures arcs intersect at equal distance from both endpoints.
This guarantees accurate midpoint and perpendicular line.

2. No, Arcs must intersect from **opposite sides** to form correct bisector.

3. Scale may have measurement errors.
Compass method gives **exact geometric construction.**

4. On the **perpendicular bisector**

5. Construct 90° angle
Draw line → draw arc → intersect arcs → join points
Gives right angle.

6. No, it is not necessary, because the given point already lies on the perpendicular bisector.

7. 360° ÷ 8 = **45°**

8. Construct 45° angle
First make 90° → then bisect it
90° ÷ 2 = **45°**

9. Because equal arcs create equal sides
So triangles formed are **congruent.**

10. No, Bisector remains same because distances remain equal.

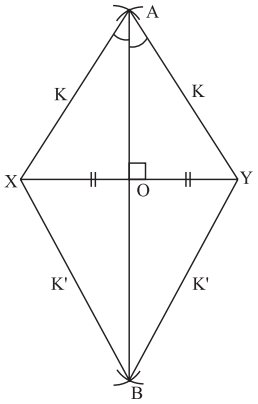
Ncert Exercise

Page-140 Figure it Out

1. Yes, when constructing the perpendicular. It is necessary to have the same radius for the arcs above and below XY.

Construction—

(1) Draw a line segment XY.



(2) Choose distance 'K' (slightly greater than $\frac{1}{2}$ XY)

(3) With centres at X and Y draw arcs of same radius 'K'. above and K' below XY intersecting at point A and B respectively.

(4) Join AB, intersecting XY at point O.

(5) Join AX, AY, BX and BY.

In ΔABX and ΔABY

AX = AY = K, BX = BY = K

AB = AB (common) (By SSS Rule)

∴ ΔABX ≅ ΔABY

∴ ∠XAO = ∠YAO...(i)

In ΔAOX and ΔAOY

AX = AY = K

∠XAO = ∠YAOfrom (i)

OA= OA (common)

∴ ΔAOX ≅ ΔAOY(By SAS Rule)

∴ OX = OY

and ∠AOX = ∠AOY...(ii)

Also∠AOX + ∠AOY

= ∠XOY = 180°

∴ 2∠AOX = 180°(from ii)

⇒ ∠AOX = 90°

∴ OX = OY and ∠AOX = ∠AOY = 90°

Thus, AB is the perpendicular bisector of the line XY.

2. Steps of Construction—

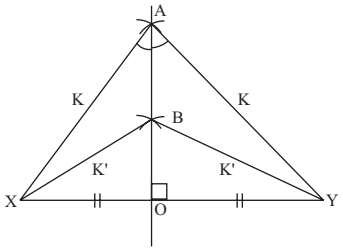
(1) Draw a line segment XY.

(2) Choose distances K and K′ which are slightly greater than $\frac{1}{2}XY$.

(3) With centres at X and Y draw two arcs of radius K. and K′ respectively above XY. These intersect each other at point A and B respectively.

(4) Join AB and produce upto O (intersecting XY at O)

(5) Join AX, AY, BX and BY.



In ΔABX and ΔABY

AX = AY = K

BX = BY = K′

AB = AB (common)

∴ ΔABX ≅ ΔABY (By SSS Rule)

∴ ∠XAO = ∠YAO

In ΔAOX and ΔAOY

AX = AY = K

∠XAB = ∠YAB

OA = OA (common)

∴ ΔAOB = ΔAOY (By SAS Rule)

∴ OX = OY

Also ∠AOX + ∠AOY = 180°

∴ 2∠AOX = 180°

∴ ∠AOX = 90°

and ∠AOX= ∠AOY = 90°

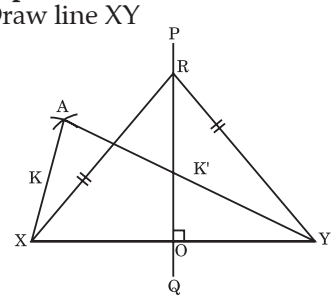
⇒ AB is perpendicular bisector of XY.

Here the pairs of arcs are both on the same side.

Thus, it is not necessary to construct the pairs of arcs above and below XY.

3. Step of Construction—

(1) Draw line XY



(2) With centres at X and Y draw arcs of unequal radii say K and K′, they cut each other at point A.

(3) Let PQ is perpendicular bisector of XY.

(4) Let R be any point on PQ. Join RX and RY

In ΔROX and ΔROY

OX = OY

∠ROX = ∠ROY

OR = OR (common)

∴ ΔROX ≅ ΔROY (By SAS Rule)

∴ RX = RY

Thus for any point R on perpendicular bisector,

RX = RY

∴ Each point on the perpendicular bisector is equidistant from X and Y.

Since AX ≠ AY

Point A is not on the perpendicular bisector.

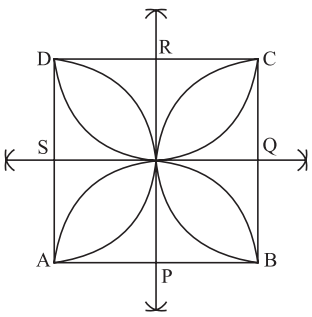
Therefore, to construct perpendicular bisector, It is necessary that we use same radius for both arcs of a pair of arcs.

4. Step of Construction—

(1) Draw a square ABCD.

(2) Draw perpendi-cular bisectors of AB and CD as shown in figure.

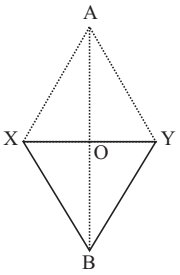
(3) These perpendi-cular bisectors intersect the square at points P, Q, R and S.



(4) With centres at P, Q, R and S, draw semicircles in the square with radius equal to AP.
(5) Colour the boundary and get the required design.

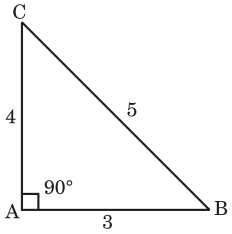
Page-142 Figure it Out

1. In the given figure,
XAY and XBY are two positions of the Rope. Points A and B are at the mid-point of the rope.



In Δ AXY and ΔAYB.
AX = AY and BX = BY
AB = AB (common)
∴ ΔAXB ≅ ΔAYB
(By SSS Rule)
∴ ∠XAO = ∠YAO
Again, In ΔAXO and ΔAYO
OX = OY
∠XAO = ∠YAO
AO = AO (common)
∴ ΔAXO ≅ ΔAYO (By SAS Rule)
∴ ∠XOA = ∠YOA
Also, ∠XOA + ∠YOA= 180°
⇒ 2∠XOA = 180°
⇒ ∠XOA = 90° = ∠YOA
∴ OX = OY and ∠XOA = ∠YOA = 90°
Therefore AB is perpendicular bisector of XY.

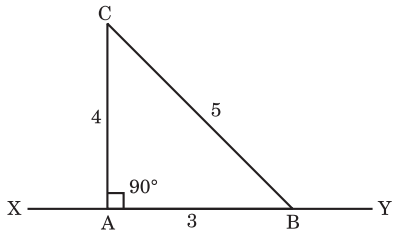
2. We know that if the sides of a triangle are in the ratio 3 : 4 : 5, then the angle opposite to the longest side is 90°.



In the above figure, sides AB, AC and BC of triangle are in the ratio 3 : 4 : 5. ∠A is opposite to longest side BC.

Steps of Construction
(1) Draw a line XY and mark a point A and it.
(2) At point A, we shall construct angle of 90°, using rope.

