HINTS AND SOLUTIONS

CHAPTER 1 : PATTERNS IN MATHEMATICS

Let's Recall

1. 1, 1, 1, 1, ...
The number sequence contains only number 1. So, it is a pattern of number 1.

2. 1, 2, 3, 4, ...
The number sequence follows an increasing pattern of counting numbers starting from 1.

3. 3, 5, 7, 9, ...
This is an increasing pattern of odd numbers starting from 3.

4. 4, 7, 10, 13, ...
Every next number is obtained by adding 3 to the previous number starting from 4.

5. 5, 9, 13, 17, ...
Every next number is obtained by adding 4 to the previous number starting from 5.

Practice Time 1A

1. (*a*) Each next number is obtained by adding 4 to the previous number starting from 4.
4, 8, 12, 16, 20, 24, 28

(*b*) Each next number is obtained by adding consecutive counting numbers starting from 1 to the previous number, starting from 1.
1, 2, 4, 7, 11, 16, 22, 29, 37

2. (*a*) 47 43 40 38 37 33 30 28
−4 −3 −2 −1 −4 −3 −2

(*b*) 100 90 81 73 66 60 55
−10 −9 −8 −7 −6 −5

3.

987654321	× 9	=	8	888	888	889
987654321	× 18	=	17	777	777	778
987654321	× 27	=	26	666	666	667
987654321	× 36	=	35	555	555	556
987654321	× 45	=	44	444	444	445
987654321	× 54	=	53	333	333	334
987654321	× 63	=	62	222	222	223
987654321	× 72	=	71	111	111	112
987654321	× 81	=	80	000	000	001

4. 5 = 5, 4 + 1, 1 + 4, 3 + 2, 2 + 3, 3 + 1 + 1, 1 + 3 + 1, 1 + 1 + 3, 2 + 2 + 1, 2 + 1 + 2, 1 + 2 + 2, 2 + 1 + 1 + 1, 1 + 2 + 1 + 1, 1 + 1 + 2 + 1, 1 + 1 + 1 + 2, 1 + 1 + 1 + 1 + 1

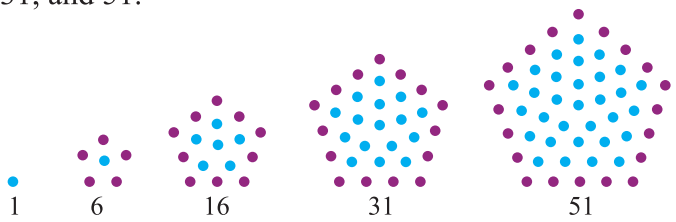
5. 1 staircase = 1 ways
2 staircase = 2 ways
3 staircase = 3 ways
4 staircase = 5 ways
5 staircase = 8 ways
6 staircase = 13 ways
7 staircase = 21 ways
8 staircase = 34 ways
9 staircase = 55 ways
10 staircase = 89 ways

Project (Page 12)

Yes, Third perfect number = 496
Forth perfect number = 8128

Think and Answer (Page 13)

Yes, five centered pentagonal numbers are: 1, 6, 16, 31, and 51.

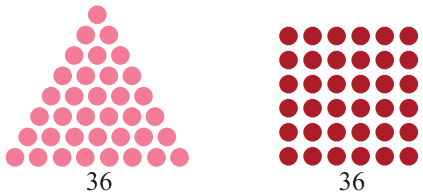


Practice Time 1B

1. (*a*) Even numbers 10, 28, 64, 66, 100
(*b*) Odd numbers 15, 25, 27, 35, 49, 55, 81
(*c*) Triangular numbers 10, 15, 28, 55, 66
(*d*) Square number 25, 49, 64, 81, 100
(*e*) Cubic numbers 27, 64
(*f*) Pentagonal numbers 35
(*g*) Hexagonal numbers 15, 28, 66

3. Triangular, Square, Pentagonal, Hexagonal

4.



Square number that are triangular number
1, 36, 1225, 41616, 1413721

5. Do it yourself.

6. $1 = 1^3$

$1 + 7 = 8 = 2^3$

$1 + 7 + 19 = 27 = 3^3$

$1 + 7 + 19 + 37 = 64 = 4^3$

Thus, sum of consecutive central hexagonal numbers is a cubic number.

Quick Check (Page 15)

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Practice Time 1C

1. First 10 triangular numbers:

1, 3, 6, 10, 15, 21, 28, 36, 45, 55

Multiplying triangular numbers by 6 and adding 1

$1 \times 6 + 1 = 7$

$3 \times 6 + 1 = 19$

$6 \times 6 + 1 = 37$

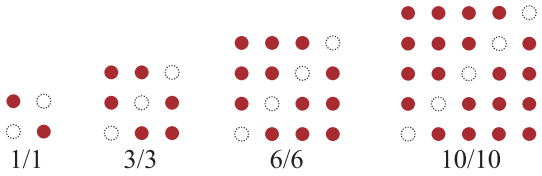
$10 \times 6 + 1 = 61$

} are centered hexagonal numbers

2. $64 = 8 \times 8$ = Square number

$= 4 \times 4 \times 4$ = Cubic number

3.



1/1 3/3 6/6 10/10

The upper and lower portion of square number become triangular number when diagonal dots are removed.

4. $2^2 - 2 = 2$

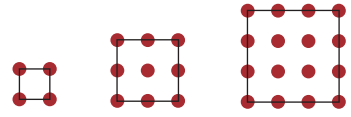
$3^2 - 3 = 6$

$4^2 - 4 = 12$

$5^2 - 5 = 20$

} Even numbers

5.



4 dots 8 dots 12 dots

All are multiples of 4.

6. A triangular number represents a set of dots arranged in a triangle. The fourth triangular number means arranging dots in a triangular shape with 4 layers starting with 1.

Given that two copies of the fourth triangular number form a rectangle. The base of the rectangle is made by 4 dots, and the height is 4 +1. So, the fourth triangular number is 1/2 of the number of dots in the area of the rectangle so formed (since two identical triangles are fitted together).

Fourth triangular number $= \frac{4 \times 5}{2}$.

By the same pattern we can assemble two 100th triangular numbers to form a rectangle with 100 dots along the base and 101 dots along the height. Therefore, 100th triangular number

$$= \frac{100 \times 101}{2} = 5050$$

Similarly, 1000th triangular number

$$= \frac{1000 \times 1001}{2} = 500500$$

Generalisation:

Triangular number $= \frac{1}{2}$ (Product of dots along the length and breadth of the rectangle so formed)

7. Do it yourself.

8. $65 = 8^2 + 1^2 = 7^2 + 4^2$

9. Do it yourself.

10. Do it yourself.

11. $99999 \times 2 = 199998$

$9999999 \times 2 = 19999998$

12. $11111 \times 88888 = 987634568$

$111111 \times 888888 = 98765234568$

$1111111 \times 8888888 = 9876541234568$

13. $12345 \times 8 + 5 = 98765$

$123456 \times 8 + 6 = 987654$

$1234567 \times 8 + 7 = 9876543$

$12345678 \times 8 + 8 = 98765432$

14. $65359477124183 \times 68 = 4444\ 4444\ 4444\ 4444$

$65359477124183 \times 85 = 5555\ 5555\ 5555\ 5555$

$65359477124183 \times 102 = 6666\ 6666\ 6666\ 6666$

$65359477124183 \times 119 = 7777\ 7777\ 7777\ 7777$

$65359477124183 \times 153 = 9999\ 9999\ 9999\ 9999$

Practice Time 1D

1. 9 sides = Nonagon

10 sides = Decagon

2. 1, 4, 9, 16, 25, 36; Brick wall

3. Regular polygon

Triangle $n = 3$

Quadrilateral $n = 4$

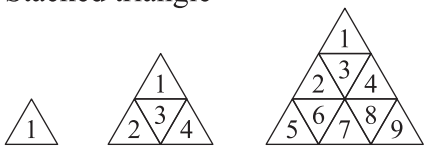
} 3, 4, 5, 6, ...

Pentagon $n = 5$

Hexagon $n = 6$

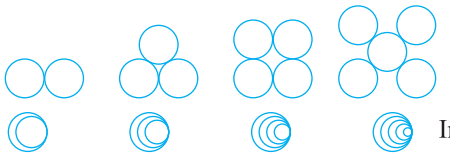
} Form the sequence of natural number

4. Stacked triangle



Total number of triangles: 1, 4, 9, 16, 25, ... This is the sequence of square numbers.

5. Do it yourself.

6. 

7. Hexagons can gain easily to form a solid figure without any gaps in between having least perimeter and maximum surface area, while other polygon cannot make such figure.

8. Koch snowflake begin with an equilateral triangle and then replaces the middle third of every line segment with a pair of line segments that form an equilateral bumps. 3, 12, 48, ... are the number of line segment. Here each next number is four times the previous.
$12 = 3 \times 4$; $48 = 4 \times 12$; $192 = 4 \times 48$

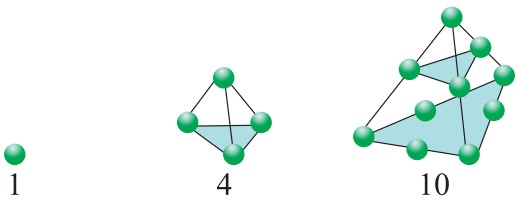
Brain Sizzlers (Page 21)

Line segment		one (1)
Line segment		3
Line segment		6
Line segment		10
Line segment		15

1, 3, 6, 10, ... form a triangular number patterns.

Mental Maths (Page 21)

1. 2, 4, 6, 8, 10, 12, 14, ... Even number sequence
2. The pattern shows the cubic number.
i.e., $1^3, 2^3, 3^3, 4^3, 5^3, 6^3, ...$
Hence, next number = $7^3 = 343$.
3. 19 is a centered hexagonal number.
4. Tetrahedral numbers



Chapter Assessment

A.

1. Since, $10 = 1 + 2 + 3 + 4$. It is the sum of first four counting numbers. So, 10 is a triangular number. Hence, option (*c*) is correct.
2. $5 \times 5 = 25$; $9 \times 9 = 81$; $10 \times 10 = 100$. But, 32 can not be written as product of two same numbers. So, 32 is not a square number. Hence, option (*d*) is correct.
3. By adding centred hexagonal numbers, we get 1, 8, 27, 64, ..., which are the cubic numbers. Hence, option (*b*) is correct.
4. We know that
$1 = 1^2$
$1 + 2 + 1 = 4 = 2^2$
$1 + 2 + 3 + 2 + 1 = 9 = 3^2$
$1 + 2 + 3 + 4 + 3 + 2 + 1 = 16 = 4^2$
$1 + 2 + 3 + 4 + 5 + 4 + 3 + 2 + 1 = 25 = 5^2$
Thus, we get the square numbers by adding the counting numbers in above pattern.
So, $1 + 2 + 3 + ... + 49 + 50 + 49 + ... + 3 + 2 + 1 = 50^2 = 2500$
Hence, option (*a*) is correct.
5. Diagonals follow the pattern: 0, 2, 5, 9, ...
So, each next number is obtained by adding the consecutive counting numbers (starting from 2) to the previous number starting from 0.
So, the number of diagonals in the heptagon would be 14. Hence, option (*a*) is correct.

B.

1. Virahanka number.
2. Cubic numbers: 1, 8, 16, ...,
Fibonacci numbers: 1, 1, 2, 3, 5, 8, ...
So, 1 and 8 are both cubic number and fibonacci number. Since, 1 is trivial in many number patterns, we'll consider 8 as the correct answer.
3. Square number as $36 = 6 \times 6$.
4. $25 + 16 + 9 + 4 + 1 = 55$
5. Triangular numbers.

C.

1. Total number of little triangles are 16, which is not a triangular number. False
2. False
3. Koch snowflakes can only be constructed with an equilateral triangle. False
4. True.

D.

1. Triangular umbers: 1, 3, 6, 10, 15, ...
Fibonacci numbers: 1, 1, 2, 3, 8, 11, ...
Pentagonal number numbers: 1, 5, 12, 22, 35, ...
Tetrahedral number: 1, 4, 10, 20, 35, ...
$1 \rightarrow c$, $2 \rightarrow d$, $3 \rightarrow a$, $4 \rightarrow b$

E.

1. $9 \times 9 = 81$

$99 \times 99 = 9801$

$999 \times 999 = 998001$

By following the above pattern, we get

$9999 \times 9999 = 99980001$

$99999 \times 99999 = 9999800001$

2. $11 \times 11 = 121$

$111 \times 111 = 12321$

$1111 \times 1111 = 1234321$

$11111 \times 11111 = 123454321$

$111111 \times 111111 = 12345654321$

$1111111 \times 1111111 = 1234567654321$

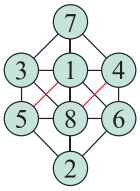
$11111111 \times 11111111 = 123456787654321$

$111111111 \times 111111111 = 12345678987654321$

These numbers remain same when read from the front or back and they are called palindromic numbers. Mahaviracharya was the first Indian mathematician who first contributed to the study of these special numbers.

3. A truncated icosahedron consists of 12 pentagonal faces and 20 hexagons.

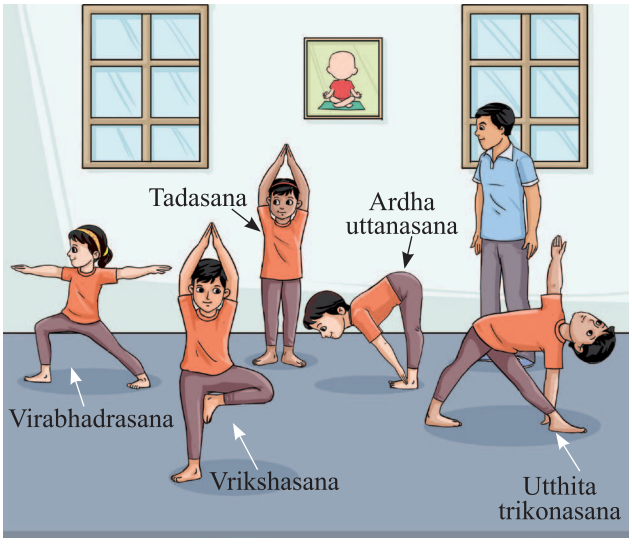
4.



CHAPTER 2 : LINES AND ANGLES

Let's Recall

1.



2.

3. (*a*) Ardha chakrasana

(*b*) Adho mukha vrikshasana

(*c*) Anantasana

4. 21 June

Quick Check (Page 30)

1. (*a*) Beam of light from light house ⇒ Ray

(*b*) A flat face of a box ⇒ Plane

(*c*) Edge of a postcard ⇒ Line segment

(*d*) Tip of a needle ⇒ Point

2.

Line	Line segment	Ray
(*a*) no	(*a*) two	(*a*) one
(*b*) infinite	(*b*) finite	(*b*) infinite
(*c*) cannot	(*c*) can	(*c*) cannot
(*d*) $\overleftrightarrow{AB}$	(*d*) $\overline{AB}$	(*d*) $\overrightarrow{AB}$

Practice Time 2A

1. A line segment has two end points. So, option *b* is correct.

2. A ray has only one end point. So, option *b* is correct.

3. In the given image M and N are two end points of MN. So, MN is a line segment, and hence the option *b* is correct.

4. (*a*) A line segment can have infinitely many points. So, the given statement is false.

(*b*) T (*c*) T

(*d*) The English alphabet 'X' is an example of intersecting lines. So, the given statement is false.

5. (*a*) $\overleftrightarrow{AE}$, $\overleftrightarrow{EF}$ (*b*) $\overleftrightarrow{AE}$ (*c*) $\overleftrightarrow{CO}$

(*d*) $\overleftrightarrow{AE}$, $\overleftrightarrow{CO}$ and $\overleftrightarrow{DE}$, $\overleftrightarrow{FE}$

6. (*a*) T (*b*) T (*c*) T (*d*) F
(*e*) F (*f*) F (*g*) T

7. LM, MP, PQ and QR
Point L and point R are on exactly one line segments LM and QR respectively.

8. TA, TB, NB

9. (*a*) Lines GF, NM
(*b*) Line segments EF, ED, DC, BC, AB, DO, CE, MN, GE, GF
(*c*) Rays DC, DO, EF, EG, FG, GF, NM, MN, EC, BA

10. (*a*) Yes, PQ ⊥ CD: as they intersect at 90°.
(*b*) Parallel lines: $\overleftrightarrow{EF} \parallel \overleftrightarrow{CD}, \overleftrightarrow{CD} \parallel \overleftrightarrow{AB}, \overleftrightarrow{AB} \parallel \overleftrightarrow{EF}$.
(*c*) Concurrent lines: $\overleftrightarrow{CD}, \overleftrightarrow{KL}, \overleftrightarrow{PQ}$ and $\overleftrightarrow{MN}$.

11. Do it yourself.

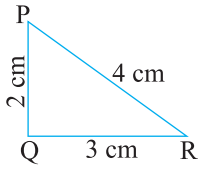
Practice Time 2B

1. (*a*) Shortest side: LM; Longest side: LN
(*b*) Shortest side: AD; Longest side: BC

2.

B is the mid point of AC ⇒ AB = BC
C is the mid point of BD ⇒ BC = CD
⇒ AB = BC = CD

3. (*a*) Since, PQ + QR = 2 + 3 > 4
= PR
QR + PR = 3 + 4 > 2 = PQ
PR + PQ = 4 + 2
= 6 > 3 = QR



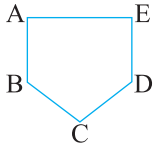
(*b*) If can also be verified by actual measurements of sides of the Δ.