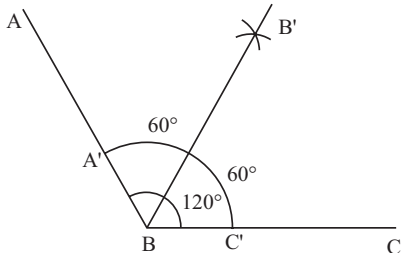
(3) Fix a small pole at point A.
(4) Take a rope and mark it at 0, 4, 8, 12 (in unit)
(5) Attach the 0 unit mark and 12 unit mark of the rope at A
(6) Attach the 3 unit mark at point B on XY with the help of pole at B.
(7) Hold the 8 unit of the rope and stretch away from XY such that both sides of this points are tight.
(8) Place a hole at this point and call this point C.
In the obtained triangle ΔABC.
AB = 3 unit, AC = 4 unit and BC = 5 unit.
and the angle opposite to the longest side is ∠A



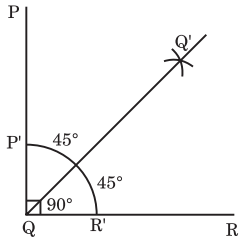
Thus by the 3 – 4 – 5 principle.
∠A = 90°
Thus, AC is perpendicular to XY at given point A.

Page-144 Figure it Out

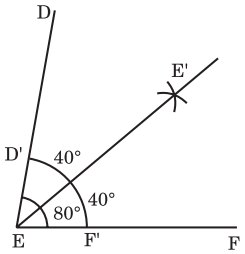
1. (i)



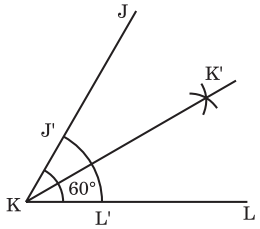
(ii)



(iii)



(iv)



2. Steps of Construction—

(1) Draw a line AB,

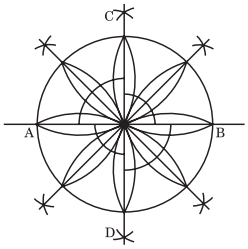
(2) with centres at A and B, draw arcs of equal radius above and below the line AB.

(3) Let the arcs intersect at the points C and D.

(4) Join C and D.

(5) Let AB and CD intersect at O.

(6) Draw the bisectors of ∠BOC, ∠COA, ∠AOD, and ∠DOB as shown in the figure,



(7) Draw a circle with centre at O and radius equal to the length of a petal in the given figure.

(8) Draw dots at the points of intersection of the circle with the lines.

(9) Using the dots and the centre of the circle, draw the petals as shown in the given figure.

(10) In the next step, we erase the extra lines and arcs.

The figure now obtained looks as required.

3. ∠XOY be given angle

According to question,

(1) Draw an arc with centre O, intersecting these lines OX and OY at A and B respectively.

(2) With centres at A and B draw arcs of same radius, intersect at point C.

(3) Join AC, BC and OC and extend to CD.

In ΔOAC and ΔOBC

OA = OB

AC = BC

OC = OC (common)

∴ ΔOAC ≅ ΔOBC (By SSS Rule)

∴ ∠AOC = ∠BOC

∴ 180° – ∠AOC= 180° – ∠BOC

∴ ∠AOD = ∠BOD

Thus OD is the bisector of the angle ∠XOY and OC is the bisector of the ∠XOY.

4. Any angle can be bisect, using bisection method. By using angle bisection, we can make angles.

22·5°, 112·5°, 67·5°, 135°, 120°, 105°.

By using angle bisection, we cannot construct angle of 65·5°.

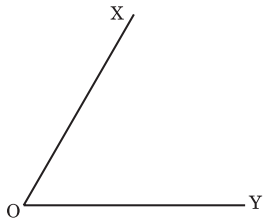
5. Let ∠XOY be given angle

Step of bisect ∠XOY

(1) Fix a small pole at point O.

(2) Take a rope and make a loop at one end.

(3) Mark a point at some distance on the rope. Fix the loop of the rope at the pole at O and rotate the rope from OX to OY.



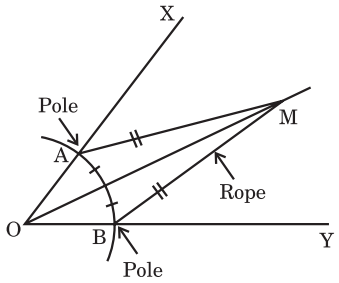
(4) Mark points A and B at fix distance mark on the rope.

(5) Fix small poles at A and B both.

(6) Take a rope and make loops on both ends.

(7) Fix the loops with poles at A and B.

(8) Mark the mid-point of this rope and hold the rope at the mid-point.



(9) Make both ends of rope tight and mark its mid-point as M.

(10) Join AM, BM and OM.

In ΔOAM and ΔOBM

$OA = OB$; $AM = BM$; $OM = OM$ (common)

$\therefore \Delta OAM \cong \Delta OBM$

$\therefore \angle AOM = \angle BOM$ and $\angle XOM = \angle YOM$

Thus, OM is the bisector of the given angle $\angle XOY$.

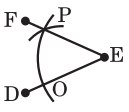
12. Solve this similarly as question 4 page nubmer 4.

Page-147 Figure it Out

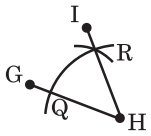
13. Given angles arc

(i)

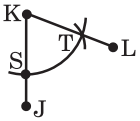
(ii)



(iii)



(iv)



Step of Construction (i)

(1) Draw a line A′B′ along the direction of AB.

(2) With centre B and B′ draw arcs of equal radius.

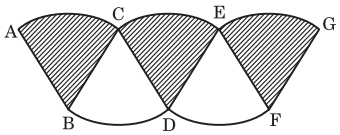
(3) Arcs intersect AB and BC at M and N respectively.

(4) Let the arcintersect A′B′ at M′. Mark the arc M′N′ s.t. MN = M′N′

(5) Join B′N′

(6) Solve remaining similarly.

2. Given figure



Steps of Construction—

(1) Draw line A′B′ along the direction of AB.

(2) With centre at B′ draw an arc of radius A′B′ from A′ draw an arc A′C′ such that A′C′ = AC

(3) Join B′ and C′ and shade this sector.

(4) Again, with centre at C′ draw an arc of radius B′C′ from B′ draw an arc B′D′, such that B′D′ = BD.

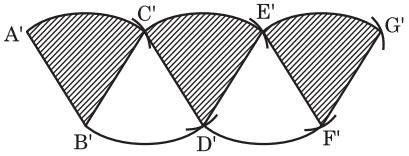
(5) Join C′ and D′ and shade this sector.

(6) Again, with centre at D′, draw an arc of radius C′D′ from C′ draw an arc C′E′ such that C′E′ = CE.

(7) Join D′ and E′. Shade this sector.

(8) Similarly we continue this procedure by taking centre at E′ and F′.

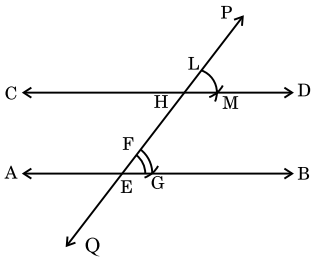
(9) Erase the extra arcs from the figure constructed. We get required figure.



Page-148 Figure it Out

1. Steps of Construction

(1) Let AB be a given line and we shall draw a line parallel to AB.



(2) Draw line PQ intersecting AB at E.

(3) Mark a point H on PQ, where we shall draw line parallel to AB.

(4) With centres at E and H draw arcs of equal radius.

(5) Using compass, measure FG and mark LM s.t. LM = FG.

(6) Join H & M and extend this line on both sides.

(7) Here PQ is a transversal and ∠PHD = ∠HEG (corresponding angles)

∴ Lines AB and CD are parallel lines.

Similarly, we can draw other three pairs of parallel lines.

2. Steps of Construction—

There are 8 rhombus in given figure.

So acute angle between the adjacent sides of Rhombus $= \frac{360°}{8} = 45°$. By joining 8 Rhombus of same size we can get given figure.

(1) Draw a line and take a point A on it.

(2) With centre A, draw a semi circle which cuts the line at B and C point.

(3) With centres at B and C draw arcs of equal radius. These arcs cut each other at point D.

(4) Join AD

(5) Draw bisector of ∠CAD. Let AF be angle bisector.

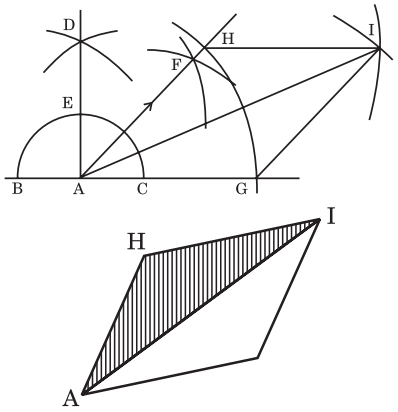
(6) With A as centre draw an arc intersecting extended AC and AF at G and H respectively.

(7) With centres at G and H, draw arcs of equal radius equal to AG. They meet at I.

(8) Join AI

(9) AGIH is a Rhombus with base angle 45°.

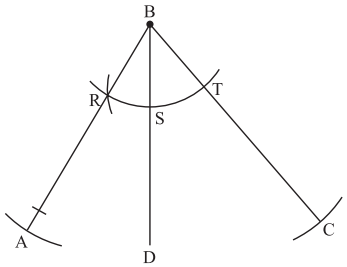
(10) Erase the extra arcs and lines, shade the upper triangle AHI



by using tracing paper we can make 8 such rhombus and place them together and get required figure.

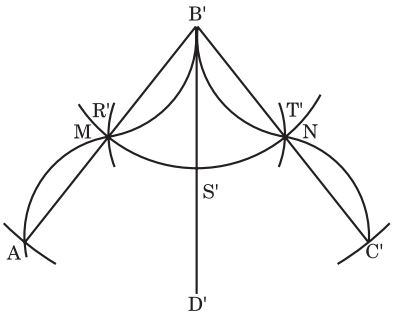
Page-151 Figure it Out

1. Given figure is



Steps of Construction—

(1) Draw a vertical line B′D′ with centres at B and B′, draw arcs of equal radius.

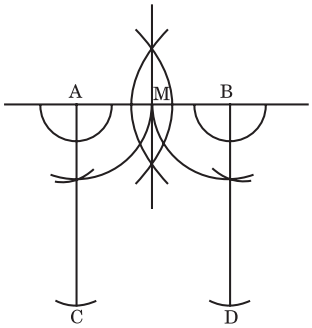


(2) Measure arc RS, then from R′ draw an arc R′S′ s.t. R′S′ - RS.
(3) Join B′R′ and extend this line. Make B′A′ equal to BA.
(4) Measure arc ST, using compass then from S′ draw an arc S′T′ s.t. S′T′ = ST.
(5) Join B′ and T′ and extend this line make B′C′ equal to BC.
(6) With the help of compass, find mid-point M and N of A′B′ and B′C′ respectively.
(7) On the lines A′M, MB′, B′N and NC′, draw similar arcs as shown in the figure.
(8) Erase the extra lines and arcs to get the required pointed arch with given support lines.

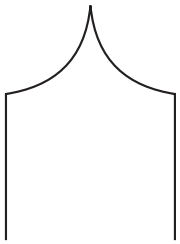
2. Steps of Construction—
(1) Draw a vertical line AB
(2) With centre at A draw an arc. With centre at C, draw an arc intersecting at D and E.
(3) Join AD and AE and extend these lines.
(4) Take point F on extended AD and G on extended AE such that AF = AG.
(5) Let M and N be mid-point of AF and AG respectively using compass, draw semicircles on the lines MF, AM, AN and NG.
(6) Erase the extra lines, and arcs to get the required arch design.

Page-154 Figure it Out

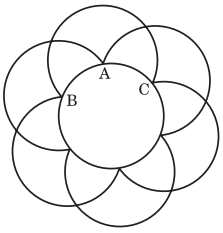
1. (a) Steps of Construction—
(1) Draw a line and mark points A and B on it.
(2) Draw perpendiculars from points A and B, below the line.



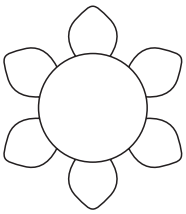
(3) Draw equal lines AC and BD.
(4) Find mid-point of AB and mark as M.
(5) With centres at A and B and radius AM, draw arcs as shown in the above figure.
(6) Erase the extra lines, arcs and letters to get the required figure.



(b) Steps of Construction—
(1) Draw a circle.
(2) Take any point A on the circumference and draw arc of same radius as that of the circle outside the circle and touching its circumference at B and C. With centre at B, draw an arc of same radius outside the circle and touching the circumference. Repeat the process we will get following patterns.



(3) Erase the extra arcs and letters to get required figure.



(c) Steps of Construction—

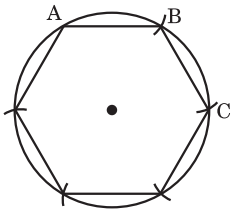
(1) Draw a circle.

(2) Take any point A on the circumference.

(3) Draw an arc with centre A and radius as that of the circle and intersect the circle at B.

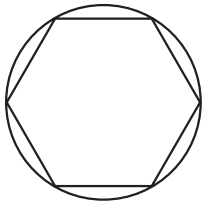
(4) With centre at B and same radius draw an arc intersecting the circle at C.

(5) Repeat the same process and gets the point D,E, F. Join AB, BC, CD, DE, EF, CA.



Erase the arcs and letters to get the required figure.

Obtained figure—

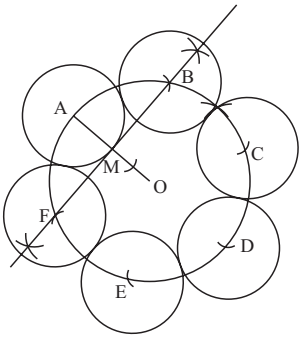


(d) Steps of Construction—

(1) Take any point A on the circle.

(2) Draw an arc of same radius as that of the circle intersecting the circle at B.

(3) With B as centre draw an arc of same radius intersecting the circle at C.

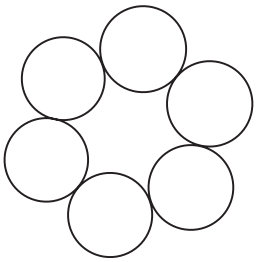


(4) Repeat this process and find points D, E and F.

(5) Join O an A. Find the mid-point of OA.

(6) Let M be the mid-point of OA. With centres at A, B, C, D, E and F, draw circles of radius equal to OM.

(7) Erase the extra lines, arcs and letters to get the required figures.

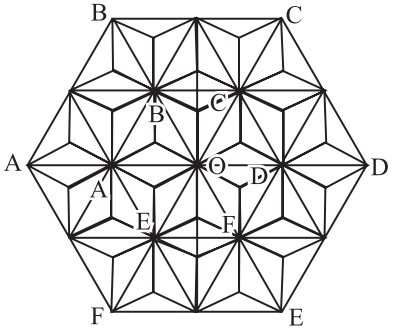


(e) Steps of Construction—

(1) Draw a circle, take any point A on the circle.

(2) Draw an arc with centre at A and radius OA, intersecting the circle at B.