4. Yes, $\overline{AC} = \overline{AB} + \overline{BC}$

5. (*a*) AE + EC = AC (*b*) DC – RC = DR
(*c*) PR – PQ = QR (*d*) BD – (BE + QD) = EQ

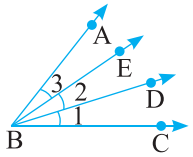
Practice Time 2C

1. (*a*)



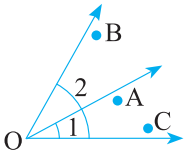
Angles are:
∠BAE, ∠AED,
∠EDC, ∠DCB, ∠CBA

(*b*)



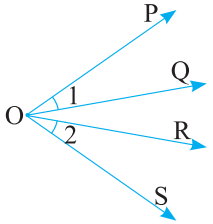
∠DBC, ∠EBD, ∠ABE, ∠ABD, ∠EBC, ∠ABC

2.



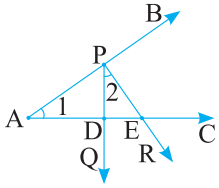
Yes, point C lies in the interior of ∠2 also.

3. (*a*)



Here, ∠POQ, ∠QOR and ∠ROS have one common point O.

(*b*)



Here, points P, D and E are common in angle, BAC and in angle QPR.

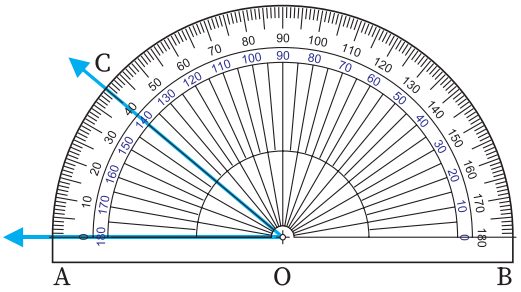
Quick Check (Page 40)

1. (*a*) ∠AOY; ∠XOY is included in ∠AOY
(*b*) ∠AOC; ∠XOY is included in ∠AOC
(*c*) ∠YOB = ∠YOC as B and C lie on the same line.

2. ∠XOY, as ∠XOY is an obtuse angle and ∠AOB is an acute angle.

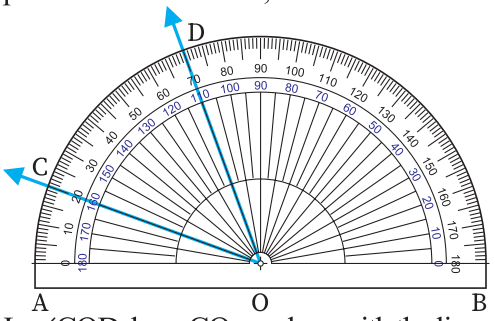
Practice Time 2D

1. (*a*)



In ∠AOB, base AO is aligned with the horizontal line with point O at the centre of the protractor and the second arm of ∠AOC i.e., CO overlap with the line marking on the protractor at 40°. So, ∠AOC = 40°.

(*b*)



In ∠COD, base CO overlaps with the line marking on the protractor at 20° and the second arm i.e., OD overlaps with the line marking on the protractor at 70°. So, ∠COD = 70° – 20° = 50°.

(*c*) Do it yourself.

2. Do it yourself. **3.** Do it yourself.

4. Same as question 1.

(*a*) 35° (*b*) 94° (*c*) 55° (*d*) 125° (*e*) 31°

5. Central angle = 360°

Each angle $= \frac{360°}{20} = 18°$

6. **Observation:** Sum of angles of a triangle = 180°

Quick Check (Page 47)

1. Since, ∠SOR = ∠QOR.

So, OR is the angle bisector of ∠QOS.

2. ∠QOT

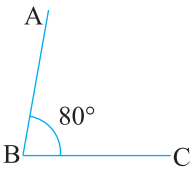
(∵ ∠TOS = ∠SOQ = 30°),

Or

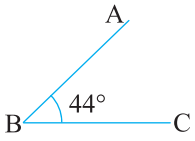
(∵ ∠TOR = ∠POR = 45°)

Practice Time 2E

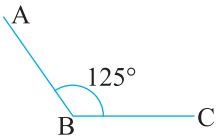
1. (*a*)



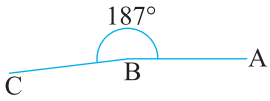
(*b*)



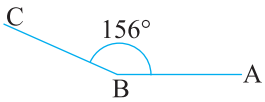
(*c*)



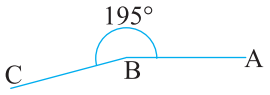
(*d*)



(*e*)

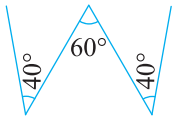


(*f*)



2. Do it yourself.

3.



4. Do it yourself. **5.** Do it yourself.

Quick Check (Page 54)

1. (*a*) Acute (*b*) Right (*c*) Obtuse (*d*) Reflex

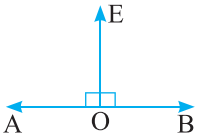
2. Acute angle: ∠EAB

Obtuse angle: ∠ABC, ∠AED

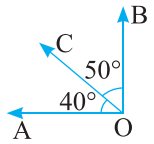
Right angle: ∠DCB

Enrichment (Pages 56-57)

1. No, because a right angle is an angle with measure 90° and sum of two right angle is 180°, which is not complementary angle.



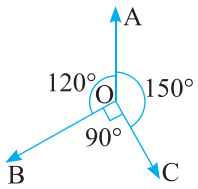
2. Yes,



∠AOC and ∠BOC are adjacent angles, where ∠AOC = 40° and ∠BOC = 50°

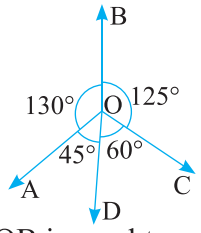
∴ ∠AOC + ∠BOC = 40° + 50° = 90°, complementary angles.

3. Yes,



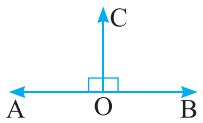
∠AOB and ∠AOC are obtuse as well as adjacent angles.

4. Yes,



∠AOB is an obtuse angle and ∠AOD is an acute angle and both are adjacent.

5. Yes,



∠AOC = 90° = ∠BOC and ∠AOC + ∠BOC = 180°

Practice Time 2F

1. Do it yourself.

2. (*a*) True

(*b*) The measure of an obtuse angle is greater than 90° and less than 180°. So, the given statement is false.

(*c*) True (*d*) False

(*e*) The measure of one complete angle is 360°. So, the given statement is false.

3. (*a*) Obtuse (*b*) Acute (*c*) Right

(*d*) Complete (*e*) Reflex (*f*) Obtuse

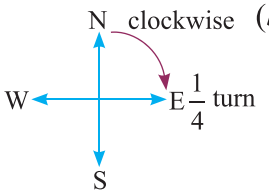
(*g*) Straight (*h*) Acute

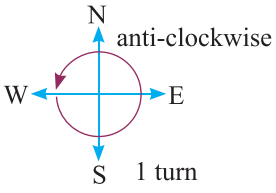
4. (*a*) From 2 to 8, the minute hand moves 6 hour marks (2 → 3 → 4 → 5 → 6 → 7 → 8).

Since a full revolution corresponds to moving through 12 hour marks, the fraction of the revolution completed is: $\frac{6}{12} = \frac{1}{2}$.

(*b*) From 10 to 1, the minute hand moves 3 hour marks. So, the fraction of the revolution completed is: $\frac{3}{12} = \frac{1}{4}$.

(*c*) From 9 to 6, the minute hand moves 9 hour marks. So, the fraction of the revolution completed is: $\frac{9}{12} = \frac{3}{4}$.

5. (*a*) 

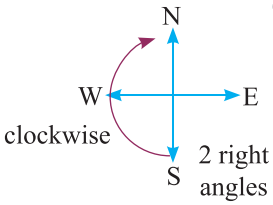
(*b*) 

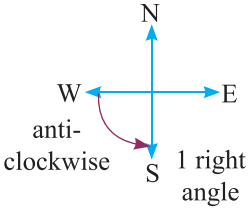
6. (*a*) A full revolution of the hour hand is 360°, which corresponds to moving across 12 hours. Moving from one hour to the next corresponds to turning: 360°/ 12 = 30°.

From 6 to 12 the hour hand moves 6 hour marks. Thus, the hour hand turns through: 6 × 30° = 180° 2 right angles

(*b*) 10 → 1 (3 hrs) 1 right angle

(*c*) 8 → 11(3 hrs) 1 right angle

7. (*a*) 

(*b*) 

8.(*a*) One right angle corresponds to 90°, which covers 3 hour marks. So, in two right angles it will be 6 hour marks. From 8, 6 hour marks in the clockwise direction is 2. Thus the correct answer is 2.

(*b*) Similar to part (*a*)

9. (*a*) A full revolution of the hour hand corresponds to moving across 12 hours. Half a revolution means moving across: $\frac{12}{2}$ = 6 hour marks. Starting from 7, six hour marks in the clockwise direction is 1.

(*b*) Similar to part (*a*)

10. (*a*) A full circle in a clock is 360°, and there are 12 hours, so each hour mark represents: 360°/ 12 = 30° per hour.

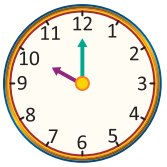
The difference between 9 and 12 is 3 hour marks.

Thus, the angle between the hands: 3 × 30° = 90°

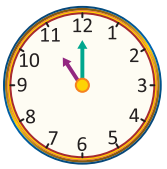
(*b*) 12 → 1 = 1 × 30° = 30°

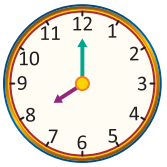
(*c*) 6 → 12 = 6 × 30° = 180°

11. Similar to question 10.

(*a*)  10 → 12 = 2 × 30° = 60°

(*b*)  12 → 4 = 4 × 30° = 120°

(*c*)  11 → 12 = 1 × 30° = 30°

(*d*)  8 → 12 = 4 × 30° = 120°

12. (*a*) acute angle

(*b*) straight angle (since 90° + 90° = 180°)

(*c*) acute angle (complementary angles are always acute)

(*d*) obtuse angle (Subtracting an acute angle from 180° always results in a value greater than 90°)

(*e*) straight angle (*f*) acute angle

13. (*a*) X is the mid point of AC
Y is the mid point of BC
Z is the mid point of AB

(*b*) P is the bisector of AC
q is the bisector of BC

(*c*) *p* is the perpendicular bisector of AC

(*d*) *r* is the line which is only perpendicular to AB, but does not bisect it.

(*e*) *q* is the line which only bisects BC, but is not perpendicular to it.

14. (*a*) Yes, the sum of two acute angles can be an acute angle. (*i*) 15° + 45° = 60° (*ii*) 35° + 48° = 83°

(*b*) Yes, the sum of two acute angles can be a right angle. 45° + 45° = 90°

(*c*) Yes, the sum of two acute angles can be an obtuse angle. $50° + 80° = 130°$

(*d*) An acute angle is any angle less than 90°. So, the sum of two acute angles is always less than 180°. Thus, it is not possible to have two acute angles whose sum is a straight angle.

(*e*) Reflex angle is more than 180°, but the sum of two acute angles is always less than 180°. Thus, it is not possible to have two acute angles whose sum is a reflex angle.

15. (*a*) Yes, $120° + 130° = 250° < 360°$

Sum of two obtuse angles can be a reflex angle.

(*b*) An obtuse angle is any angle greater than 90° but less than 180°. If we add two obtuse angles, their total will always be greater than 180° but less than 360°. Thus, it is not possible to have two obtuse angles whose sum is a complete angle (360°).

Practice Time 2G

3. (*a*) Acute angle: A, K, M, N, V, W, X, Y, Z

(*b*) Obtuse angle: A, X, K, Y

(*c*) Straight angle: I

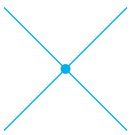
Mental Maths (Page 62)

1. No, two angles cannot have exactly 5 points in common.

2. Total line segment = $5 \times 2 = 10$

$\overline{AB}$, $\overline{AC}$, $\overline{AD}$, $\overline{AE}$, $\overline{BC}$, $\overline{BD}$, $\overline{BE}$, $\overline{CD}$, $\overline{CE}$, $\overline{DE}$

3.

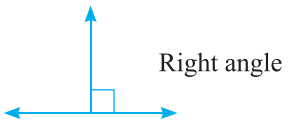


Two lines can intersect at one point only. So, it is false.

4. Parallel lines can never meet each other.

5. A **6.** 45° **7.** Infinitely many

8.



Brain Sizzlers (Page 62)

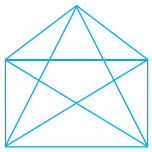
2. Parallel lines: AB || CS,

Non-parallel lines: AC, PL, RS

Chapter Assessment

A.

1.



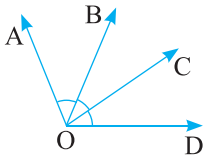
Thus, the required lines are 10.

Hence, the correct option is (*a*).

2. In the figure, ∠XYZ cannot be written as ∠ZXY, since there is no such arm as ZX.

Hence, the correct option is (*b*).

3.



Angles in the given figure are ∠AOB, ∠AOC, ∠AOD, ∠BOC, ∠BOD and ∠COD.

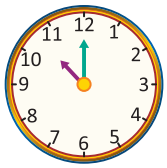
Thus, the total number of angles in the given figure = 6.

Hence, the correct option is (*d*).

4. Lines *r* and *s* are perpendicular, intersects each other at a right angle.

Hence, the correct option is (*c*).

5.

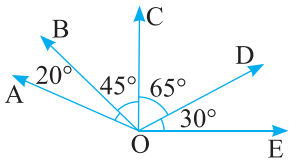


Angle between the hour and minute hand at 10 o'clock = $2 \times 30° = 60°$

Other angle = $360° - 60° = 300°$

Hence, the correct option is (*a*).

6.



Obtuse angle:

∠EOC, ∠EOB, ∠EOA, ∠DOB, ∠DOA

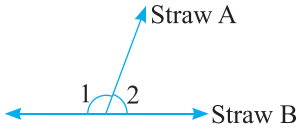
∴ Total number of obtuse angle = 5

Hence, the correct option is (*d*).

7. Since, sum of two right angles is equal to 180°.

Hence, the correct option is (*d*).

8.



When the value of $\angle 2$ triples, the new value of $\angle 2$ is $3(\angle 2)$.

So, the increase in the value of $\angle 2 = 3(\angle 2) - (\angle 2)$
$= 2(\angle 2)$.

The same will be the decrease in the value of <1.

Hence, the correct option is (*b*).

9. $6 \rightarrow 360°$

$1 \rightarrow 60°$

$4 \rightarrow 4 \times 60° = 240°$

Hence, the correct option is (*b*).

10. Semi-circulator angle = 180°, which is divided into 8-equal parts.

So, $8 \rightarrow 180°$

$\Rightarrow 1 \rightarrow \frac{180°}{8} = 22.5°$

$\Rightarrow 2 \rightarrow 2 \times 22.5° = 45°$

Hence, the correct option is (*b*).

B.

1. *d* **2.** *a* **3.** *d*

C.

1. one **2.** finite **3.** parallel **4.** acute

5. two **6.** reflex

7. Since, $90° + 90° = 180°$, then angle which is equal to its supplement is of 90°.

D.

1. True

2. False, as $\overline{AB}$ is the perpendicular bisector of line segment PQ.

3. False, as a line can be extended infinitely in both directions and cannot be measured.

4. False, as two parallel lines never intersect to each other, they are equidistant from each other.

5. True

6. False, acute angle is greater than 0° but less than 90°.

E.

1. Four rays: — (*b*)

2. Nine line segment — (*a*)

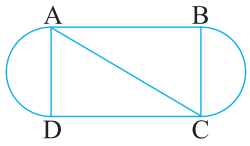
3. Six angles — (*b*), (*c*)

4. Six points on the boundary — (*a*), (*c*)

5. Three collinear points — (*b*)

F.

1.



Line segment: AB, AC, BC, CD, AD

Number of line segment = 5

2. 65°, $\frac{1}{2} \times 65° = 32.5°$

3. 6; AB, CD, DA, AC, BD, BC

4. Do it yourself.

5. Angles formed at all points A, B, C, D, E, F,G and H.

(*a*) Acute angle: $\angle F$, $\angle C$

(*b*) Obtuse angle: $\angle A$, $\angle B$

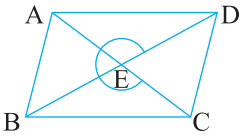
(*c*) right angle: $\angle D$, $\angle E$, $\angle H$, $\angle G$

6. Do it yourself.

7. (*a*) Acute angle: $\angle AEB$, $\angle DEC$, $\angle BAE$, $\angle EDC$

(*b*) $\angle AED$, $\angle BEC$

(*c*) Reflex $\angle CED$ etc.



(Answer may vary)

8. (*a*)

6 (Saffron, White, Green, Saffron + White, White + Green, Saffron + White + Green)

(*b*) Total angles = 360°

Since there are 24 spokes, the angle between two consecutive spokes is: $\frac{360°}{24} = 15°$

(*c*) Since there are 24 spokes, each spoke can form a right angle with the one 6 places ahead. Every spoke contributes to one right angle. Thus, there will be 24 right angles.

(*d*) Parallel lines: AB || CD, AB || EF, AB || GH, CD || EF, CD || GH, EF || GH, AG || BH.