(3) With centre at B and same radius draw an arc intersecting th circle at C.



(4) Repeat this process and get points of intersection D, E, F.

(5) Draw a circle with centre O and radius twice the OA.

(6) Join OA and extend to A'.

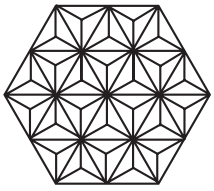
Similarly extend other lines.

(7) Join the lines as shown in the following figure.

(8) There arc 5, 7, 7, 5 triangles in I^{st}, II^{nd}, III^{rd} and IV^{th} rows respectively.

(9) Join the vertices of each triangle to the centre of the respective triangles.

(10) Erase the extra lines, arcs and letters to get the required figure.



(e)

2. Steps of Construction—

(1) Draw a circle.

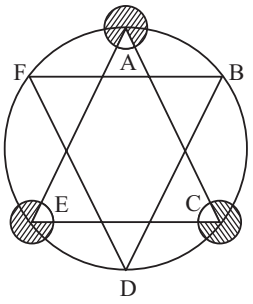
(2) Take any point A on the top of the circle and draw an arc with centre at A and radius as that of the circle and intersecting the circle at B.

(3) With centre at B and same radius draw an arc intersecting the circle at C.

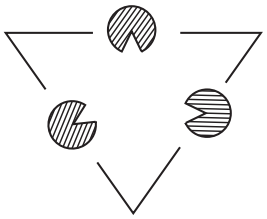
(4) Repeat this process to get points of intersection D, E and F.

(5) Join AC, CE, EA, BD, DF and FB.

(6) Draw three equal circles with wedges removed at A, C and E as shown below.



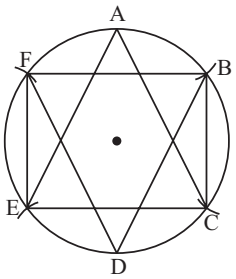
(7) Erase the extra arcs, circle and letters to get the required figure as shown below



3. Steps of Construction—

(1) Draw a circle.

(2) Take any point A on the top of the circle and draw an arc with centre at A and redius as that of the circle and intersecting the circle at B.

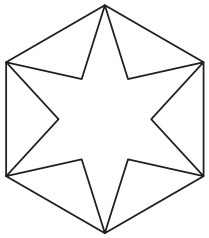


(3) With centre at B and same radius draw an arc intersecting the circle at C.

(4) Repeat this process to get point of intersection D, E and F.

(5) Join the lines as shown in the figure.

(6) Erase the extra arcs, circle and letters to get the required figure as below:



4. Steps of Construction—

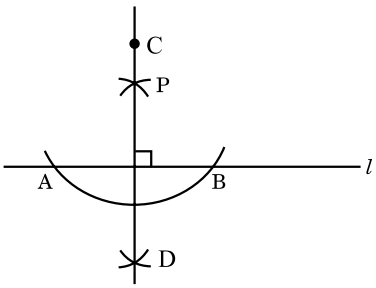
(1) Draw a line *l* and mark a point P outside *l*.

(2) With centre P, draw an arc so that it cuts the line *l* at two points say A and B.

(3) With cenres A and B, draw arcs of equal radius above and below AB.

(4) Let the arcs intersects at points C and D.

(5) Join CD. Line CD is perpendicular to line l and passes through the given point P.



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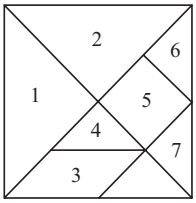
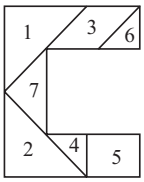
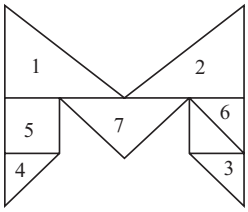
1. We prepare 10 sets of 7 tans obtained from a tangram based shape.



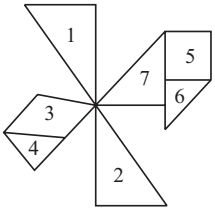
(i)



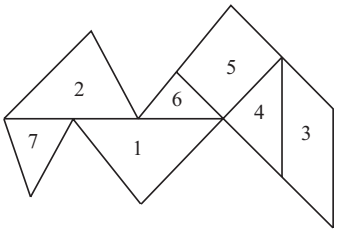
(ii)



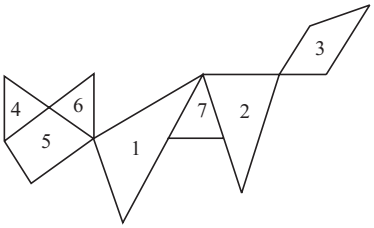
(iii)



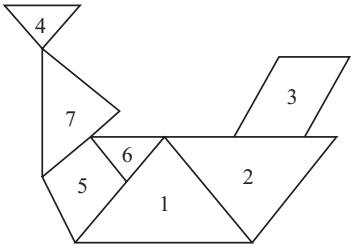
(iv)



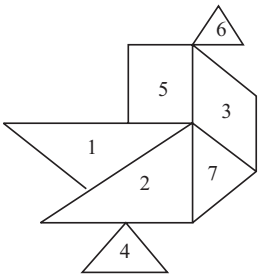
(v)



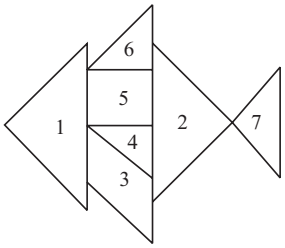
(vi)



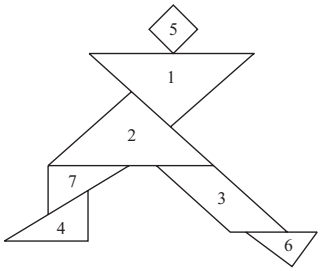
(vii)



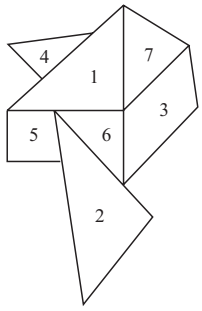
(viii)



(ix)



(x)



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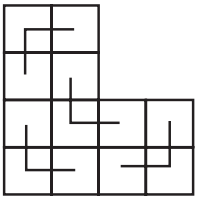
24. The given tiles can be used for tiling the region. The tiling shall use 4 tiles of the given shape.

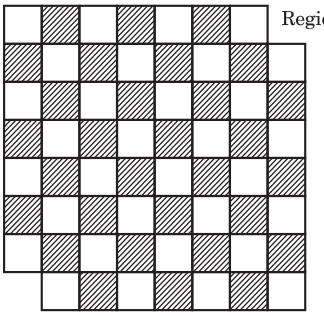


Region

Tile

25. By using the following tile

Given region be tiled region as shown in the following figure



Region

In the given region,

There are 30 shaded squares and 32 blank squares. Since these numbers are not equal. The given region cannot be tiled by using the given shape tiles.

Chapter – 7

Work it Out–1

1. Solve the equations

(a) 4p – 12 = 28

Add 12 both sides : 4p – 12 + 12
= 28 + 12

4p = 40

Divide by 4 :

p = **10**

Verification : 4×10 – 12 = 40 – 12 = 28

(b) 7x = 4x

Subtract 4x : 7x – 4x = 4x – 4x

3x = 0

x = **0**

Verification : 7×0 = 0 and 4×0 = 0

(c) 5k – 4 = 3k + 6

Bring like terms together :

5k – 3k = 6 + 4

2k = 10

k = **5**

Verification : LHS = 25 – 4 = 21

RHS = 15 + 6 = 21

(d) 3(n + 5) – 10 = 2n – 2

Expand :

3n + 15 – 10 = 2n – 2

3n + 5 = 2n – 2

Subtract 2n :

n + 5 = – 2

n = **– 7**

Verification :

LHS = 3(– 2) – 10 = – 6 – 10 = – 16

RHS = – 14 – 2 = – 16

(e) x/12 = 5

Multiply both sides by 12 :

x = **60**

Verification :

60 ÷ 12 = 5

Work it Out–2

1. Create 3 equations where x = – 5

Just make equations that give x = – 5

Examples :

1. x + 5 = 0
2. 2x = – 10
3. x – 3 = – 8

All give **x = – 5**

2. Solve for the unknown

(a) 4y = 120

y = 120 ÷ 4 = **30**

(b) – 10 = 3x – 1

Add 1 : – 9 = 3x

x = **– 3**

(c) 15 – k = 2

– k = 2 – 15 = – 13

k = **13**

(d) 2m + 10 = 20 – 3m

2m + 3m = 20 – 10

5m = 10

m = **2**

(e) – 6 + 2x = 4x + 6

2x – 4x = 6 + 6

– 2x = 12

x = **– 6**

(f) 12 – 2z = 4z

12 = 4x + 2z = 6z

12 = 6z

z = **2**

Connect and Reflect

[A] Multiple Choice Questions

1. (c), **2.** (c), **3.** (d), **4.** (b), **5.** (c).

[B] Fill in the Blanks

1. **equation**
2. **variable**
3. **4** (since x – 5 = 9 → x = 14, but blank is "solution" → **Ans.** = 14)
   Correct : 14
4. **equality**
5. **8**

[C] True / False

1. False
2. True
3. True
4. False
5. True

[D] Subjective Questions

1. Solve : 3x – 10 = 35

3x = 45

x = **15**

2. Find y if 2y = 60

y = **30**

3. Solve : 3v – 7 = 2v + 3

v = **10**

4. Find k if k + 8 = 12 – k

2k = 4

k = **2**

5. Quarter number increased by 9

$\frac{x}{4} + 9 = x$

Multiply 4 :

x + 36 = 4x

3x = 36

x = **12**

6. Brick weight

Let weight = x

$x = \frac{x}{2} + 1$

Multiply 2 :

2x = x + 2

x = **2 kg**

7. Solve : 5(r + 2) = 10

r + 2 = 2

r = **0**

8. Solve : 13 – z = 8

z = **5**

9. Two numbers sum = 76

Let numbers = x and 3x

4x = 76

x = 19

Numbers = **19 and 57**

10. Solve : 7m = m – 3

6m = – 3

m = **– 1/2**

11. Solve : 3n = 10 + n

2n = 10

n = **5**

12. Taxi fare

800 + 20x = 2200

20x = 1400

x = **70 km**

13. Solve : 2(x – 4) = – 16

x – 4 = – 8

x = **– 4**

14. Solve : 10 – 5x = 3(x – 4) – 2(x – 7)

RHS = 3x – 12 – 2x + 14 = x + 2

So : 10 – 5x = x + 2

– 6x = – 8

x = **4/3**

15. Heads & feet problem

Let donkeys = x
Children = y
Heads : x + y = 28
Feet : 4x + 2y = 80
Multiply first by 2 :
2x + 2y = 56
Subtract :
2x = 24
x = **12 donkeys**

Ncert Exercise

Page-172 Figure it Out

1. (a) $3x - 10 = 35$

Adding 10 on both sides, we get

$3x - 10 + 10 = 35 + 10 = 45$

Dividing both sides by 3, we get

$$\frac{3x}{3} = \frac{45}{3} = 15 \Rightarrow x = 15$$

Check LHS = $3x - 10$

$= 3 \times 15 - 10 = 45 - 10$

$= 35 =$ RHS

LHS = RHS

(b) $5s = 3s$

Subtracting both sides $3s$, we get

$5s - 3s = 3s - 3s \Rightarrow 2s = 0$

$$\Rightarrow \frac{2s}{2} = \frac{0}{2} \text{ (Dividing both sides by 2)}$$

$\Rightarrow s = 0$

Check : LHS = $5s$

$= 5 \times 0 = 0$

RHS = 3s = 3(0) = 0

LHS = RHS **Hence Proved.**

(b) $34 - 7 = 2u + 3$

Subtracting both sides $2u$, weg get

$3u - 7 - 2u = 2u + 3 - 2u$

$u - 7 = 3$

Adding 7 on both sides, we get

$u - 7 + 7 = 3 + 7$

$u = 10$

Check LHS = $3u - 7$

$= 3 \times 10 - 7 = 30 - 7 = 23$

RHS = $2u + 3$

$= 2 \times 10 + 3 = 20 + 3 = 23$

LHS = RHS **Hence Proved.**

(d) $4(m + 6) - 8 = 2m - 4$

$\Rightarrow 4m + 24 - 8 = 2m - 4$

$\Rightarrow 4m + 16 = 2m - 4$

Subtracting $2m$ from both sides, we get

$4m + 16 - 2m = 2m - 4 - 2m$

$2m + 16 = -4$

Subtracting 16 from both sides, we get

$2m + 16 - 16 = -4 - 16$

$\Rightarrow 2m = -20$

Dividing both sides by 2, we get

$$\frac{2m}{2} = \frac{-20}{2} \Rightarrow m = -10$$

Check LHS = $4(m + 6) - 8$

$= 4(-10 + 6) - 8 = 4(-4) - 8$

$= -16 - 8 = -24$

RHS = $2m - 4 = 2(-10) - 4$

$= -20 - 4 = -24$

LHS = RHS **Hence Proved.**

(e) $\frac{u}{15} = 6$

Multiplying both sides by15, we get

$$\frac{u}{15} \times 15 = 6 \times 15 \Rightarrow u = 90$$

Check LHS = $\frac{u}{15} = \frac{90}{15} = 6$

= RHS **Hence Proved.**

2. $u + 6 = u + 2$ has no. solution

Subtract u from both sides, we get

$u + 6 - u = u + 2 - 4$

$6 = 2$

Which is not possible, so it is an incorrect state-ment.

Page-181 Figure it Out

1. (i) $x = -2$

Dividing both sides by 6, we get

$$\frac{x}{6} = \frac{-2}{6} = \frac{-1}{3}$$

(ii) $x = -2$

Multiplying both sides by 3, we get

$3 \times x = -2 \times 3$

$3x = -6$

Adding 2 on both sides, we get
$3x + 2 = -6 + 2$
$3x + 2 = -4$

(iii) $x = -2$
Multiplying both sides by 5, we get
$5 \times x = 5 \times (-2)$
$5x = -10$
Adding 6 on both sides, we get
$5x + 6 = -10 + 6$
$5x + 6 = -4$

(iv) $x = -2$
Subtracting 5 on both sides, we get
$x - 5 = -2 - 5$
$x - 5 = -7$

(v) $x = -2$
Adding 3 on both sides, we get
$x + 3 = -2 + 3$
$x + 3 = 1$
Multiplying both sides by 2
$2(x + 3) = 2$