$\therefore$ Total number of parallel lines = 7.

Unit Test – 1

A.

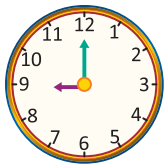
1. (*d*)

2. (*c*) Since $36 = 6 \times 6 = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8$. So, 36 is both a square as well as a triangular number.

3. (*b*)

4. (*c*) $\frac{3}{5}$ of a right angle $= \frac{3}{5} \times 90° = 54°$

5. (*c*)



$\because$ $1 \rightarrow 30°$

$\therefore$ $12 - 9 = 3 \rightarrow 3 \times 30° = 90°$

6. (*a*) Tetrahedral numbers: 1, 4, 10, 20, 35, ...

7. (*d*) AC and BD are intersecting lines but not perpendicular to each other.

8. (*c*)

9. (*c*) $64 = 8 \times 8 = 4 \times 4 \times 4$
But every square number is not a cubic number as, $4 \times 4 = 16$, which is not a cube of any number.

10. (*a*)

B.

1. 343, cubic number **2.** 90°

3. Two **4.** Pentagonal number

5. Virahanka

C.

1. True

2. False, because polygon with 8 sides is called octagon.

3. True

4. False, as if sum of two angles is 90°, they are complementary.

5. False, as 1, 4, 10, 20, ... are tetrahedral numbers.

D.

1. Since $\angle A$ is four times $\angle B$, we can think of $\angle B$ as one part and $\angle A$ as four parts. This means the total parts = 4 parts (for $\angle A$) + 1 part (for $\angle B$) = 5 parts. We know that supplementary angles add up to 180°. Therefore, we divide 180° into 5 equal parts: One part = $180° \div 5 = 36°$
So, $\angle B = 36°$
$\angle A = 4 \times 36° = 144°$.

2. (*a*) 9, 15, 21, 27, 33, 39, 45 (Increase by = 6)
(*b*) 81, 72, 63, 54, 45, 36, 27 (Decrease by = 9)

3. In each hour, the hour hand turn through 30°. And moving from 1 to 10 covers 9 hours.
$\therefore$ Total angle covered by hour hand moving from 1 to 10 $= 9 \times 30° = 270°$.

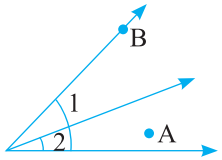
So, number of right angles $= \frac{270°}{90°} = 3$

$\therefore$ Hour hand make 3 right angles moving from 1 to 10.

4. Do it yourself.

5. $1 + 3 + 5 + 7 + 9 = 25 = 5 \times 5$
$1 + 3 + 5 + 7 + 9 + 11 = 36 = 6 \times 6$

6.



7. $50 = 7^2 + 1^2 = 5^2 + 5^2$
$65 = 8^2 + 1^2 = 7^2 + 4^2$

8. (*a*) $\angle PQR$ (*b*) $\angle MQR$ and $\angle PQN$
(*c*) $\angle NQM$

CHAPTER 3 : NUMBER PLAY

Let's Recall

1. Given number = 27859

TTh	Th	H	T	O
2	7	8	5	9

$9 \times 1 = 9$
$5 \times 10 = 50$
$8 \times 100 = 800$
$7 \times 1000 = 7000$
$2 \times 10000 = 20000$

Expanded form of 27859
$= 20000 + 7000 + 800 + 50 + 9$

2. The numbers are: 5,30,003; 5,29,999; 5,30,456; 5,29,896 and 5,29,870. Each of these numbers, when rounded to the nearest 10,000, becomes 5,30,000. (Answer may vary)

3. Total score of team India = 176
Runs scored by Kohli = 76
Extra runs = 7
So, the runs scored by other players
= Total team score – Kohli's score – Extra runs
$= 176 - 76 - 7 = 93$

$\therefore$ Total contribution of runs by other players is 93 runs.

4. Number of balls in one over of an inning = 6

∴ Total number of balls in 20 overs of an inning = 20 × 6 = 120

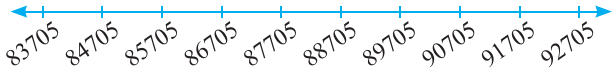
5. When reading the given number from forward or backword direction, it remains same. So, the given number is a palindromic number. The other numbers similar to 151 are 11, 121 and 99.

6. Fall of the next wickets at 106/4, 163/5, 174/6 and 176/7 on the number line is as follows:

Quick Check (Page 76)

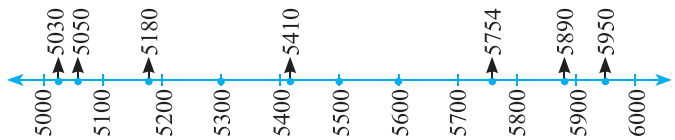
1. The numbers marked on the first number line are the consecutive numbers starting from 15077 till the number 15086.

The numbers marked on the second number line are counting numbers starting from 83,705 and each next number is obtained by adding 1000 to previous number.

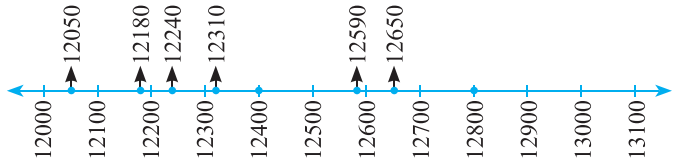


2. The positions of the given numbers on the given number lines are as follows:

(*a*)



(*b*)



Quick Check (Page 77)

Since, 22,429 > 22,327

Therefore, the area of Meghalaya is greater than the area of Manipur.

Think and Answer (Page 77)

1. A cell is called a supercell if the numbers in its adjacent cells are smaller than that cell.

The table with 4-digit numbers such that the supercells are the coloured cells is as follows:

4352	4452	3500	3683	3452	3600	6300	6071	1200	1251

Here, 4452 is greater than 4352 and 3500.

similarly, 3683 is greater than 3500 and 3452 and so on. Thus, 4452, 3683, 6300 and 1251 are the supercells. (Answer may vary)

2. Yes, the cell having the largest number in a table always be a supercell because if it is a corner cell, then the number adjacent to it will be smaller than it. If it is in between the two cells then both of its adjacent numbers would be smaller than it.

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

Maths Connect (Page 78)

1. The largest planet in our solar system is Jupiter whose diameter is 88,846 miles and the smallest planet is Mercury with diameter 3032 miles.

2. All the planets according to their diameters in ascending order are as follows:

Mercury (3032 miles) < Mars (4221 miles) < Venus (7521 miles) < Earth (7926 miles) < Neptune (30775 miles) < Uranus (31763 miles) < Saturn (74898 miles) < Jupiter (88846 miles)

3.

3032	7521	7926	4221	88846	74898	31763	30775

The diameters of planets have been arranged according to their distances from the sun in the above table.

Since, 3032, 4221 and 30775 are smaller numbers than their respective adjacent numbers in the above table.

Therefore, 3032, 4221 and 30775 are subcells.

And 7926 and 88846 are greater numbers than their respective adjacent numbers in the above table. So, these are supercells. Thus, there are 3 subcells and 2 supercells.

Practice Time 3A

1.

200	577	626	345	694	109	198

Here, 198, 626 and 694 are greater numbers than the numbers in their adjacent cells. So, they are supercells.

2.

6828	670	9435	3780	3708	7308	8000	5583	52

Here, 6828, 8000 and 9435 are greater numbers than the numbers in their adjacent cells. So, they are supercells.

3.

43	76	67	28	69	109	18

The numbers 18, 28 and 43 are smaller than the numbers in their adjacent cells. So, they are subcells.

4.

11	12	13	14	15	16	17	18	19	20

In the above table, only 11 is smaller than its adjacent cell and 20 is greater than its adjacent cell.

∴ There is only 1 supercell (coloured blue) and 1 subcell (coloured red). (Answer may vary)

5.

40,007	77,400	70,400	40,700
47,700	40,070	47,000	74,000
74,400	74,004	70,740	70,004
47,070	47,770	70,744	40,777

(Answer may vary)

6.

12	11	13	14	15	16	17	18	19	20

Second smallest number (a supercell) — Second largest number (not a subcell)

In the above table, second largest number is 19, but it is not a subcell as it is greater than its adjacent cell. Also, second smallest number is 12, which is a supercell as it is greater than its adjacent cell.

(Answer may vary)

7. No, it is not possible because the cell having the largest number in a table always be a supercell.

8.

2	16	13	3
11	5	8	10
7	9	12	6
14	4	1	15

Supercell

2	16	13	3
11	5	8	10
7	9	12	6
14	4	1	15

Subcell

9.

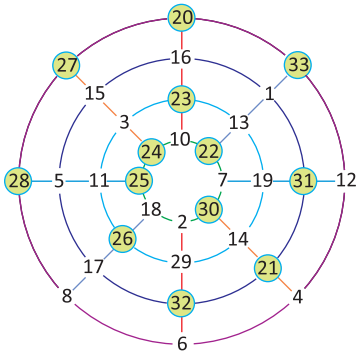
11	24	7	20	3
4	12	25	8	16
17	5	13	21	9
10	18	1	14	22
23	6	19	2	15

Supercell

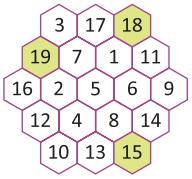
11	24	7	20	3
4	12	25	8	16
17	5	13	21	9
10	18	1	14	22
23	6	19	2	15

Subcell

10. Yes,



11.



Quick Check (Page 80)

1. Since, 1 + 2 + 4 + 5 = 12

So, 1245 is a 4-digit numbers whose digits add up to 12. Other such numbers are as follows: 1236, 3333, 7050, etc.

2. Smallest 5-digit number is 10,000. To make it smallest 5-digit number whose digits sum is 12, we will add to it the smallest number whose digits sum is 11. Since, 2 + 9 = 11

∴ 10,000 + 29 = 10029.

3. To find such number we need to maximize each digit from left to right of the largest 6-digit number so that the total sum remains 12.

So, the left most digit in the largest 6-digit number is 9, but since the sum of digits should be 12.

So, the sum of the remaining digits will be 12 – 9 = 3.

∴ The largest 6-digit number whose digits sum is 12 is 9,30,000.

Practice Time 3B

1. (*a*) There are total 10 times when digit 6 appears as unit digit and 10 times when digit 6 appears as tens digit from 1 to 100.

i.e., 06, 16, 26, ..., 56, ..., 96 and 60, ..., 65, ... 69.

∴ Total 20 times digit 6 appears among 1 to 100.

(*b*) From 501 to 599, numbers which have 6 as a digit are: 506, 516, 526, 536, 546, 556, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 576, 586, 596. Here, digit 6 occurs 20 times.

Similarly, from 701 to 999 number of times digit 6 occurs = 3 × 20 times = 60 times

And, the number of times digit 6 occurs from 600 to 699: 100 times + 20 times = 120 times

$\therefore$ Total number of times digit 6 occurs from 501-1000: (120 + 60 + 20) times = 200 times

2. (*a*) All the two digit numbers whose tens and units places add up to 15 are:

96 : 9 + 6 = 15, 87 : 8 + 7 = 15

78 : 7 + 8 = 15, 69 : 6 + 9 = 15

So, all the 2-digit numbers with digit sum 15 are 69, 78, 87 and 96.

(*b*) For any 3-digit number whose digits sum is 15, the sum of digits at hundred, tens and unit places should be 15. Five such numbers are,

159 : 1 + 5 + 9 = 15; 168 : 1 + 6 + 8 = 15;

258 = 2 + 5 + 8 = 15; 348 : 3 + 4 + 8 = 15;

555 : 5 + 5 + 5 = 15.

(*c*) For any 4-digit number whose digits sum is 15, the sum of digits at thousand, hundred, tens and units places should be 15.

So, the three such numbers are as follows:

1086 : 1 + 0 + 8 + 6 = 15

1239 : 1 + 2 + 3 + 9 = 15

2436 : 2 + 4 + 3 + 6 = 15

(*d*) For any 5-digit number whose digits sum is 15, the sum of digits at ten thousand, thousand, hundred, tens and units places should be 15 and the left digit should be smaller than or equal to the right digit in the number to make the digits in ascending order.

So, the four 5-digit numbers with the digits sum 15 in which digits are in ascending order are as follows: 12345, 22245, 13335, 22335

(*e*) Smallest 6-digit number is 100000. To make it smallest 6-digit odd number whose digits sum is 15, we will add to it the smallest number whose digits sum is 14 and it should be odd.

Since, 5 + 9 = 14 and 59 is an odd number.

$\therefore$ 100000 + 59 = 100059 is the smallest 6-digit odd number with the digits sum 15.

3. (*a*) 3-digit numbers whose any two digits are same are 232, 252, 335, 998, ….

Now 2 + 3 + 2 = 7; 2 + 5 + 2 = 9;

3 + 3 + 5 = 11; 9 + 9 + 8 = 26, ….

So, the digit sum of the 3-digit numbers whose any two digits are same can be any counting number less than 27.

(*b*) 3-digit numbers whose all three digits are same are 111, 222, 333, 444, 555, 666, 777, 888, 999.

The sum of the digits is as follows:

1 + 1 + 1 = 3; 2 + 2 + 2 = 6; 3 + 3 + 3 = 9;

4 + 4 + 4 = 12; 5 + 5 + 5 = 15, …

Thus, the digit sum of the 3-digit numbers whose all three digits are same is 3 times to any digit of that number.

(*c*) 3-digit numbers whose all three digits are consecutive are: 123, 234, 345, 456, 567, 678, 789. The sum of the digits are as follows:

1 + 2 + 3 = 6; 2 + 3 + 4 = 9; 3 + 4 + 5 = 12;

4 + 5 + 6 = 15; 5 + 6 + 7 = 18, ….

Thus, the digit sum of the 3-digit numbers whose all three digits are consecutive are multiples of 3.

(*d*) 3-digit numbers in which difference between two consecutive digits is 4 are: 404, 515, 595, ….

The sum of the digits are as follows:

4 + 0 + 4 = 8; 5 + 1 + 5 = 11; 5 + 9 + 5 = 19

4. To find the largest 5-digit number we need to maximize each digit of a 5-digit number from left to right while making sure that the digit sum remains 14.

The largest leftmost digit in a 5-digit number is 9, but since the digit sum is 14, so the second leftmost digit will be 14 – 9 = 5.

$\therefore$ The largest 5-digit number whose digit sum is 14 is 95000.

5. The numbers from 31 to 79 are 31, 32, 33, …, 79.

So, their digit sum is 3 + 1 = 4, 3 + 2 = 5, 3 + 3 = 6, ..., 7 + 9 = 16.

Thus, the digit sum of all numbers from 31 to 79 is the counting numbers from 4 to 16.

Quick Check (Page 83)

1. Given digits are 2, 5, 9, 1.

To find the largest 4-digit number using the given digits, arrange the digits in ascending order, i.e., 9521.

And to find the smallest 4-digit number using the given digits, arrange the digits in descending order, i.e., 1259.

Sum = 9521 + 1259 = 10780, which is a 5-digit number. Difference = 9521 – 1259 = 8262, which is a 4-digit number.

∴ Difference is a 4-digit number but sum is not.

2. Since 82,675 is the largest number in the given table so if we swap the first two digits of this number, then it will become a smaller number then we get the 4 supercells.

36,200	39,344	20,765
63,609	28,675	54,306
49,381	50,319	37,084

Practice Time 3C

1. Given number = 2345

All possible 4-digit numbers using the digits of number 2345 are:

2345, 2354, 2435, 2453, 2534, 2543, 3254, 3245, 3452, 3425, 3524, 3542, 4325, 4352, 4235, 4253, 4523, 4532, 5324, 5342, 5234, 5243, 5432, 5423.

2345	2354	2435	2453	2534	2543
3254	3245	3452	3425	3524	3542
4325	4352	4235	4253	4523	4532
5324	5342	5234	5243	5432	5423

From the above table, subcell = 2345 and supercell = 5342 and 5432.

But if we change the place of numbers in the above table, then the supercells and subcells may change.

2. Since the number is a 4-digit palindromic number, its thousands and unit digits will be the same, also the hundreds and tens digit will be the same. We are given that the tens digit is 3 more than thousands digit. Therefore, we will start with the smallest such numbers and will check their digits sum if it is 22.

1441, 2552, 3663, 4774, 5885, 6996

In these numbers the sum of the digits of 4774 is 22. Thus, the required number is 4774.

3. To find a palindromic number, first take a number and reverse it. Add the original number with the reversed number obtained. Check you get a palindromic number or not. If not, repeat the same process. Therefore, the examples of numbers that gives 2-step palindromes are as follows:

19 + 91 = 110

⇒ 110 + 011 = 121;

And 91 + 19 = 110

⇒ 110 + 011 = 121

Here, 121 is a palindromic number.

The examples of numbers that gives 3-step palindromes are as follows:

95 + 59 = 154

⇒ 154 + 451 = 605

⇒ 605 + 506 = 1111;

And 59 + 95 = 154

⇒ 154 + 451 = 605

⇒ 605 + 506 = 1111

Here, 1111 is a palindromic number.

The examples of numbers that gives 4-step palindromes are as follows:

96 + 69 = 165

⇒ 165 + 561 = 726

⇒ 726 + 627 = 1353

⇒ 1353 + 3531 = 4884;

And 69 + 96 = 165

⇒ 165 + 561 = 726

⇒ 726 + 627 = 1353

⇒ 1353 + 3531 = 4884.

Here, 4884 is a palindromic number.

4. The dates which are palindromic numbers are:

12/02/2021, 22/02/2022, 13/03/3031, 23/03/3032, 14/04/4041, 24/04/4042, 15/05/5051, 25/05/5052, 16/06/6061, 26/06/6062 (Answer may vary)

5. 3.52 +25.3 = 28.82

Since, 28.82 is palindromic number, so only one step is required to produce a palindromic number starting with 3.52.

6. Since, 69 + 96 = 165

165 + 561 = 726

726 + 627 = 1353

1353 + 3531 = 4884

Here, after four steps starting with 69, we get a palindrome.

Also, 78 + 87 = 165

165 + 561 = 726

726 + 627 = 1353

1353 + 3531 = 4884

Here, after four steps starting with 78, we get a palindrome.

Also, 79 + 97 = 176

176 + 671 = 847

847 + 748 = 1595

$$1595 + 5951 = 7546$$
$$7546 + 6457 = 14003$$
$$14003 + 30041 = 44044$$

Here, after six steps starting with 79, we get a palindromic number 440044.

Thus, there are many numbers less than 100 that requires at least four steps to become a palindrome.

7. Some palindromic squares are 676, 10201, 12321, 14641, 44944 and so on as they remain the same when its digits are reversed.

8. $11 \times 10 = 110$, which is a multiple of 11 but not a palindromic number. So, the smallest multiple of 11 which is not a palindromic number is 110.

9.
$$11 \times 11 = 121$$
$$111 \times 111 = 12321$$
$$1111 \times 1111 = 1234321$$
$$11111 \times 11111 = 123454321$$
$$111111 \times 111111 = 12345654321$$
$$1111111 \times 1111111 = 1234567654321$$
$$11111111 \times 11111111 = 123456787654321$$
$$111111111 \times 111111111 = 12345678987654321$$

10. 99 and 101 are palindromes and their difference is 2. Similarly, 999 and 1001 are palindromes with difference 2. So there are many palindromes less than 1000 with difference 2.

11. 1001 is a palindromic number which is larger than 1000.

12. $1 + 3 + 1 = 5$; $2 + 1 + 2 = 5$

So, 131 and 212 are palindromic numbers which has a digit sum 5.

13. If 56665 is the first palindrome in a series then the next palindromes to 56665 are 56765, 56865, 56965, 57075, 57175, 57275, 57375. Thus, the 8th palindrome in this series is 57375.

14. 90909 is a palindromic number which has digit sum $9 + 0 + 9 + 0 + 9 = 27$ and product of its digit is zero that is, $9 \times 0 \times 9 \times 0 \times 9 = 0$

15. Lets start with some 3 digit palindromic numbers whose some of the digits is 7, and then check their product of digits.

Number	Sum of digits	Product of Digits
151	7	5
232	7	12
313	7	9

Here, for 232 the sum of the digits is 7 and product of the digits is 12. So, the required number is 232.

16. The largest 5-digit number is 99999, which is a palindromic number and the smallest five-digit number is 10000. So, its next number is 10001, which is the smallest 5-digit palindromic number. Their sum = 10001 + 99999 = 110000 and difference = 99999 – 10001 = 89998

17. The dates whose digits read the same from left to right and from right to left are 31/01/1013, 21/02/2012, 11/02/2011; 01/02/2010 and so on.

18. Timings with patterns 5:55, 10:01 and 12:21 are palindromes because they read the same from left to right and from right to left. Some more possible times on a 12- hour clock of each of these types are 1:11, 2:22, 11:11 and 4:44 etc.

19. Some examples of product of two palindromes that gives a palindrome are: $121 \times 11 = 1331$; $33 \times 11 = 363$;

But this statement is not always true as $44 \times 55 = 2420$, which is not a palindrome.

Practice Time 3D

1. (*a*) In the given figure, the number written in blue and yellow box is 8, the number written in red box is 4, and the numbers written in green and maroon boxes are 2 and 16 respectively.

There are 5 blue box, 5 yellow box, 10 red box, 10 green box and 1 maroon box. Thus, the sum of the numbers given in the figure = $5 \times 8 + 5 \times 8 + 10 \times 4 + 10 \times 2 + 1 \times 16 = 156$

(*b*) The given figure represents a palindromic numbers in each line horizontally or vertically that are 1413141, 4254524, 1536351, 3461643, 1536351, 4254524 and 1413141. The sum of their digits are 15, 26, 24, 27, 24, 26, 15.

Thus, the total sum of numbers written in each box = 15 + 26 + 24 + 27 + 24 + 26 + 15 = 157

2. Make a square of 5 × 5, and put the numbers as follows:

80	80	80	80	80
80	40	40	40	80
80	40	20	40	80
80	40	40	40	80
80	80	80	80	80

Here, 16 yellow outer boxes contain number 80, internal 8 green boxes contain number 40 and 1 inner red colour box contains 20.

Thus, the sum of patterns = $16 \times 80 + 8 \times 40 + 1 \times 20$
$= 1280 + 320 + 20 = 1620$

Another pattern is

80	40	20	40	20	80
80	40	20	40	20	80
80	40	20	40	20	80
80	40	20	40	20	80
80	40	20	40	20	80
80	40	20	40	20	80

The number in first and last columns is 80, in second and fourth columns is 20 and in third and fifth columns is 40.

Thus, their sum = $12 \times 80 + 12 \times 40 + 12 \times 20$
$= 1680$

There are many pattern using the numbers 20, 40 and 80 whose sum lies between 1600 and 2000.

(Answer may vary)

3. Collatz conjecture for number 12 is 12, 6, 3, 10, 5, 16, 8, 4, 2, 1.

Collatz conjecture for number 19 is 19, 58, 29, 88, 44, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1. Collatz conjecture for number 23 is 23, 70, 35, 106, 53, 160, 80, 40, 20, 10, 5, 16, 8, 4, 2, 1.

Number 12 takes minimum steps while number 19 takes maximum steps to satisfy the conjecture.

4. To find the Kaprekar constant, we follow these steps:

- First arrange the digits in ascending order
- Then arrange the digits in descending order.
- Subtract the smaller number from the larger number.
- Repeat the process till we get the Kaprekar constant 6174.

(*a*) Let us proceed with number 1738 to reach the Kaprekar constant.

Step 1: 8731 – 1378 = 7353

Step 2: 7533 – 3357 = 4176

Step 3: 7641 – 1467 = 6174 (Kaprekar constant)

Thus, it takes 3 steps to reach the constant.

(*b*) Let us proceed with number 2964 to reach the Kaprekar constant.

Step 1: 9642 – 2469 = 7173

Step 2: 7731 – 1377 = 6354

Step 3: 6543 – 3456 = 3087

Step 4: 8730 – 0378 = 8352

Step 5: 8532 – 2358 = 6174 (Kaprekar constant)

Thus, it takes 5 steps to reach the constant.

(*c*) Let us proceed with the number 3214 to reach the Kaprekar constant.

Step 1: 4321 – 1234 = 3087

Step 2: 8730 – 0378 = 8352

Step 3: 8532 – 2358 = 6174 (Kaprekar constant)

Thus, it takes 3 steps to reach the constant.

(*d*) Let us proceed with the number 4075 to reach the Kaprekar constant.

Step 1: 7540 – 0457 = 7083

Step 2: 8730 – 0378 = 8352

Step 3: 8532 – 2358 = 6174 (Kaprekar constant)

Thus, it takes 3 steps to reach the constant.

5. Let us proceed with the 3-digit number 346 to reach the Kaprekar constant.

Step 1: 643 – 346 = 297

Step 2: 972 – 279 = 693

Step 3: 963 – 369 = 594

Step 4: 954 – 459 = 495 (Kaprekar constant)

It takes 4-steps to reach the constant.

6. The matchstick used in first figure = 7

The matchstick used in second figure = 12

The matchstick used in third figure = 17

Therefore, the number of matchstick is increasing by 5 in each figure.

Thus, the table shows the pattern as follows:

Pattern numbers	Number of matchsticks
1	7
2	12
3	17
4	22
5	27
6	32
7	37
8	42
9	47
10	52

7. A 4-digit palindromic number is 1221

Now, let us proceed with the number 1221 to reach the Kaprekar constant.

Step 1: 2211 – 1122 = 1089

Step 2: 9810 – 0189 = 9621

Step 3: 9621 – 1269 = 8352

Step 4: 8532 – 2358 = 6174 (Kaprekar constant)

Thus, it takes 4 steps to reach Kaprekar constant.

Practice Time 3E

1. (*a*) Since, 99,999 + 99,998 = 1,99,997 > 95,000

Thus, the given scenario is possible.

(*b*) Since, 99899 + 9999 = 109898, which is a 6-digit number.

∴ The given scenario is possible.

(*c*) Since, 100009 – 99 = 99910, which is a 5-digit number.

∴ The given scenario is possible.

(*d*) Since, 1001 – 999 = 2 < 100

∴ The given scenario is possible.

(*e*) Since, 65,500 – 1000 = 64,500

∴ The given scenario is possible.

2. (*a*) The number 2000 can be obtained by adding the given numbers as:

$2000 = 1400 + 200 + 200 + 200$

$= 1400 + 3 \times 200$

or we can write it as:

$2000 = 500 + 500 + 500 + 500$

$= 4 \times 500$

(*b*) The number 4800 can be obtained using the given numbers as:

$4800 = 1400 + 1400 + 1400 + 200 + 200 + 200$

$= 3 \times 1400 + 3 \times 200$

(*c*) The number 75,000 can be obtained using the given numbers as:

$75000 = 25000 + 25000 + 25000 = 3 \times 25000$

Or $75000 = 40000 + 25000 + 7000 + 6 \times 500$

(*d*) The number 36,800 can be obtained using the given numbers as:

$36800 = 25000 + 3 \times 1400 + 3 \times 200 + 7000$

(*e*) The number 51,500 can be obtained using the given numbers as:

$51500 = 25000 + 25000 + 500 + 500 + 500$

$= 2 \times 25000 + 3 \times 500$

Or $51500 = 40000 + 7000 + 3 \times 500 + 2 \times 1400 + 200$

Above written numbers can also be obtained by adding other given numbers.

3. (*a*) The number 12000 can be obtained by adding the given numbers as:

$12000 = 8000 + 2 \times 1500 + 700 + 300$

(*b*) The number 9600 can be obtained by adding and subtracting the given numbers as:

$9600 = 8000 + 2 \times 1500 – 2 \times 700$

(*c*) The number 5000 can be obtained by subtracting the given numbers as:

$5000 = 8000 – 1500 – 1500 = 8000 – 2 \times 1500$

(*d*) The number 68500 can be obtained by adding and subtracting the given numbers as:

$68500 = 50{,}000 + 8000 + 1500 + 700 + 300 + 8000$

or $68500 = 50{,}000 + 21{,}000 – 1500 – 700 – 300$

(*e*) The number 92500 can be obtained by adding and subtracting the given numbers as:

$92500 = 50{,}000 + 21000 \times 2 + 1500 – 700 – 300$

Above written numbers can also be obtained by adding and subtracting other given numbers.

4. Let us take a date of birth 19 Jan 2016, i.e. 19012016, then the smallest 8-digit number using these digits is 10011269 and the largest 8-digit number is 96211100.

Therefore, the sum and difference of these smallest 8-digit and largest 8-digit is as follows:

Sum = 10011269 + 96211100 = 106222369

Difference = 96211100 – 10011269 = 86199831

5. (*a*) Let us take the largest 5-digit number 99999.

Now, we add the largest 5-digit number with itself as: 99999 + 99999 = 199998, which is not a 10-digit number.

Thus, the sum of two 5-digit numbers can never be a 10-digit number.

(*b*) Let us take smallest 4-digit number i.e., 1000 and one 1-digit number i.e., 9 then after subtracting them, we get 1000 – 9 = 991, which is a 3-digit number.

Thus, the difference of 4-digit number and 1-digit number is a 3-digit number.

(*c*) Let us take the largest 3-digit number, i.e. 999 and largest 4-digit number, i.e. 9999, then their sum is 999 + 9999 = 10998, which is a 5-digit number.

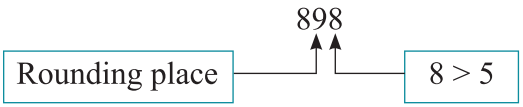
Thus, the sum of a 3-digit number and a 4-digit number is a 5-digit number.

(*d*) Let us take the smallest 6-digit number 100000 and the largest 4-digit number 9999, then their difference is 100000 – 9999 = 90001, which is not a 2-digit number.

Thus, the difference of a 6-digit number and a 4-digit number can never be a 2-digit number.

Practice Time 3F

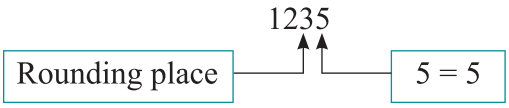
1. (*a*)



In the number 898, the digit at ones place is 8 (> 5). The next digit is 9 (at the tens place). So to round off the given number to the nearest tens place, we round up the tens digit by 1, i.e. 9 + 1 = 10 and the last digit becomes 0.

Therefore, 898 ≈ 900

(*b*)



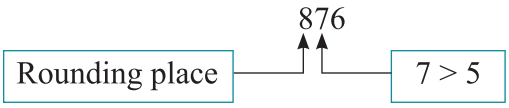
In the number 1235, the digit at ones place is 5. The next digit is 3 (at the tens place).

So to round off the given number to the nearest tens place, we round up the tens digit by 1, i.e. 3 + 1 = 4, and the last digit becomes 0.

Therefore, 1235 ≈ 1240.

(*c*) Similar to part (*b*).

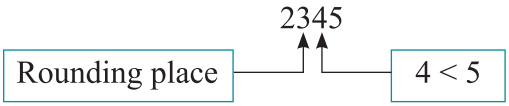
2. (*a*)



In the number 876, the digit at the tens place is 7 (> 5). The next digit is 8 (at hundreds place). Thus to round off the given number to the nearest hundred place, we round up the hundreds digit by 1 and the digits at tens and units place become 0.

Therefore, 876 ≈ 900

(*b*)

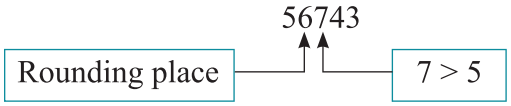


In the number 2345, the digit at the tens place is 4 (< 5). The next digit is 3 (at hundreds place). Thus to round off the given number to the nearest hundred place, we leave the hundreds digit as it is and the digits at tens and units place become 0.

Therefore, 2345 ≈ 2300

(*c*) Similar to part (*b*).

3. (*a*)



In the number 56743, the digit at the hundreds place is 7 (> 5). The next digit is 6 (at thousands place). Thus to round off the given number to the nearest thousands place, we round up the thousands digit by 1 and the digits at hundreds, tens and units place become 0.

Therefore, 56743 ≈ 57000.

(*b*) Similar to part (*a*) (*c*) Similar to part (*a*)

4. In the number 2345, the digit at the units place is 5(= 5). The next digit is 4 (at tens place). Thus to find the estimated value of the given number in 10s, we round up the tens digit by 1 and the digit at units place becomes 0.

Therefore, 2345 ≈ 2350.

Also, the digit at the tens place is 4 (< 5). The next digit is 3 (at hundred place). Thus to find the estimated value of the given number in 100s, we leave the hundreds digit as it is and the digits at tens and units place become 0.

Therefore, 2345 ≈ 2300.

Also, the digit at the hundreds place is 3 (< 5). The next digit is 2 (at thousand place).

Thus to find the estimated value of the given number in 1000s, we leave the thousands digit as it is and the digits at hundreds, tens and units place become 0.

Therefore, 2345 ≈ 2000.

Thus, the table for estimated values is as follows:

Number	2345	6458	6174
Estimated Value in 10s	2350	6460	6170
Estimated Value in 100s	2300	6500	6200
Estimated Value in 1000s	2000	6000	6000

5. (*a*) On an average, a person blinks their eyes 15-20 times per minute.

(*b*) On an average, a person blinks their eyes 900 to 1200 times in every hour.

(*c*) On an average, a person blinks their eyes 14,400 – 19,200 times a day.

(*d*) On an average, a person blinks their eyes 100,800 to 134,400 times a week.

(*e*) On an average, a person blinks their eyes 432,000 to 576,000 times a month.

(*f*) On an average, a person blinks their eyes 5.25 million to 7.1 million times a year.

6. Do it yourself.

7. Do it yourself

8. Do it yourself

9. Do it yourself

10. Distance travelled by Seema from Delhi to Patna = 861 km

Distance travelled by Seema from Patna to Kolkata = 462 km

In the number 861, the digit in the tens place is 6 (> 5) and the next digit is 8 (at hundred place).

Thus to round off the given number in 100 km, we round up the hundred digit by 1 and the digits at tens and units place become 0 and similarly in the number 462.

Therefore, 861 km ≈ 900 km and 462 km ≈ 500 km.

And, estimated distance from Delhi to Patna to nearest 100 km = 900 km

So, estimated distance from Patna to Kolkata to nearest 100 km = 500 km

∴ Estimated distance travelled by Seema from Kolkata to Delhi = estimated distance travelled from Delhi to Patna + estimated distance travelled from Patna to Kolkata = 900 km + 500 km = 1400 km

Chapter Assessment

A.

1. Option (*a*) is not a palindromic number, option (*d*) is 3-digit palindromic number made with two different digits.

Option (*b*) and (*c*) are the palindromic number using there different digits.

But option (*b*) is the smallest among the given option. Hence, the correct answer is option (*b*).