2. (a) $2y = 60$
Dividing both sides by 2, we get

$$\frac{2y}{2} = \frac{60}{2}$$

$\Rightarrow y = 30$

(b) $-8 = 5x - 3$
Adding 3 on both sides, we get
$-8 + 3 = 5x - 3 + 3 - 5 \quad = 5x$
on dividng by 5 both sides, we get

$$\frac{-5}{5} = \frac{5x}{5} \Rightarrow -1 = x$$

(c) $-53w = -15$
Dividing both sides by -53

$$\frac{-53w}{-53} = \frac{-15}{-53} \Rightarrow w = \frac{15}{53}$$

(d) $13 - z = 8$
Subtracting 13 from both sides, we get
$13 - z - 13 = 8 - 13 \Rightarrow -z = -5$
Dividing both sides by -1, we get

$$\frac{-z}{-1} = \frac{-5}{-1} \Rightarrow z = 5$$

(e) $k + 8 = 12 - k$
Adding k on both sides, we get
$k + 8 + k = 12 - k + k$
$2k + 8 = 12$
Subtracting 8 from both sides, we get
$2k + 8 - 8 = 12 - 8 \Rightarrow 2k = 4$
Dividing both sides by 2, we get

$$\frac{2k}{2} = \frac{4}{2} \Rightarrow k = 2$$

(f) $7m = m - 3$
Subtracting m from both sides, we get
$7m - m = m - 3 - m \Rightarrow 6m = -3$
Dividing both sides by 6, we get

$$\frac{6m}{6} = \frac{-3}{6} \Rightarrow m = -\frac{1}{2}$$

(g) $3n = 10 + n$
Subtracting n from both sides, we get
$3n - n = 10 + n - \Rightarrow 2n = 10$
Dividing both sides by 2

$$\frac{2n}{2} = \frac{10}{2} \Rightarrow n = 5$$

3. Let ten's place digit be x
Then hundred's place digit $= x - 3$
Unit's digit $= x + 3$
Sum of all the three digit $= 15$
According to questions,
$(x - 3) + x + (x + 3) = 15 \Rightarrow 3x = 15$
Dividing both sides by 3, we get

$$\frac{3x}{3} = \frac{15}{3}$$

$x = 5$
$\therefore$ Ten's digit $= x = 5$
Hundred's digit $= x - 3 = 5 - 3 = 2$
Unit's digit $= x + 3 = 5 + 3 = 8$
So number formed 258.

4. Let weight of a brick be x kg.
According to question, $x = \frac{x}{2} + 1$
Subtract $\frac{x}{2}$ from both sides

$$\frac{x}{1}-\frac{x}{2}=\frac{x}{2}+1-\frac{x}{2}$$

$$\frac{2X-X}{2}=1$$

$$\frac{X}{2}=1$$

Multiply both sides by 2

$$\frac{X}{2}\times 2=1\times 2$$

$$x=2$$

$\therefore$ weight if the brick = 2kg.

5. Let the no. be x.

According to question,

$$\frac{1}{4}\times x+9=x$$

$$\frac{x}{4}+9=x$$

$$\Rightarrow 9=\frac{x-x}{4}$$

$$\Rightarrow 9=\frac{4x-x}{4}=\frac{3x}{4}\Rightarrow 9=\frac{3x}{4}$$

Divide both sides by $\frac{3}{4}$

$$9\div\frac{3}{4}=\frac{3}{4}x\div\frac{3}{4}\Rightarrow 9\times\frac{4}{3}=\frac{3}{4}x\times\frac{4}{3}$$

$$\Rightarrow 12=x$$

Thus, the required number is 12.

6. $4k+1=13$

Subtracting 1 from both sides, we get

$4k+1-1=13-1\Rightarrow 4k=12$

Dividing both sides by 4

$4k\div 4=12\div 4\Rightarrow k=3$

(a) $8k+2=8(3)+2=24+2=26$

(b) $4k$

$4\times 3=12$

(c) $k=3$

(d) $4k-1=4(3)-1=12-1=11$

(e) $-k-2=-3-2=-5$

Page-185 Figure it Out

1. (a) $5\times\ldots-8=37$

Let missing term be x,

Then $5\times x-8=37$

$5x-8=37\Rightarrow 5x=37+8$

$\Rightarrow 5x=45\Rightarrow x=\frac{45}{5}=9$ **Ans.**

(b) $37-(33-\ldots)=35$

Let missing term be x

Then $37-(33-x)=35$

$\Rightarrow 37-33+x=35\Rightarrow 4+x=35$

$\Rightarrow x=35-4=31$ **Ans.**

Sol. (c) $-3\times(-11+\ldots)=45$

Let missing term be x

Then $-3\times(-11+x)=45$

Dividing both sides by – 3, we get

$(-11+x)=\frac{45}{-3}=-15$

$\Rightarrow -11+x=-15\Rightarrow x=-15+11$

$\Rightarrow x=-4$ **Ans.**

2. Let no. of ₹50 notes $=x$

= no. of ₹100 notes

Total money Ranju have ₹750

According to question,

value of ₹50 notes= ₹50 $\times$ x = ₹50x

value of ₹100 notes = ₹100 $\times$ x = ₹100x

$\therefore$ ₹50x + ₹100x= ₹750

$\Rightarrow 150x=750\Rightarrow x=\frac{750}{150}=5$

Thus Number of notes of ₹50 is 5

Number of notes of ₹100 is 5

3. Let each black blob hide x blue dotes.

There are 3 black blobs and 4 blue dots in the picture

Total blue dots = 25

According to questions,

$3x+4=25\Rightarrow 3x=25-4$

$\Rightarrow x=\frac{21}{3}=7$

Thus, each black blob hides 7 blue dots. **Ans.**

4. (a)

(i) $\xrightarrow{9} +3 \xrightarrow{12} \times 4 \xrightarrow{48} -5 = 43$

(ii) $\xrightarrow{17} +3 \xrightarrow{20} \times 4 \xrightarrow{80} -5 = 75$

(b) (i) Let the missing number be x

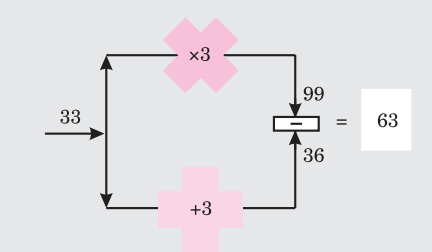
then, $x \times 3 - (x + 3) = 63$

$\Rightarrow \quad 3x - x - 3 = 63$

$\Rightarrow \quad 2x - 3 = 63$

$\Rightarrow \quad 2x = 63 + 3 = 66$

$\Rightarrow \quad x = \frac{66}{2} = 33$



(ii) Let the missing number be y

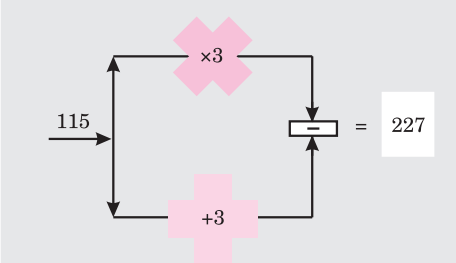
then $y \times 3 - (y + 3) = 227$

$\Rightarrow 3y - y - 3 = 227 \Rightarrow 2y - 3 = 227$

$\Rightarrow 2y = 227 + 3 = 230 \Rightarrow 2y = 230$

$\Rightarrow y = \frac{230}{2} = 115$

Thus missing number is 115



5. (i) $\xrightarrow{45} \div 3 \xrightarrow{15} \div 3 = 5$

Let missing number is x

Then $(x \div 3) \div 3 = 5$

$\Rightarrow x \div 3 = 5 \times 3 \Rightarrow \frac{x}{3} = 15$

$\Rightarrow x = 15 \times 3 = 45$

Thus, missing number is 45.

(ii) $\xrightarrow{-3} -4 \xrightarrow{-7} -4 = -11$

Let missing number is y

Then $(y - 4) - 4 = -11$

$\Rightarrow y - 4 - 4 = -11 \Rightarrow y - 8 = -11$

$\Rightarrow y = -11 + 8 = -3 \Rightarrow y = -3$

Thus missing number is -3

6. Fixed fee charged by taxi driver = ₹800

After that, charge per kilometer = ₹20

Let the distance covered by x km

According to question, $x \times 20 + 800 = 2200$

$\Rightarrow 20x = 2200 - 800$

$\Rightarrow 20x = 1400 \Rightarrow x = \frac{1400}{20} = 70$

Thus, Total distance covered is 70 km.