2. The smallest and largest 2-digit palindromes are 11 and 99 respectively.

∴ Sum = 11 + 99 = 110.

Thus, option (*d*) is correct.

3.

Given number	Step 1	Step 2	Step 3	Step 4	Step 5
4716	7641 – 1467 = 6174 (kaprekar constant)				
3214	4321 – 1234 = 3087	8730 – 0378 = 8352	8532 – 2358 = 6174 (kaprekar constant)		
9874	9874 – 4789 = 5085	8550 – 0558 = 7992	9972 – 2799 = 7173	7731 – 1377 = 6354	6543 – 3456 = 3087 And so on.
8067	8760 – 0678 = 8082	8820 – 0288 = 8532	8532 – 2358 = 6174 (kaprekar constant)		

Thus, using the number 4716, we get the Kaprekar constant in 1 step only.

Hence, the correct answer is option (*a*).

4.

5	15	20	410	85
458	357	612	111	65
54	6	99	750	478
715	745	100	951	10
854	147	555	66	521

There are 8 supercells in the above table.

Thus, the correct answer is option (*d*).

5. The number obtained by interchanging the digits at the tens and thousands place of the number 64891 is 69841. Difference = 69841 – 64891 = 4950

Hence, the correct answer is option (*a*).

6. In Collatz conjecture, if a number is odd we multiply it by 3 and add 1 to it and if a number is even we divide it by 2, so in option (*a*) after 11 there should be 34 and in option (*b*) after 5 there should be 16. So the correct option is (*c*).

Hence, the correct answer is option (*c*).

B.

1. If we add two smallest five digit numbers, i.e. 10000, we get 20000, a 5-digit number. But if we add two largest 5-digit numbers, i.e. 99999, we get 199998, a 6-digit number. Therefore, the sum of two 5-digit numbers can be a 5-digit number or 6-digit number.

2. Using the digits 2, 4, 5, 5-digit palindrome can be 25452 or 42524 or 52425 and so on. Thus, using the digits 2,4 and 5, there are many 5-digit palindromes possible.

3. Since $2 \times 40000 + 3 \times 2000 = 86000$
Therefore, $86000 - 85400 = 600$
So, $85400 = 2 \times 40000 + 3 \times 2000 - 600$

4. From 101 to 900 there are total 800 3-digit numbers and from 901 to 999 there are 99 3-digit numbers and 100 is also a 3-digit number. Thus there are total $800 + 99 + 1 = 900$ 3-digit numbers.

5. When we subtract 1 from 10,00,000 we get $10,00,000 - 1 = 999999$, which is the 6-digit largest number. Thus, by adding 1 to the greatest 6-digit number, we get ten lakhs.

C.

1. $7 \times 100000 + 3 \times 10000 + 2 \times 1000 + 2 \times 100 + 3 \times 10 + 4 = 700000 + 30000 + 2000 + 200 + 30 + 4 = 732234$

$\therefore$ 1 – (*d*)

2. Greatest 5-digit number is 99,999, which we get by subtracting 1 from 1,00,000. So 99,999 is the predecessor of 1,00,000.

$\therefore$ 2 – (*a*)

3. A 4-digit Kaprekar constant is 6174. So, 3 – (*e*)

4. An average person takes 17000 to 22000 breaths in a day.

$\therefore$ 4 – (*b*)

5. The greatest 4-digit number formed with the digits 1,4,7, and 6 is 7641.

$\therefore$ 5 – (*c*)

D.

1.

2340	3421	7344	6174
4981	3115	9124	9876
2465	1944	5000	6027
3165	4777	6413	8888

The numbers which are neither in supercells nor in subcells are 3421, 7344, 3115, 9124, 2465, 5000, 6027, 3165, 4777, 6413.

These numbers in ascending order are as follows:
$2465 < 3115 < 3165 < 3421 < 4777 < 5000 < 6027 < 6413 < 7344 < 9124$.

2. To make a palindrome, take a number and reverse it. Add the original number with the reverse number obtained. Check if you get a palindromic number. If not, repeat the process. Let us find the palindromes using the given numbers.

(*a*) $43 + 34 = 77$, which is a palindromic number.

(*b*) $29 + 92 = 121$, which is a palindromic number.

(*c*) $78 + 87 = 165$
$165 + 561 = 726$
$726 + 627 = 1353$
$1353 + 3531 = 4884$, which is a palindromic number.

(*d*) $67 + 76 = 143$
$143 + 341 = 484$, which is a palindromic number.

(*e*) $89 + 98 = 187$
$187 + 781 = 968$
$968 + 869 = 1837$
$1837 + 7381 = 9218$
$9218 + 8129 = 17347$
$17347 + 74371 = 91718$
$91718 + 81719 = 173437$
$173437 + 734371 = 907808$
$907808 + 808709 = 1716517$
$1716517 + 7156171 = 8872688$
$8872688 + 8862788 = 17735476$
$17735476 + 67453771 = 85189247$
$85189247 + 74298158 = 159487405$
$159487405 + 504784951 = 664272356$
$664272356 + 653272466 = 1317544822$
$1317544822 + 2284457131 = 3602001953$
$3602001953 + 3591002063 = 7193004016$
$7193004016 + 6104003917 = 13297007933$
$13297007933 + 33970079231 = 47267087164$
$47267087164 + 46178076274 = 93445163438$
$93445163438 + 83436154439 = 176881317877$
$176881317877 + 778713188671 = 955594506548$
$955594506548 + 845605495559 = 1801200002107$
$1801200002107 + 7012000021,081 = 8813200023188$, which is a palindromic number

3. The magic constant or magic sum is the sum of numbers in any row, column, or diagonal of the magic square.

$\therefore$ $363 + 424 + 646 + 747 + 757 + 767 + 787 + 393 = 4884$

The sum of rows, columns and diagonals = 4884 (since it is a magic square with magic constant 4884). Also, 4884 is a palindromic number.

So, the magical constant is a palindromic number.

4. Since, 111113 × 111113 = 12346098769 and 311111 × 311111 = 96790054321

Thus, the given pattern fails here.

And we cannot find a series of squares in which the given pattern continues, because the pattern discontinues after some steps. Let us take another similar series which continue the pattern for some steps and then fails.

12 × 12 = 144

112 × 112 = 12544

1112 × 1112 = 1236544

11112 ×11112 = 123476544

.

.

.

111111112 × 111111112 = 12345679209876544

And 21 × 21 = 441

211 × 211 = 44521

2111 × 2111 = 4456321

21111 × 21111 = 445674321

.

.

.

211111111 × 211111111

= 44,56,79,01,18,76,54,321

5. In the given pattern, each number is a palindrome. Also, the sum of any three palindromic number is same as sum of any another three palindromic number. Some other such patterns are:

(*i*) 1001 + 5665 + 4774 = 3443 + 2002 + 5995

(*ii*) 181 + 727 + 757 = 353 + 383 + 929

6. Let us proceed to reach the Kaprekar constant taking the given number 3444 as follows:

Step 1: 4443 – 3444 = 0999

Step 2: 9990 – 0999 = 8991

Step 3: 9981 – 1899 = 8082

Step 4: 8820 – 0288 = 8532

Step 5: 8532 – 2358 = 6174 (Kaprekar constant)

Thus, we can find a Kaprekar constant for 4-digit number 3444 and it takes 5 steps to reach the constant.

But we cannot find the Kaprekar constant for the number 2222 because all digits are same and after subtracting the lowest number 2222 from the highest number 2222, we get 0.

7. In Collatz conjecture, choose a number. If number is odd, multiply it by 3 and add 1 to it and if number is even divide it by 2, repeat the process till you get the resultant 4 - 2 - 1.

Let us find the Collatz conjecture for the number 29:

29 → 88 → 44 → 22 → 11 → 34 → 17 → 52 → 26 → 13 → 40 → 20 → 10 → 5 → 16 → 8 → 4 → 2 → 1.

Mental Maths (Page 101)

1. The smallest 3-digit number for digit sum 14 = 149

The greatest 3-digit number for digit sum 14 = 950

2. A four numbers in a table is as follows:

3333	2222	4445	4500

In the above table, second smallest number is 3333, its adjacent cell number is smaller than 3333. So, the cell 3333 becomes the supercell.

3. The 2-digit palindromic numbers are 11, 22, 33, 44, 55, 66, 77, 88, 99. So, the total 2-digit palindromic numbers are 9.

4. Yes, let us take two 4-digit number 4005 and 3950. Then, the difference is 4005 – 3950 = 55, which is a 2-digit palindromic number.

5. Yes, we can write 86400 as an addition using the numbers 30000, 3000 and 300 as follows:

86400 = 30000 + 30000 + 3000 + 3000 + 3000 + 3000 + 3000 + 3000 + 3000 + 3000 + 300 + 300 + 300 + 300 + 300 + 300 + 300 + 300

= 2 × 30000 + 8 × 3000 + 8 × 300

Brain Sizzlers (Page 102)

1. In the given diagram, we can see that every digit end at 1 which seems like a collatz conjecture. So let us check one of the series whether it is Collatz conjecture or not.

Let's start with 21, then we get

21 → 64 → 32 → 16 → 8 → 4 → 2 → 1

Thus, we get a Collatz conjecture.

2. The number of steps to reach 1 for the number 3 using Collatz conjecture is as follows:
$3 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$
Thus, it takes 7 actual steps to reach 1.

3. The number of steps to reach 1 for the number 18 using Collatz conjecture is as follows:
$18 \rightarrow 9 \rightarrow 28 \rightarrow 14 \rightarrow 7 \rightarrow 22 \rightarrow 11 \rightarrow 34 \rightarrow 17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.
Thus, Nikhil takes 20 actual steps to reach 1.

4. Let Sunita starts with number 13 (i.e. between 10 and 20) and Lalita starts with number 21 (i.e. between 20 and 30), the steps to reach 1 using Collatz conjecture are as follows:
$13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$
And $21 \rightarrow 64 \rightarrow 32 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$
So, Lalita takes less number of steps to reach 1.
Now, if Sunita takes the number 17 and Lalita takes the number 23, then the Collatz conjecture is as follows.
$23 \rightarrow 70 \rightarrow 35 \rightarrow 106 \rightarrow 53 \rightarrow 160 \rightarrow 80 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$
And $17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.
So, Sunita takes 12 steps, while Lalita takes 15 steps to reach 1.
Thus, Sunita takes less number of steps to reach one.

$\therefore$ It will depend on the number they choose that who will take less steps to reach 1.

CHAPTER 4 : DATA HANDLING AND PRESENTATION

Let's Recall

The data of the given blood groups is given in the following table:

Blood Group	O^+	O^-	A^+	A^-	B^+	B^-	AB^+	AB^-
Number of Students	11	8	10	10	7	8	1	5

1. The maximum number of students have blood group O^+.
2. The minimum number of students have blood group AB^+.
3. From the table, we can see that 8 students have blood group B^-.

Maths Connect (Page 105)

The Complete table which shows the performance of top five countries in Paris Olympics is as follows:

Countries	Medals			To
	Gold	Silver	Bronze	
United States of America	40	44	42	126
People's Republic of China	40	27	24	91
Japan	20	12	13	45
Australia	18	19	16	53
France	16	26	22	64

1. Japan and Australia won less than 20 bronze medals, i.e. 13 and 16 respectively.
2. The least number of silver medal was won by Japan i.e., 12.
3. France won the total 64 medals which is the third highest medals.
4. Gold medal won by USA = 40
Gold medal won by China = 40
Gold medal won by Japan = 20
$\therefore$ Total gold medals of top 3 countries = 40 + 40 + 20
= 100

Practice Time 4A

1. (*a*) The table for the given collected data using tally marks is as follows:

Ice cream flavours	Tally marks	Number of children (frequency)
Vanilla	𝍸 |	6
Chocolate	𝍸 𝍸	9
Strawberry	𝍸	4
Mango	𝍸 |	6
Total		**25**

(*b*) Most number of children prefer Chocolate flavored ice cream.

2. The frequency distribution table for the given data is as follows:

Observations (Shoe size)	Tally marks	Number of children (frequency)
4	𝍸 ||	7
5	𝍸 |||	8
6	||||	4
7	𝍸 ||	7
8	||||	4
Total		**30**

From the above table, the most frequent shoe size is 5.

3. The frequency distribution table using tally marks for the given data is as follows:

Family size	Tally marks	Number of families (frequency)
1	𝍸 |	6
2	𝍸 ||||	9
3	𝍸	5
4	|||	3
6	||	2
Total		**25**

(*a*) The smallest family size is 1.

(*b*) 6 families have only 1 member in their family. Thus, the families of smallest size are 6.

(*c*) Since, 9 families have family size 2. So, the most common family size is 2.

4. The frequency table of the marks of Mathematics test for the given data is as follows:

Marks	Tally marks	Number of students (frequency)
60	𝍸	5
65	|||	3
70	𝍸 |	6
80	𝍸	5
85	||	2
90	|||	3
100	|	1
Total		**25**

(*a*) The maximum marks obtained by the students is 100.

(*b*) 5 students scored 60 marks, 3 students scored 65 marks and 6 students scored 70 marks.
Thus, total number of students scored less than 75 marks = Number of students scored 60 marks + Number of students scored 65 marks + Number of students scored 70 marks
= (5 + 3 + 6) students = 14 students

(*c*) 5 students scored 80 marks, 2 students scored 85 marks, 3 students scored 90 marks and 1 student scored 100 marks.
∴ Total number of students scored 80 marks and above = Students scored (80 marks + 85 marks + 90 marks + 100 marks)
= (5 + 2 + 3 + 1) students = 11 students

(*d*) Total number of students = (5 + 3 + 6 + 5 + 2 + 3 + 1) students = 25 students

Practice Time 4B

1. (*a*) Since, 1  = 20 stamps and Shahid has total 5  .

∴ Total number of stamps of Shahid
= 5 × 20 stamps = 100 stamps

(*b*) From the pictograph, we can see that Jaya has maximum number of stamps as she has maximum  .

(*c*) Total number of  collected by 5 friends = 32

∴ Total number of stamps collected by 5 friends = 32 × 20 stamps = 640 stamps.

2. (*a*) From the pictograph, we can see that the least number of cars were produced in 2021, because there are only 2  and 1  .

Also since, 1  = 4000 cars and 1  = 2000 cars.

Therefore, total cars in 2021 = 2 × 4000 cars + 1 × 2000 cars = 10,000 cars

(*b*) In 2023, the number of  is maximum, so the most cars produced in 2023.

(*c*) In 2024, there are total 6  and since, 1  = 4000 cars.

∴ Total cars produced in 2024 = 6 × 4000 cars = 24000 cars

(*d*) From 2021 to 2024, total number of cars produced = 22  + 2 

= 22 × 4000 cars + 2 × 2000 cars = 92000 cars.

3. (*a*) From the pictograph, Joseph has maximum number of baskets as he has 9  and 1 

(*b*) Namita sold 4  and 1  .

Since, 1  = 100 fruit baskets and 1  = 50 fruit baskets.

∴ Total baskets sold by Namita = 4 × 100 fruit baskets + 1 × 50 fruit baskets = 450 fruit baskets.

(*c*) Fruit baskets sold by Ranjit = 7 

= 7 × 100 fruit baskets = 700 fruit baskets

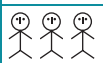
Fruit baskets sold by Joseph = 9  + 1 

= 9 × 100 fruit baskets + 1 × 50 fruit baskets = 950 fruit baskets.

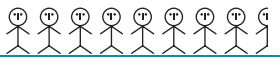
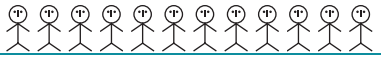
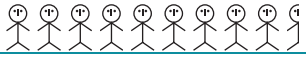
Fruit basket sold by Rahim = 8  = 8 × 100 fruit baskets = 800 fruit baskets.

Thus, Ranjit, Joseph and Rahim sold 600 or more fruit baskets in the particular session.

4. The pictograph for the given students in a school is as follows:

Activity	Number of Students
Playing	
Reading storybooks	
Watching TV	
Listening music	
Painting	
Key: 1  = 10 students, 1  = 5 students	

5. The pictograph to represent the given employee data is as follows:

Years	Number of employees
2016	
2017	
2018	
2019	
2020	
Key: 1  = 50 employees and 1  = 25 employees	

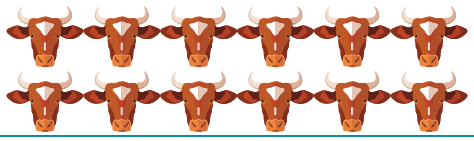
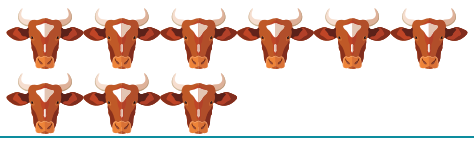
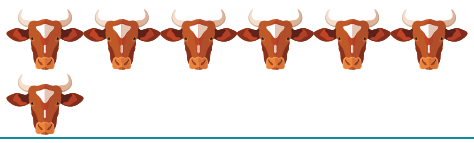
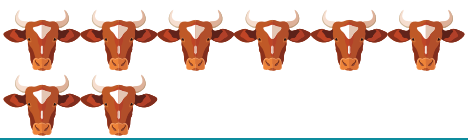
(*a*) From the given data, we can see that 2019 has the maximum number of employees i.e., 650.and to represent this number, we used 13 symbols of  .

(*b*) Total symbols used to represent the total number of employees from 2016 to 2020

= Symbol in 2016 + Symbol in 2017 + Symbol in 2018 + Symbol in 2019 + Symbol in 2020

= 53 full symbols + 2 half symbols

6. The pictograph represents the total number of animals of six villages where 1  = 10 animals is as follows:

Village	Number of animals
A	
B	
C	
D	
E	
F	
Key: 1  = 10 animals	

(*a*) Since village C has 70 animals and 1  = 10 animals .

So, total symbols used to represent animals in village $C = \frac{70}{10} = 7$.

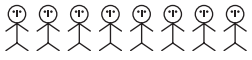
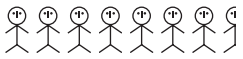
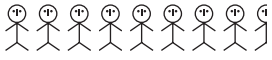
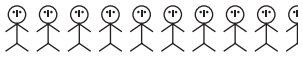
(*b*) Village B has 90 animals while village C has 70 animals.

Thus, Village B has more animals than village C.

7. The pictograph about the colours of scooties riding in a street on a particular day is as follows:

Colour of scooty	Number of employees
Black	
White	
Red	
Pink	
Green	
Key: 1  = 4 scooties	

8. (*a*) The pictograph that represents the number of students in a school with one symbol = 100 students is as follows:

Years	Number of students
2014	
2016	
2018	
2020	
2022	
2024	
Key: 1  = 100 students and 1  = 50 students	

(*i*) Total number of students in the year 2022 = 850

Since, 1  = 100 students,

Therefore, total symbols that represent the number of students in the year $2022 = \frac{850}{100} = 8\frac{1}{2}$

(*ii*) Total number of students in the year 2016 = 800

Since, 1  = 100 students,

Therefore, total symbols that represent the number of students in the year $2016 = \frac{800}{100} = 8$

(*b*)

Years	Number of students
2014	
2016	
2018	
2020	
2022	
2024	
Key: 1  = 50 students	

The second pictograph seems more informative as it is more precise to the actual number of students.

Think and Answer (Page 120)

1. Since, LPG used in 40 houses. Thus, the maximum houses used LPG as a fuel.

2. Since, Kerosene used in 5 houses only. Thus, the minimum houses used Kerosene as a fuel.

3. The coal is used by 10 houses as a fuel given in a bar graph.

4. If the total number of houses in the town is 1 lakh, then 100 houses = 1 lakh

$\Rightarrow$ 1 houses = 1000

Now in the given bar graph, the number of houses using electricity as a fuel = 25

Then, the number of houses using electricity as a fuel = 25 × 1000 = 25000.

Practice Time 4C

1. (*a*) From the bar graph, the maximum number of tickets sold = 100, which is sold for Delhi.

(*b*) The minimum number of tickets sold for Chennai i.e., 30.

(*c*) From the bar graph, Tickets sold for Patna = 70,

Tickets sold for Jaipur = 50,

Tickets sold for Delhi = 100,

Tickets sold for Guwahati = 40

Thus, for Patna, Jaipur, Delhi and Guwahati the number of tickets sold is more than 30 tickets.

(*d*) Total number of tickets sold for Delhi = 100,
Total number of tickets sold for Jaipur = 50
Total number of tickets sold for Patna = 70,
Total number of tickets sold for Chennai = 30
∴ Total number of tickets sold for Delhi and Jaipur = 100 + 50 = 150
∴ Total number of tickets sold for Patna and Chennai = 70 + 30 = 100
So, Difference = 150 – 100 = 50
Thus, number of tickets sold for Delhi and Jaipur together exceeds the total number of tickets sold for Patna and Chennai by 50.

(*e*) Total number of tickets sold = Ticket sold for Delhi + Ticket sold for Jaipur + Ticket sold for Patna + Ticket sold for Chennai + Ticket sold for Guwahati = 100 + 50 + 70 + 30 + 40 = 290

2. (*a*) From the bar graph, total number of students with favourite free-time dancing = 175,
Total number of students with favourite free-time drawing = 150,
Total number of students with favourite free-time playing sports = 125,
Total number of students with favourite free-time watching TV = 125
Total number of students with favourite free-time playing indoor games = 75
Total number of students with favourite free-time reading books = 50
Thus, Total students who were surveyed = 175 + 150 + 125 + 125 + 75 + 50 = 700

(*b*) From the bar graph, total number of students preferred playing indoor games = 75

(*c*) Only 50 students prefer reading books, so the least number of students prefer reading book.

(*d*) Total students surveyed = 700
Number of students like to play games = playing sports + playing indoor games = 125 + 75 = 200
∴ Number of students who do not like to play any games = 700 – 200 = 500

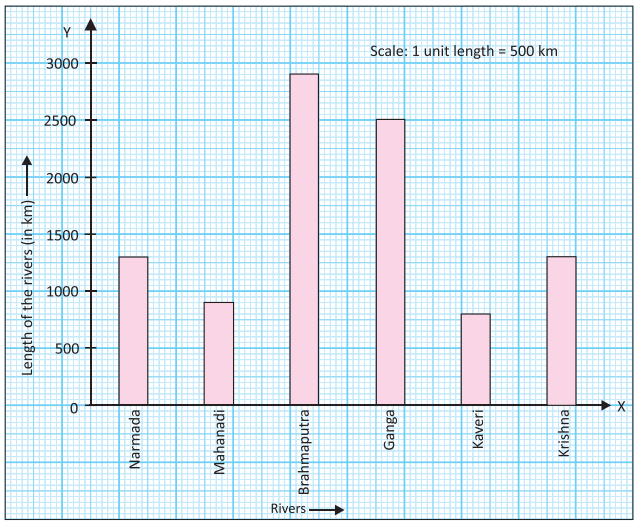
3. (*a*) From the bargraph the longest length of National highway = 1500 km, which is the length of NH2.
Thus, the longest National Highway is NH2.

(*b*) The shortest length of National highway = 400 km, which is the length of NH10.
Thus, the shortest National Highway is NH10.

(*c*) From the bar graph, the length of National highway 9 is 1400 km.

(*d*) The length of National highway 10 = 400 km and the length of National highway 3 = 1200 km.
Since, 1200 = 3 × 400. Thus, the length of NH 3 is three time the length of NH10.

4. The bar graph that represents the length of some major rivers of India is as follows:



5. The bar graph that represents the number of different types of plants using the given data is as follows:

(*a*) From the graph, the maximum number of plants is 95, which are trees.
Thus, trees are maximum in number in the garden.

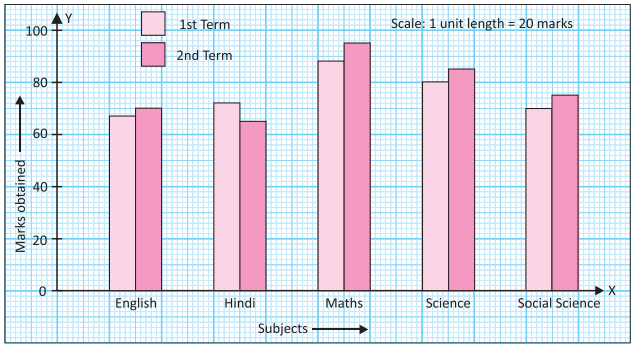
(*b*) The minimum number of plants is 20, which is creeper. Thus, creepers are minimum in number in the garden.

6. (*a*) In double bar graph, the *x*-axis represents the students of the class and the *y*-axis represents the marks of quarterly test and half yearly test. Thus, the data of the double bar graph in table form is as follows:

Students	Marks obtained in quarterly test	Marks obtained in half yearly test
Ashish	10	15
Arun	15	18
Kavish	13	16
Maya	20	22
Rita	8	15

(*b*) Yes, the new teaching technique should be continued because the performance of all the listed students are improving.

7. The double bar graph for the given data with scale: 1 unit = 20 marks is as follows:



(*a*) In English, improved marks of student = 2nd term – 1st term = 70 – 67 = 3

In Maths, improved marks of student = 2nd term – 1st term = 95 – 88 = 7

In Science, improved marks of student = 2nd term – 1st term = 85 – 80 = 5

In Social Science, improved marks of student = 2nd term – 1st term = 75 – 70 = 5. Thus, in Maths, the student has improved the most.

(*b*) From the above bar graph, the improvement of marks in English is 3, which is the least. Thus, the student has improved the least in English.

(*c*) Yes. In Hindi, the marks of 2nd term is less than the 1st term. Thus, the performance has deteriorated in Hindi.

Mental Maths (Page 129)

1. From the bar graph, the number of ants = 80. Thus, Reena saw 80 ants in the park.

2. Total number of butterflies = 10, which is the least in the given bar graph. Thus, the least seen insects were butterflies.

3. From the bar graph, the grasshoppers were seen by Reena = 14

4. Total number of insects in the park = Number of (Butterflies + Grasshoppers + Ladybugs + Dragonflies + Ants + Bees) = 10 + 14 + 30 + 40 + 80 + 38 = 212

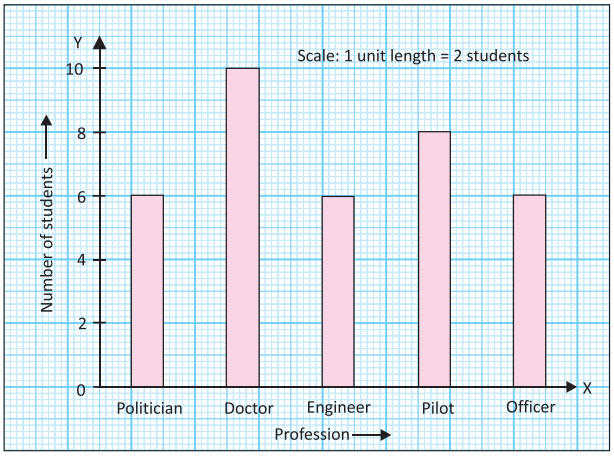
Brain Sizzlers (Page 130)

The representation of the given data using tally marks is as follows:

Profession	Tally marks	Frequency (Number of students)
Politician	𝍸 I	6
Doctor	𝍸 𝍸	10
Engineer	𝍸 I	6
Pilot	𝍸 III	8
Officer	𝍸 I	6
Total		**36**

Now the pictograph and bar graph for the above frequency table is as follows:

Profession	Number of students
Politician	☺☺☺☺☺☺
Doctor	☺☺☺☺☺☺☺☺☺☺
Engineer	☺☺☺☺☺☺
Pilot	☺☺☺☺☺☺☺☺
Officer	☺☺☺☺☺☺
Keys: 1 ☺ = 1 student	



Chapter Assessment

A.

1. Using tally marks, number 8 can be written as 𝍸 |||. Hence, the correct answer is option (*d*).

2. The marks more than or equal to 5 are 5, 6, 7, 8, 9 and 10 and the number of students who got more than or equal to 5 marks are 17.

Hence, the correct answer is option (*d*).

3. The number of students who scored marks less than 4 are 10.

Hence, the correct answer is option (*d*).

4. Since, 1  = 20 flowers

Therefore,  = 3 × 20 flowers = 60 flowers.

Hence, the correct answer is option (*c*).

5. Since, 1  = 30 shells

Then, 3.5 × 1  = 3.5 × 30 shells = 105 shells

That is,  = 105 shells.

Hence, the correct answer is option (*d*).

B.

1. Data obtained in its original form is called **raw** data.

2. The number of times a particular observation occurs in a data is called **frequency** of the observation.

3. An observation occurring 9 times in a data is represented as 𝍸 ||| using tally marks.

4. Arranging the data in the form of table using tally marks is called **frequency distribution table**.

5. A representation of data using pictures or symbols of objects is called a **pictograph**.

C.

1. Since, Pictographs and bar graphs are pictorial representations of the numerical data.

Thus, the given statement is **true**.

2. There are two types of bar graph, one is drawn horizontally and one is drawn vertically. So, we can draw the bars of uniform width vertically or horizontally. Thus, this statement is **false**.

3. Using tally marks, observation which occurs five times in a data is represented as 𝍸. Thus, this statement is **false**.

4. In a bar graph, each bar represents only one value of its corresponding frequency. Thus, this statement is true.

5. Using a bar graph, a more practical approach might be to use a larger scale.

For instance, 1unit length could represent 100, 1000, or even 10000 people, depending on the range of the populations, this method would make the graph more manageable and easier to interpret, especially if the populations are large.

But if we take 1 unit length to represent one person then for the large data, the graph become so large and critical and difficult to draw.

So, this statement is false.

D.

1. The tabular form of the given data using tally marks is as follows:

Marks obtained	Tally marks	Number of students
10	|	1
15	||	2
19	𝍸	5
20	||||	4
24	𝍸 |	6
25	𝍸 |	6
30	𝍸 |	6
Total		**30**

(*a*) From the above table, the number of students who scored more marks than 25 is 6.

(*b*) Since passing marks is 20. Thus, the students who got equal or more marks than 20 will pass the exam.

∴ Number of students who passed the test = students who scored 20 marks + students who scored 24 marks + students who scored 25 marks + students who scored 30 marks = (4 + 6 + 6 + 6) students = 22 students

(*c*) The marks scored by students between 15 and 30 are 19, 20, 24 and 25.

Thus, the total number of students who scored marks between 15 and 30 = (5 + 4 + 6 + 6) students = 21 students

2. Pictograph to represent the given data is as follows:

Modes of transport	Number of students
Car	
Cycle	
Private Van	
School Bus	
Walking	

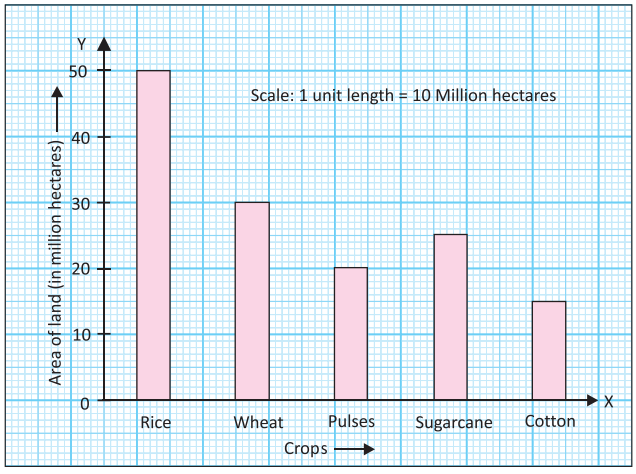
Key: 1 = 50 students and 1 = 25 students

3. (*a*) From the given pictograph, area of Koria district = 6 , and 1 = 1000 sq. km
Thus, the area of Koria district = 6 × 1000 sq. km
= 6000 sq. km

(*b*) From the pictograph, the area of both Raigarh and Jashpur = 6 and 1 .
Thus, both Raigarh and Jashpur district have same area.

(*c*) Since, 1 = 1000 sq. km
Then, 5 = 5 × 1000 sq. km = 5000 sq. km
So, if any district have more than 5 , then that district have an area more than 5000 sq. km.
From the pictograph, we can see that the district which have an area more than 5000 sq. km are Raigarh, Rajnandgaon, Koria and Jashpur. Thus, 4 district have an area more than 5000 sq. km

4. To draw the bar graph of the given area of land at the particular region, let us choose the scale: 1unit length = 10 million hectares, the bar graph is as follows:

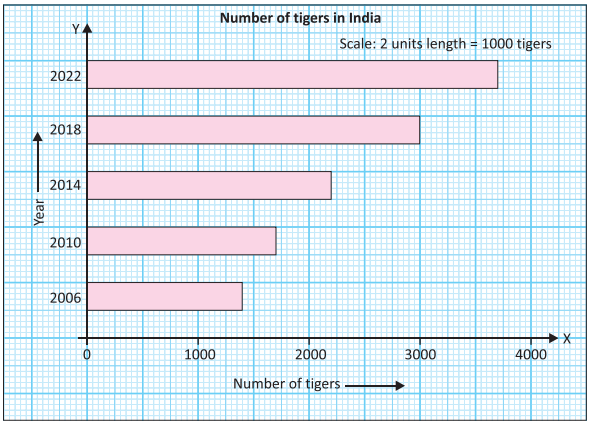


5. From the bar graph, the number of motorcycle sold by dealer I in first 6 months = 8 + 12 + 6 + 3 + 6 + 18 = 53.
And the number of motorcycle sold by dealer II in first 6 months = 9 + 16 + 10 + 5 + 12 + 4 = 56
Difference between the number of motorcycle sold by dealer I and dealer II in first 6 months = 56 – 53 = 3. Thus dealer II sold 3 more bikes than dealer I.
Also, Cost of 1 motorcycle = ₹55,000
Thus, Cost of 3 motorcycle = 3 × ₹55,000
= ₹1,65,000
Hence, Dealer II get ₹1,65,000 more than dealer I.

6. (*a*) In the year 2006, the number of tigers in the table is 1411, and its estimated value is 1400, but the given bar graph shows the number of tigers in 2006 is 700.
Similarly, other mistakes are listed in the table below:

Years	Estimated value of tigers to the nearest hundred	Number of tigers given in bar graph
2006	1400	700
2010	1700	1500
2014	2200	2750
2018	3000	2250
2022	3700	3700

So, we will draw the correct bar graph using the estimated value of tigers.



(*b*) Growth from 2006 to 2010 = 1706 – 1411 = 295
Growth from 2010 to 2014 = 2226 – 1706 = 520
Growth from 2014 to 2018 = 2967 – 2226 = 741
Growth from 2018 to 2022 = 3682 – 2967 = 715
Thus, the maximum growth in the number of tigers is in 2014-2018.

(*c*) Population of tigers in 2006 = 1411
Population of tigers in 2022 = 3682
Since, the population of tigers in 2022 is approximately more than 2 and half times the population of tigers in 2006. Thus, the population is increased by approximately 2 and half times from 2006 to 2022.