7. Let x and $3x$ are two numbers

According to question,

$x + 3x = 76$

$\Rightarrow 4x = 76 \Rightarrow x = \frac{76}{4} = 19$

$\therefore x = 19$

$3x = 3 \times 19 = 57$

Thus 19 and 57 are required two numbers.

8. Total height of the window (including frame) = 34 cm

Total height of the window (excluding frame) = (34 – 3 – 3) cm = 28 cm.

Width of one rod of grill = 2 cm

Number of rods of the grill = 5

Total width of 5 rods = 5 × 2 cm = 10 cm

Let height of 1 gap be x cm

and number of gaps = 6

$\therefore$ Total height of gaps = $.6x$

According to question,

$10 + 6x = 28 \Rightarrow 6x = 28 - 10$

$\Rightarrow 6x = 18 \Rightarrow x = \frac{18}{6} = 3$

Thus, Gap between two Rods = 3 cm.

9. Let the cost of chocolate milkshake be ₹x

Cost of fruit juice = ₹$(x - 15)$

Cost of 4 fruit juices and 7 chocolate milkshakes = ₹600

According to question,

$4(x - 15) + 7x = 600$

$\Rightarrow \quad 4x - 60 + 7x = 600$

$\Rightarrow \quad 4x + 7x = 600 + 60$

$\Rightarrow \quad 11x = 660$

$\Rightarrow \quad x = \frac{660}{11} = 60$

Thus, cost of 1 chocolate milkshake = ₹60

cost of 1 fruit juice = ₹60 – ₹15 = ₹45

10. Given $28p - 36 = 98$

$\Rightarrow 28p = 98 + 36$

$\Rightarrow 28p = 134 \Rightarrow p = \frac{134}{28} = \frac{67}{14}$

Putting $p = \frac{67}{14}$ in $14p - 19$,

we get $14 \times \frac{67}{14} - 19 = 67 - 19 = 48$

Putting $p = \frac{67}{14}$ in 28p – 38, we get

$28 \times \frac{67}{14} - 38 = 134 - 38 = 96$

11. (a) $\cancel{6x} + 9 = \cancel{66} \rightarrow$ Error

Variable terms should be on one side and constants on the other side before separating the coefficient from variable.

Correction

$6x + 9 = 66$

$6x = 66 - 9$

$6x = 57$

$x = \frac{57}{6} = \frac{19}{2} = 9\frac{1}{2}$

(b) $14y + 24 = 36$

$7y + 12 = 18$ (On dividing by 2 both sides)

$7y = 18 - 12 = 6 \Rightarrow y = \frac{6}{7}$

No Error.

(c) $4x - 5 = 9x + 8$

$4x = 9x + 8 - 5 \rightarrow$ Error

$4x = 9x + 3$

$4x - 9x = 3$

$-5x = 3$

$x = -\frac{5}{3} \rightarrow$ Error

Correction

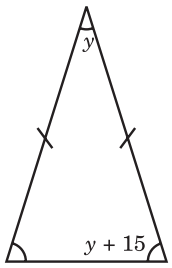
$4x - 5 = 9x + 8$

$\Rightarrow 4x = 9x + 8 + 5 \Rightarrow 4x = 9x + 13$

$\Rightarrow 4x - 9x = 13 \Rightarrow -5x = 13$

$\Rightarrow x = -\frac{13}{5} \Rightarrow x = -2\frac{3}{5}$

12. (i) In ΔABC



Given that, AB = AC

$\Rightarrow \angle B = \angle C = y + 15$

(Angles opposite to equal sides of Δ)

In ΔABC, $\angle A + \angle B + \angle C = 180°$

[Angle sum property of Δ]

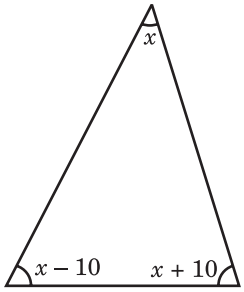
$\Rightarrow \quad y + (y + 15) + (y + 15) = 180°$

$\Rightarrow \quad 3y + 30 = 180° \Rightarrow 3y = 180° - 30$

$\Rightarrow \quad y = \frac{150}{3} = 50$

$\therefore \quad \angle A = 50°, \angle B = 65°, \angle C = 65°$

(ii)



In ΔABC, $\angle A + \angle B + \angle C = 180°$

[Angle sum property of triangle]

$\therefore \quad x + x - 10 + x + 10 = 180°$

$\Rightarrow \quad 3x = 180°$

$\Rightarrow \quad x = \frac{180°}{3} = 60°$

$\therefore \quad \angle A = 60°$

$\angle B = x - 10 = 60 - 10 = 50°$

$\angle C = x + 10 = 60 + 10 = 70°$

$\therefore \quad \angle A = 60°, \angle B = 50°, \angle C = 70°$

Ans.

13. (i) $u = 6$

Multiply both sides by 2, we get $2u = 12$

Add 6 on both sides, we get

$2u + 6 = 12 + 6 \Rightarrow 2u + 6 = 18$

(ii) $u = 6$

Multiplying both sides by 2, we get $2u = 12$

Adding 3 both sides we get

$2u + 3 = 12 + 3 \Rightarrow 2u + 3 = 15$

(iii) $u = 6$

Multiplying both sides by 3 we get

$3u = 18$

Adding 7 on both sides, we get

$3u + 7 = 18 + 7$

$3u + 7 = 25$

(iv) $u = 6$

Adding 5 both sides we get

$u + 5 = 6 + 5$

$u + 5 = 11$

14. Let Amount given to first person be x

Amount given to second person be $2x$

Amount given to third person be $3(2x) = 6x$

Amount given to fourth person be $4(6x) = 24x$

Total Amount $= 132$

$x + 2x + 6x + 24x = 132$

$\Rightarrow 33x = 132 \Rightarrow x = \frac{132}{33}$

$\Rightarrow x = 4$

Amount given to first person is 4

Ans.

15. Let height of a giraffe be $x\ m$

According to question

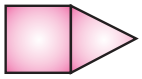
$xm = 2\frac{1}{2}m + \frac{x}{2}m \Rightarrow x = \frac{5}{2} + \frac{x}{2}$

$\Rightarrow x - \frac{x}{2} = \frac{5}{2} \Rightarrow \frac{2x - x}{2} = \frac{5}{2}$

$\Rightarrow \frac{x}{2} = \frac{5}{2} \Rightarrow x = \frac{5}{2} \times 2 = 5$

$\therefore$ Height of the giraffe $= 5\ m$ **Ans.**

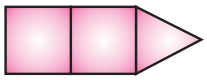
16. (a)



4 squares

$1 + 3$

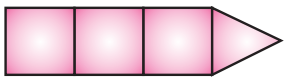
$1 + \underline{1} \times 3$



7 squares

$1 + 3 + 3$

$1 + \underline{2} \times 3$



10 squares

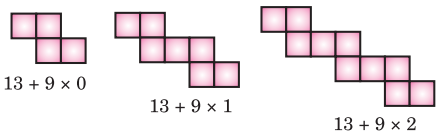
$1 + 3 + 3 + 3$ and so on

$1 + \underline{3} \times 3 \ldots\ldots 1 + \underline{x} \times 3$

No. of squares in 11^{th} position will be

$1 + \underline{11} \times 3 = 1 + 33 = 34$

(b)



and so on

So, no. of sticks needed in 11^{th} position will be $13 + 9 \times 10 = 103$

(c) Let the n^{th} arrangement have 85 sticks

$$13 + (n-1) \times 9 = 85$$

$\Rightarrow 13 + 9n - 9 = 85 \Rightarrow 4 + 9n = 85$

$\Rightarrow 9n = 85 - 4 \Rightarrow 9n = 81 \Rightarrow n = \frac{81}{9} = 9$

Yes, the arrangement will have 85 sticks in position numbr 10.