7. Base price of October month = 7195 (i.e. on 15 October 2024)
Difference between the price of 15 October and 11 October = 7195 – 7195 = 0
Difference between the price of 15 October and 14 October = 7220 – 7195 = 25
Difference between the price of 15 October and 16 October = 7240 – 7195 = 45
Difference between the price of 15 October and 17 October = 7260 – 7195 = 65
Difference between the price of 15 October and 19 October = 7380 – 7195 = 185
So, the maximum and the minimum difference in prices are 185 and 0 respectively.
Thus, on 19 October 2024, the variation from the base price is maximum and on 11 October 2024, the variation from the base price is minimum.

Unit Test – 2

A.

1. Using the tally marks, number nine is represented as 𝍸 ||||.
Hence, the correct answer is option (*c*).

2. Marks more than or equal to 16 are 16, 17, 18, 19 and 20. Thus, the number of students who obtained marks from 16 to 20 is 10.
Hence, the correct answer is option (*a*).

3. A palindromic number remains same when we read it from backward or forward direction.
Since, number 828, 727 and 121 are same from backward and forward direction, but 984 is not same. Thus, 984 is not a palindromic number.
Hence, the correct answer is option (*d*).

4. The smallest number using the digits 4,9,3,2 and 1 is 12349, which is a 5-digit number. To make it smallest 8-digit number, we write the smallest digit i.e., 1 three times to the left side of the number 12349, we get 11112349.
Hence, the correct answer is option (*a*).

5. The greatest 6-digit number is 999999.
Hence, the correct answer is option (*c*).

6. The graphical representation of a given data using rectangular bars of equal width and varying heights is called bar graph.
Hence, the correct answer is option (*b*).

7. Since, weather reports for different cities telecast on television contain information arranged and organized on the basis of some definite plan. Thus, it is an example of secondary data.
Hence, the correct answer is option (*d*).

8. Since 3 + 4 + 6 + 2 = 15, so 3462 is the number whose digits add up to 15.
Hence, the correct answer is option (*d*).

9. In the number 548, the unit digit is 8 (> 5). So to round off the given number to the nearest tens place, we round up the tens place by 1, i.e., 4 become 5 and the digit at unit place becomes 0.
$\therefore$ 548 ≈ 550
Hence, the correct answer is option (*b*).

10. First we round off the numbers 968 and 377 to nearest hundred. In number 968, the tens digit is 6 (> 5) and in number 377, the tens digit is 7 (> 5), thus to round off the digits to nearest hundred, round up each number by 1, i.e., 9 become 10 and 3 become 4 and the digits at tens and ones place become 0.
$\therefore$ 968 ≈ 1000 and 377 ≈ 400.
Now, 968 × 377 ≈ 1000 × 400 = 400000
Hence, the correct answer is option (*d*).

B.

1. Since 99, 99,999 + 1 = 1,00,00,000.
Thus, by adding 1 to the greatest **seven**-digit number, we get 1 crore.

2. If we interchange the digits at the tens and hundreds place of the number 72984, we get 72894.
$\therefore$ Difference = 72984 – 72894 = **90**.

3. The number of times a particular observation occurs in a data is called the **frequency** of that observation.

4. A pictograph is the **pictorial** representation of data.

5. Since, the date collected from the survey is unmodified, so it is called **primary** data.

C.

1. Since, a palindromic number remains same when it reads from backward or forward direction. So, the number 629 is not a palindromic number. Thus, the given statement is **true**.

2. In the number 3726, the digit at tens place is 2 (< 5). So, to round off it to the nearest hundreds place, we leave the hundreds place digit as it is and the digits at tens and units place become 0.

∴ 3726 ≈ 3700. Thus, the given statement is **true**.

3. As the frequency increases, the height of the bar increases and vice-versa. So, the height of each bar cannot be same. Thus, the given statement is **false**.

4. In a bar graph, bars of uniform width can be drawn horizontally or vertically. Thus, the given statement is **false**.

5. The smallest 7-digit number = 10,00,000

So, 10,00,000 – 1 = 9,99,999, which is the largest 6-digit number. Thus, the given statement is **true**.

D.

1. The pictograph that represents the various mode of transport used by 1000 students is as follows:

Models of transport	Number of students
Cycle	
Private van	
School Bus	
Car	

Key: 1 = 40 students, 1 = 20 students and 1 = 10 students

2. Let us take two 5-digit numbers 99999 and 87653.

∴ Difference = 99999 – 87653 = 12346, which is not a 3-digit number.

Thus, we do not always get a 3-digt number when a 5-digit number is subtracted from another 5-digit number.

3. (*a*) In the number 75, the unit digit is 5 (=5). Thus, to round off the given number to nearest 10, we round up the tens digit by 1 and the digit at ones place becomes 0.

∴ 75 ≈ 80

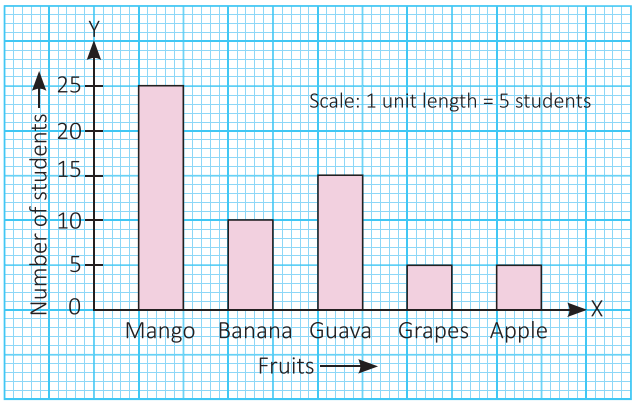
(*b*) In the number 194, the tens digit is 9 (> 5). Thus, to round off the given number to nearest 100, we round up the hundred digit by 1. So the digit at hundred place becomes 2 and the digits at tens and ones place become 0.

∴ 194 ≈ 200

(*c*) In the number 64289, the hundreds digit is 2 (< 5). Thus, to round off the given number to nearest 1000, we leave the thousand digit as it is and the digits at hundreds, tens and ones place become 0.

∴ 64289 ≈ 64000

4. The bar graph which shows the favourite fruit of students in a class is as follows:



5. (*a*) From the bar graph, total students who were surveyed = Students watching movies + students playing sports + students reading books + students listening music + students party with friends = 30 + 70 + 50 + 60 + 60 = 270

Thus, total 270 students were surveyed in all.

(*b*) From the bar graph, the number of students preferred reading books = 50

(*c*) Only 30 students prefer to watch movies. Thus, the least preferred activity is watching movies.

6. The data of marks obtained by 40 students in a unit test using tally marks is as follows:

Marks	Tally marks	Number of students
10	|	1
16	|	1
17	|	1
18	||	2
21	|	1
24	||	2

25	|	1
26	|||	3
28	|	1
29	||	2
32	|	1
35	|	1
36	|	1
37	|	1
38	||	2
39	|	1
40	𝍸 |	6
41	|	1
42	|	1
44	|	1
45	|||	3
46	|	1
48	|||	3
50	|	1
52	|	1
Total		**40**

(*a*) The marks scored by students more than 45 marks are 46, 48, 50 and 52.

Thus, the number of students who scored more than 45 marks = 1 + 3 + 1 + 1 = 6

(*b*) The marks scored by students between 20 and 50 are 21, 24, 25, 26, 28, 29, 32, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 46 and 48.

Thus, the number of students who scored marks between 20 and 50 = 1 + 2 + 1 + 3 + 1 + 2 + 1 + 1 + 1 + 1 + 2 + 1 + 6 + 1 + 1 + 1 + 3 + 1 + 3 = 33.

7. Distance travelled by Ravi by walking from his home to take a bus to his office = 695 m

Distance travelled by bus = 3 km 125 m = 3000 m + 125 m = 3125 m

Distance travelled by walk from bus stand to reach office = 100 m

∴ Total distance travelled by Ravi from his home to office = 695 m + 3125 m + 100 m.

= 700 m + 3100 m + 100 m

= 3900 m ≈ 4 km [Rounding off the given number]

Thus, the estimated distanced from his home to office is approximately 4 km.

8. The smallest 8-digit number using the digits 1, 2, 5, 9, and 4 is 11112459.

And the largest 8-digit number using the digits 1, 2, 5, 9, and 4 is 99995421.

∴ Sum = 99995421 + 11112459 = 111107880

And difference = 99995421 – 11112459

= 88882962.

CHAPTER 5 : PRIME TIME

Let's Recall

1. 2, 4, 6, 8, 10, … is the series in which each element is the succeeding multiple of 2.

Since, the total number of pairs of shoes = 9

Thus, total number of shoes = 9 × 2 = 18

And, the total number of pairs of shocks = 14

Thus, total number of socks = 14 × 2 = 28

2. A spider has 8 legs and a deer has 4 legs.

Thus, the complete table is as follows:

No. of spiders	Legs	No. of deer	Legs
2	2 × 8 = 16	3	3 × 4 = 12
3	3 × 8 = 24	4	4 × 4 = 16
4	4 × 8 = 32	5	5 × 4 = 20
6	6 × 8 = 48	8	8 × 4 = 32
9	9 × 8 = 72	10	10 × 4 = 40

3.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Quick Check (Page 139)

1. 8 × **4** = 32 **2.** 5 × **8** = 40

3. **4** × 6 = 24 **4.** **12** × 5 = 60

Practice Time 5A

1. (*a*) We know that 1 × 18 = 18, 2 × 9 = 18, 3 × 6 = 18.

Thus, 1, 2, 3, 6, 9 and 18 are the factors of 18.

(*b*) - (*c*) Same as part (*a*)

(*d*) Since, $1 \times 135 = 135$,
$3 \times 45 = 135$,
$5 \times 27 = 135$,
$9 \times 15 = 135$.

Thus, 1, 3, 5, 9, 15, 27, 45 and 135 are the factors of 135.

2. (*a*) To find first five multiples of any number, we multiply that number by natural numbers 1, 2, 3, 4 and 5.

$\therefore$ $10 \times 1 = 10$,
$10 \times 2 = 20$,
$10 \times 3 = 30$,
$10 \times 4 = 40$,
$10 \times 5 = 50$

Thus, the first five multiples of 10 are 10, 20, 30, 40 and 50.

(*b*) - (*d*) Same as part (*a*)

3. (*a*) Since, $18 \times 1 = 18$
$18 \times 2 = 36$,
$18 \times 3 = 54$,
$18 \times 4 = 72$,
$18 \times 5 = 90$, …

Thus, multiples of 18 are 18, 36, 54, 72, 90, ...
(*a*) → (*ii*)

(*b*) Since $7 \times 6 = 42$. Thus, 7 is the factor of 42.
(*b*) → (*iv*)

(*c*) We know that $1 \times 46 = 46$, $2 \times 23 = 46$. So, 1, 2, 23 and 46 are all the factors of 46.
(*c*) → (*v*)

(*d*) Since, any number is the greatest factor of itself. So 30 is the greatest factor of 30.
(*d*) → (*iii*)

(*e*) Since, any number is the smallest multiple of itself. So, 24 is the smallest multiple of 24.
(*e*) → (*i*)

4. To find the multiples of 4 between 32 and 60, we multiply it by counting numbers 9, 10, ..., 14.

$\therefore$ $4 \times 9 = 36$, $4 \times 10 = 40$, $4 \times 11 = 44$,
$4 \times 12 = 48$, $4 \times 13 = 52$, $4 \times 14 = 56$.

Thus, the multiples of 4 between 32 and 60 are 36, 40, 44, 48, 52 and 56.

5. (*a*) We know that $12 \times 5 = 60 = 20 \times 3$
And $12 + 5 = 17$ and $20 - 3 = 17$.

(*b*) We know that $4 \times 6 = 24 = 12 \times 2$
and $4 + 6 = 10 = 12 - 3$

Think and Answer (Page 142)

1. First time *Chole-Bhature* is said on number 6, then on number 12 and next on number 18. Thus, it follows the series 6, 12, 18, …. i.e., the multiples of 6.

So, the number at which *Chole-Bhature* is said for the 8^{th} time $= 8 \times 6 = 48$.

2. (*a*) Since, we say *Chole* at number 4 and *Bhature* at number 5. Thus to say *Chole-Bhature* together, we find the common multiple of 4 and 5.

Now, we know that $4 \times 5 = 20$ and $5 \times 4 = 20$.

Thus, 20 is the common multiple of 4 and 5 at which we say *Chole-Bhature* together.

(*b*) - (*c*)Same as part (*a*)

3. Multiples of 6 are 6, 12, 18, **24**, 30, 36, 42, **48**, 54, 60, 66, **72**, 78, 84, 90, **96**, …

Multiples of 8 are 8, 16, **24**, 32, 40, **48**, 56, 64, **72**, 80, 88, **96**, …

Multiples of 12 are 12, **24**, 36, **48**, 60, **72**, 84, **96**, …

From these lists, we find that the common multiples of 6, 8 and 12 are 24, 48, 72, 96, ...

Thus, among the four options only (*a*) 96 is the common multiple of 6, 8 and 12.

Quick Check (Page 143)

Factors of 63 are 1, 3, 7, 9, 21, 63.

Factors of 112 are 1, 2, 4, 7, 8, 14, 16, 28, 56, and 112.

So, the common factors of 63 and 112 are 1 and 7.

Hence, the total number of common factors of 63 and 112 is two.

Practice Time 5B

1. (*a*) The numbers less than 40 which have the sum of digits 8 are 17, 26, 35. But 7 is not the factor of 17 and 26. Thus, the required number is 35.

(*b*) All multiples of 5, which are greater than 5 are 10, 15, 20, 25, 30, ...

From all these factors, the odd number and the factor of 30 is 15. Thus, the required number is 15.

(*c*) 90 is the only number less than 100 whose one digit is 9 more than the other and two of its factors are 3 and 5.

Thus, the required number is 90.

(*d*) Factors of 120 are 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, and 120. Out of them, multiples of 2 and 3 are 6, 12, 24, 30, 60 and 120.

Also, the multiples of 5 are 5, 10, 15, 20, 25, 30, ...

Thus, out of the numbers 6, 12, 24, 30, 60 and 120. 6 is the only number which is 1 away from the multiples of 5.

Thus, 6 is the required number.

2. To find the first five even multiples of 17, we multiply 17 by the first five even numbers.

That are, $17 \times 2 = 34$,

$17 \times 4 = 68$,

$17 \times 6 = 102$,

$17 \times 8 = 136$,

$17 \times 10 = 170$.

Thus, the first five even multiples of 17 are 34, 68, 102, 136 and 170.

3. (*a*) Multiples of 7 are 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, …

Thus, the multiples of 7 from the given list are 7, 21, 63, 70 and 77.

(*b*) Similarly, the multiples of 12 are 12 and 36.

(*c*) Similarly, the multiples of 4 are 12, 36 and 80.

4. (*a*) Factors of 12 are 1, 2, 3, 4, 6 and 12.

∴ From the given list of numbers, the factor of 12 is 3.

(*b*) Same as part (*a*)

(*c*) Factors of 12 are 1, 2, 3, 4, 6 and 12 and factors of 15 are 1,3, 5, 15.

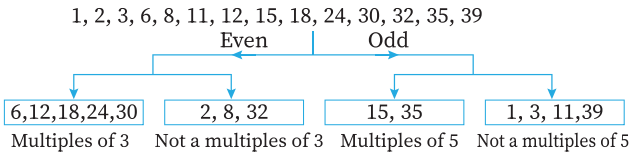
∴ The common factors of 12 and 15 are 1 and 3.

Thus, the common factor of 12 and 15 from the given list of numbers is 3.

(*d*) Even multiples of 3 are 6, 12, 18, 24, 30, ...

Thus, from the given list of numbers, even multiples of 3 are 24 and 30.

5.



6. Both lights will flash together at the time which are common multiples of 8 and 12.

∵ Multiples of 8 are 8, 16, 24, 32, 40, 48 …. and multiples of 12 are 12, 24, 36, 48 …

∴ Common multiples of 8 and 12 are 24, 48, …

Thus, after 24 seconds both lights will flash together.

7. To buy the same number of breads and eggs, Namita has to find the common multiple of 20 and 12.

∵ Multiples of 12 are 12, 24, 36, 48, 60, … and multiples of 20 are 20, 40, 60, 80, …

∴ Common multiples of 12 and 20 are 60, 120, …

So, the same number of breads and eggs that were bought by Namita is 60.

Now since, $20 \times 3 = 60$ and $12 \times 5 = 60$

Thus, Namita bought 3 bread packs and 5 eggs tray.

8. (*a*) Smallest odd number is **1**.

(*b*) First 3 multiples of 12 are **12**, **24** and **36**.

(*c*) 12, 15, 21, 27 are the multiple of **3**.

(*d*) **2** is a factor of every even number.

(*e*) A number is a factor of another number if on dividing, the **remainder** is zero.

9. The complete multiplication grid is as follows:

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

(*a*) Multiples of 3 (colour yellow): 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 36, 42, 45, 48, 54, 60, 63, 72, 81, 90.

(*b*) Even numbers greater than 60 but less than 80 are 64, 70, 72 (mark circle).

(*c*) First 10 multiples of 7 are 7,14, 21, 28, 35, 42, 49, 56, 63, 70 (colour red).

(*d*) From the above table, we can see that 11 is not a factor of 54.

(*e*) Since $7 \times 5 = 35$, thus 7 is a factor of 35.