(d) Let the n^{th} arrangment have 150 sticks.

$$13 + (n-1) \times 9 = 150$$

$\Rightarrow 13 + 9n - 9 = 150 \Rightarrow 4 + 9n = 150$

$\Rightarrow 9n = 150 - 4 \Rightarrow 9n = 146$

$\Rightarrow n = \frac{146}{9} \Rightarrow n = 16\frac{2}{9}$

It is not a whole number.

So, no arrangment can be made with 150 sticks.

17. Let the number be x

According to question,

$x + 36 = 10 \times x \Rightarrow x + 36 = 10x$

$\Rightarrow 36 = 10x - x \Rightarrow 36 = 9x$

$\Rightarrow 36 \div 9 = x \Rightarrow x = 4$

18. (a) $5(r + 2) = 10$

$\Rightarrow 5 \times (r + 2) = 10 \Rightarrow (r + 2) = 10 \div 5$

$\Rightarrow r + 2 = 2 \Rightarrow r = 2 - 2 = 0$

$\Rightarrow r = 0$

(b) $-3(u + 2) = 2(u - 1)$

$\Rightarrow -3u - 6 = 2u - 2$

$\Rightarrow -3u - 2u = -2 + 6 \Rightarrow -5u = 4 \Rightarrow u = -\frac{4}{5}$

(c) $2(7 - 2n) = -6$

$\Rightarrow 2 \times 7 - 2 \times 2n = -6 \Rightarrow 14 - 4n = -6$

$\Rightarrow -4n = -6 - 14 \Rightarrow -4n = -20$

$\Rightarrow n = \frac{20}{4} = 5$

(d) $2(x - 4) = -16$

$\Rightarrow 2 \times x - 2 \times 4 = -16 \Rightarrow 2x - 8 = -16$

$\Rightarrow 2x = -16 + 8 \Rightarrow 2x = -8$

$\Rightarrow x = \frac{-8}{2} = -4$

(e) $6(x - 1) = 2(x - 1) - 4$

$\Rightarrow 6 \times x - 6 \times 1 = 2 \times x - 2 \times 1 - 4$

$\Rightarrow 6x - 6 = 2x - 2 - 4 \Rightarrow 6x - 2x = -2 - 4 + 6$

$\Rightarrow 4x = -6 + 6 = 0 \Rightarrow x = \frac{0}{4} = 0$

(f) $3 - 7s = 7 - 3s \Rightarrow 3 - 7 = -3s + 7s$

$\Rightarrow -4 = 4s \Rightarrow s = \frac{-4}{4} = -1 \Rightarrow s = -1$

(g) $2x + 1 = 6 - (2x - 3) \Rightarrow 2x + 1$

$= 6 - 2x + 3 \Rightarrow 2x + 2x = 6 + 3 - 1$

$\Rightarrow 4x = 9 - 1 \Rightarrow 4x = 8$

$\Rightarrow x = \frac{8}{4} = 2$

(h) $10 - 5x = 3(x - 4) - 2(x - 7)$

$\Rightarrow 10 - 5x = 3 \times x - 3 \times 4 - 2 \times x - 2 \times (-7)$

$\Rightarrow 10 - 5x = 3x - 12 - 2x + 14$

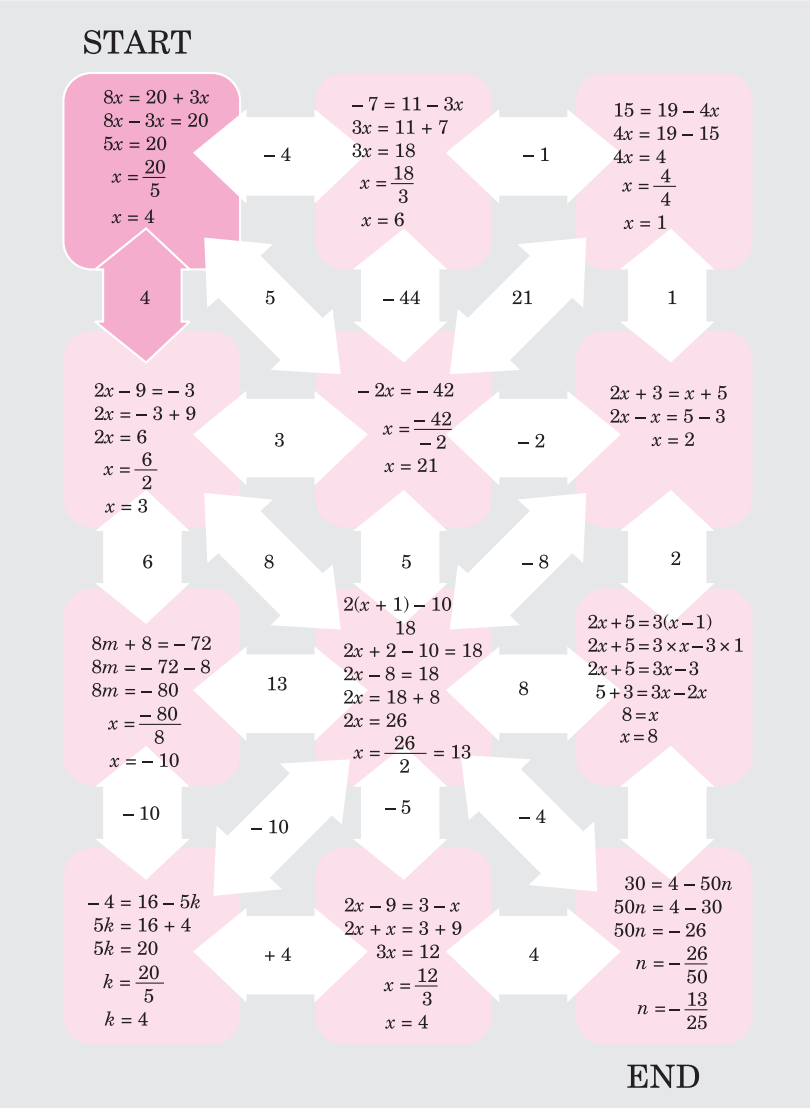
$\Rightarrow -5x - 3x + 2x = -12 + 14 - 10$

$\Rightarrow -8x + 2x = -22 + 14$

$\Rightarrow -6x = -8$

$\Rightarrow x = \frac{8}{6} = \frac{4}{3}$

20.



20. Let the number of children be x and number of donkeys be y

Then, according to question,

$x + y = 28$ ...(1)

children have 2 feet

But donkey have 4 feet

Then according to questions

Total no. of feet $2x + 4y = 80$ ...(2)

from equation (1)

$x + y = 28 \Rightarrow y = 28 - x$

Substituting this value of y in equation (2), we get $2x + 4(28 - x) = 80 \Rightarrow 2x + 112 - 4x = 80$

$\Rightarrow -2x = 80 - 112$

$\Rightarrow -2x = -32 \Rightarrow x = \frac{32}{2} = 16$

from equation (1), $x + y = 28$

$\Rightarrow 16 + y = 28 \Rightarrow y = 28 - 16 = 12$

Thus, there are 16 children and 12 donkeys.

Ans.

❑❑