(*f*) Since $9 \times 3 = 27$, thus 9 is a factor of 27 but not multiple.

(*g*) First 8 multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40 (colour green).

(*h*) From the above table, we can see that common factor of 2 and 5 is only 1.

(*i*) From the above table, we can see that the common multiple of 7 and 8 is 56.

(*j*) Odd numbers more than 25 but less than 60 are 27, 35, 45, 49.

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

Factors of 8 are 1, 2, 4 and 8.

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

Thus, common factors of 4, 8 and 12 are 1, 2, and 4.

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

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

Thus, the common factors of 35 and 50 are 1 and 5.

(*c*) Factors of 5 are 1 and 5.

Factors of 15 are 1, 3, 5 and 15.

Factors of 25 are 1, 5 and 25.

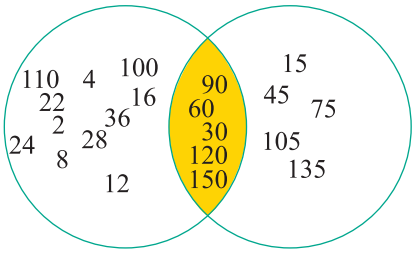
Thus, the common factors of 5, 15 and 25 are 1 and 5.

(*d*) Same as part (*b*)

11. (*a*) Even numbers are 2, 4, 6, 8, ….,16,…, 24, 26, 28, 30, ….60, …100,…

Multiples of 15 are 15, 30, 45, 60, ….

Thus, the numbers that are common in both are 30, 60, 90, ….



(*b*) Same as part (*a*)

12. Let us take two numbers 7 and 8. Their least common multiple (LCM) is 56, the first instance of '*Chole-Bhature*' after 50. Both numbers are under 10, satisfying the game's criteria. We can also take some other numbers such as 7 and 9; 8 and 9.

Quick Check (Page 147)

Prime numbers are 2, 3, 5, 7, 11, ….

Multiples of 5 are 5, 10, 15, 20, …

Since, 3 + 2 = 5, which is multiple of 5.

Also, 3 + 7 = 10, which is multiple of 5.

Thus, (2, 3), (3, 7), (7, 13) are few pairs whose sum is a multiple of 5.

Think and Answer (Page 148)

1. The smallest prime number is 2, which is an even number.

2. The smallest composite number is 4 as the factors of 4 are 1, 2 and 4, i.e., more than two factors and it is an even number.

3. The prime numbers which are less than 50 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43 and 47. Thus, there are total 15 prime numbers which are less than 50.

4. Let us take two numbers 6 and 9. Factors of 6 are 1, 2, 3 and 6 and factors of 9 are 1, 3 and 9.

So, number 6 has four factors while number 9 has three factors but 6 is less than 9. Thus, the given statement is not true.

Create and Solve (Page 148)

(*i*) Using prime numbers, we can complete it as:

2	3	7	42
7	11	2	154
13	3	5	195
182	99	70	

(*ii*) Using composite numbers, we can complete it as:

4	6	10	240
9	4	8	288
12	6	15	1080
432	144	1200	

Practice Time 5C

1. (*a*) If we divide any even number say 4 by 2, we get $\frac{4}{2} = 2$, which is an even number. Thus, given statement is false.

(*b*) Since 2 is the only prime number which is even. Thus, the given statement is true.

(*c*) True.

(*d*) 2 is an even number but the factors of 2 are 1 and 2. So, 2 is not a composite number but an even number. Thus, given statement is false.

(*e*) Let us take two prime numbers say 2 and 3. Their sum is 2 + 3 = 5, which is a prime number. Thus, given statement is false.

(*f*) Since all prime numbers are odd except 2, thus any prime number can never be end with 4. Thus, the given statement is true.

(*g*) The product of two primes can't be a prime because it violates the definition of the prime number as it will be divisible by the prime numbers which are multiplied rather than 1 and the number itself. So, the given statement is false.

(*h*) There are 1229 prime numbers between 1 and 10,000, which are finite. Thus, the given statement is false.

2. Prime numbers between 50 and 100 are 53, 59, 61, 67, 71, 73, 79, 83, 89, 97. So, there are total 10 prime numbers between 50 and 100.

3. (*a*) Factors of 9 are 1, 3 and 9 and factors of 16 are 1, 2, 4, 8 and 16. So, the only common factor of 9 and 16 is 1. Thus, 9 and 16 is a pair of co-primes.

(*b*) Same as part (*a*)

(*c*) Factors of 10 are 1, 2 and 5 and factors of 25 are 1, 5 and 25. So, the common factors of 10 and 25 are 1 and 5. Thus, 10 and 25 are not pairs of co-primes.

(*d*) Same as part (*a*)

4. We know that the pairs of primes with a difference of 2 are called twin primes. So, the pairs of twin primes from 1 to 100 are (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73).

5. We know that 2, 3, 5, 7, 11, 13, 17 and 19 are prime numbers less than 20.

Now, difference of 3 and 7 = 7 – 3 = 4, which is a multiple of 4.

Difference of 3 and 11 = 11 – 3 = 8, which is a multiple of 4.

Difference of 13 and 17 = 17 – 13 = 4, which is a multiple of 4. Thus, the required pairs are (3, 7), (3, 11), (13, 17). There can be some more pairs (5, 13), (5, 17), (7, 19), (11, 19), etc.

(Answer may vary)

6. (*a*) Since 3 + 3 + 7 = 13, which is a prime number. Also, 5 + 7 + 11= 23, which is also a prime number. Thus, we can express prime numbers as the sum of odd primes.

(*b*) The product of two primes can never be a prime because it violates the definition of the prime number as it will be divisible by the prime numbers which are multiplied rather than 1 and the number itself. So, prime numbers cannot be expressed as the product of two primes.

7. Using the technique of Sieve of Eratosthenes, we can find the prime numbers between 101 and 200 as: 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199.

8. 3-digit numbers formed by using each of the digits 2, 3 and 5 once are 235, 253, 352, 325, 523, 532. Out of them, there is only one prime number i.e., 523 as all others have a factor other than 1 and the number itself.t

Think and Answer (Page 150)

The first four different prime numbers are 2, 3, 5, and 7.

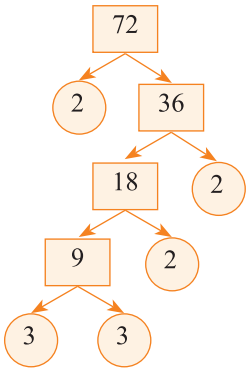
On multiplying them, we get

2 × 3 × 5 × 7 = 210. Thus, the smallest number having four different prime factors is 210.

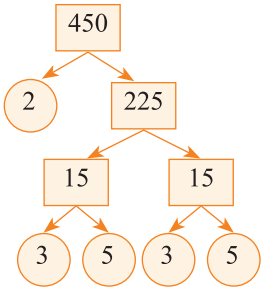
Practice Time 5D

1. The factor trees are as follows:

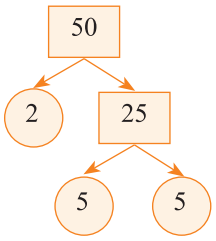
(*a*)



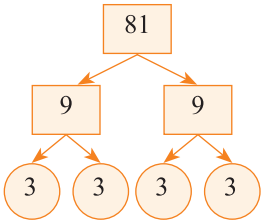
(*b*)



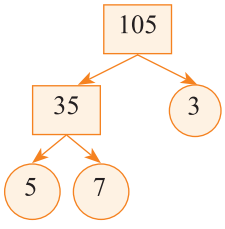
(*c*)



(*d*)

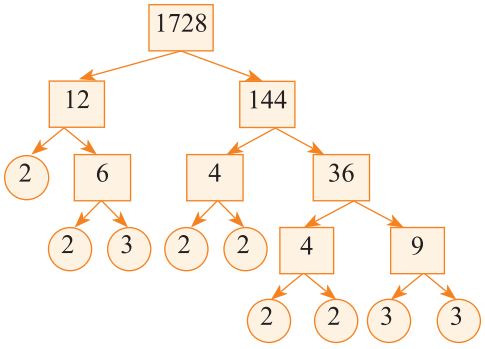


2. (*a*)



Thus, 105 = 3 × 5 × 7.

(*b*)



Thus, $1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

(*c*) - (*d*) Same as part (*b*)

3. (*a*)

3	141
	47

$\therefore$ $141 = 3 \times 47$

(*b*)

2	1000
2	500
2	250
5	125
5	25
	5

$\therefore$ $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

(*c*) - (*d*) Same as part (*b*)

4. (*a*) Since, the first three prime numbers are 2, 3, and 5.

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

Thus, 30 is the smallest number which has three different prime factors.

(*b*) Since, the first five prime numbers are 2, 3, 5, 7 and 11.

$\therefore$ $2 \times 3 \times 5 \times 7 \times 11 = 2310$.

Thus, 2310 is the smallest number which has five different prime factors.

5. (*a*) Prime factorisation of $25 = 5 \times 5$.

Prime factorisation of $56 = 2 \times 2 \times 2 \times 7$

Since, the numbers 25 and 56 have no common prime factor, so only common factor is 1.

Hence, 25 and 56 are co-prime.

(*b*) Prime factorisation of $231 = 3 \times 7 \times 11$

Prime factorisation of $242 = 2 \times 11 \times 11$

Since, the numbers 231 and 242 have a common factor 11.

Hence, 231 and 242 are not co-prime.

(*c*) - (*d*) Same as part (*a*)

6. Let us take an example for each type of number.

Factors of 496 = 1, 2, 4, 8, 16, 31, 62, 124, 248, 496

Sum of all proper factors of 496 = 1 + 2 + 4 + 8 + 16 + 31 + 62 + 124 + 248 = 496

Since, sum of all proper factors of 496 is equal to the number itself. So, 496 is a perfect number.

Now, factors of 18 = 1, 2, 3, 6, 9, 18

Sum of all proper factors of 18 = 1 + 2 + 3 + 6 + 9 = 21

Since, sum of all proper factors of 18 is greater than itself. So, 18 is an abundant number.

Now, factors of 15 = 1, 3, 5, 15

Sum of all proper factors of 15 = 1 + 3 + 5 = 9

Since, sum of all proper factors of 15 is less than the number itself. So, 15 is a deficient number.

7. Let us take a pair (1184, 1210).

Proper divisors of 1184 = 1, 2, 4, 8, 16, 32, 37, 74, 148, 296, 592.

Proper divisors of 1210 are 1, 2, 5, 10, 11, 22, 55, 110, 121, 242, 605.

Now, sum of proper divisors of 1184 = 1 + 2 + 4 + 8 + 16 + 32 + 37 + 74 + 148 + 296 + 592 = 1210.

And sum of proper divisors of 1210 = 1 + 2 + 5 + 10 + 11 + 22 + 55 + 110 + 121 + 242 + 605 = 1184.

Therefore, 1184 and 1210 is a pair of amicable numbers.

Think and Answer (Page 156)

Any number would be divisible by 4 if the number formed by its last two digits is divisible by 4. Using the given digits 1, 2, 3 and 4, a 4-digit number which is divisible by 4 can have 12, 24 or 32 at the last two digits.

Thus, the possible 4-digit numbers using the given digits are 3412, 4312, 1324, 3124, 1432 and 4132.

So, the smallest 4-digit number using the digits 1, 2, 3 and 4, divisible by 4 is 1324.

Practice Time 5E

1. (*a*) A number is divisible by 10 if its unit digit is 0. In the number 7345, unit digit is 5, so 7345 is not divisible by 10.

(*b*) In the number 8760, unit digit is 0, so it is divisible by 10.

(*c*) Same as part (*a*) (*d*) Same as part (*b*)

2. A number is divisible by 8 if the number formed by the last 3 digits is divisible by 8.

(*a*) In the number 7248882, the number form by the last 3 digits is 882, which is not divisible by 8. So, the number 7248882 is not divisible by 8.

(*b*) Same as part (*a*)

(*c*) In the number 92304, the number formed by the last 3 digits is 304, which is divisible by 8. So, the number 92304 is divisible by 8.

(*d*) Same as part (*c*).

3. Refer to the answer given in the book.

4. A number is divisible by 9 if the sum of its digits is divisible by 9.

(*a*) In the number 345672, the sum of digits = 3 + 4 + 5 + 6 + 7 + 2 = 27, which is divisible by 9. So, the number 345672 is divisible by 9.

(*b*) In the number 278901, the sum of digits = 2 + 7 + 8 + 9 + 0 + 1 = 27, which is divisible by 9. So, the number 278901 is divisible by 9.

(*c*) In the number 46938, the sum of digits = 4 + 6 + 9 + 3 + 8 = 30, which is not divisible by 9. So, the number 46938 is not divisible by 9.

(*d*) In the number 96435, the sum of digits = 9 + 6 + 4 + 3 + 5 = 27, which is divisible by 9. So, the number 96435 is divisible by 9.

5. (*a*) We know that if a number is divisible by both 2 and 3, then it is divisible by 6 also.
In the number 3409122, the unit digit is 2.
So, it is divisible by 2.
Now, the sum of the digits of 3409122 = 3 + 4 + 0 + 9 + 1 + 2 + 2 = 21, which is divisible by 3. So, the number 3409122 is divisible by 3.
Since, the number 3409122 is divisible by both 2 and 3. So, it is divisible by 6.

(*b*) In the number 17218, the unit digit is 8, so it is divisible by 2.
Now, the sum of the digits of 17218 = 1 + 7 + 2 + 1 + 8 = 19, which is not divisible by 3.
So, the number 17218 is not divisible by 3.
Since, the number 17218 is divisible by 2 but not by 3. So, it is not divisible by 6.

(*c*) We know that a number is divisible by 8 if the number formed by the last 3 digits is divisible by 8. In the number 11309634, the number formed by last 3 digits is 634, which is not divisible by 8, so the given number is not divisible by 8.

(*d*) In the number 515712, the number formed by the last 3 digits is 712, which is divisible by 8. So, the given number is divisible by 8.

(*e*) We know that a number is divisible by 4 if the number formed by the last 2 digits is divisible by 4. In the number 3501804, the number formed by last 2 digits is 04, which is divisible by 4, so the number 3501804 is divisible by 4.

(*f*) A number is divisible by 9 if the sum of its digits is divisible by 9. In the number 23456780, the sum of digits = 2 + 3 + 4 + 5 + 6 + 7 + 8 + 0 = 35, which is not divisible by 9. Thus, the number 23456780 is not divisible by 9.

6. We know that if a number is divisible by both 2 and 3, then it is divisible by 6 also.

(*a*) In the number 59730, the unit digit is 0.
So, it is divisible by 2.
Now, the sum of the digits of 59730 is 5 + 9 + 7 + 3 + 0 = 24, which is divisible by 3.
So, the number 59730 is divisible by 3.
Since, the number 59730 is divisible by both 2 and 3. So, it is divisible by 6.

(*b*) 18620 is divisible by 2 but not by 3, so it not divisible by 6.

(*c*) - (*d*) Same as part (*a*)

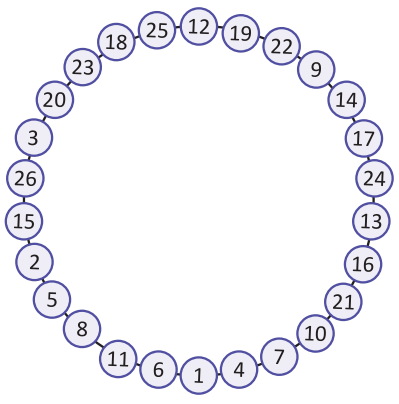
7. (*a*) 48 = 7 + 41 (*b*) 64 = 3 + 61
(*c*) 96 = 7 + 89 (Answer may vary)

8. (*a*) 27 = 3 + 5 + 19 (*b*) 41 = 3 + 7 + 31
(*c*) 63 = 3 + 7 + 53 (Answer may vary)

9. (*a*) 36 = 17 + 19, where 17 and 19 are twin primes.
(*b*) 84 = 41 + 43, where 41 and 43 are twin primes.

10. Let us take three 2-digit numbers that are 25, 26 and 31. Now, 25 = 2 + 23; 26 = 3 + 23; 31 = 7 + 11 + 13. Since, each number is written as the sum of two or more primes, thus they satisfy the Goldbach conjecture.

11. The required circle is as follows:



12. (*a*) Since, 202 – 2 × 3 = 196 and 19 – 2 × 6 = 7, which is divisible by 7, so the number 2023 is divisible by 7. (*a*) → (*iv*)

(*b*) In the number 24804, sum of digits = 2 + 4 + 8 + 4 = 18, which is divisible by 3. So, the number 24804 is divisible by 3. (*b*) → (*i*)

(*c*) In the number 12892, sum of digits at odd places – sum of digits at even places = (1 + 8 + 2) – (2 + 9) = 11 – 11 = 0. So, 12892 is divisible by 11. (*c*) → (*ii*)

(*d*) In the number 6016, the number formed by last three digits i.e., 016 is divisible by 8. So, the number is divisible by 8. (*d*) → (*iii*)

13. (*a*) 127 = 1 × 127. So, it is a prime number.

(*b*) 361 = 19 × 19. So, it has a factor other than 1 and itself. So, it is a composite number.

(*c*) 299 = 13 × 23. So, it has a factor other than 1 and itself. So, it is a composite number.

(*d*) 343 = 7 × 7 × 7. So, it has a factor other than 1 and itself. So, it is a composite number.

14. A number is divisible by 9 if the sum of its digits is divisible by 9. Now, sum of digits = 1 + 7 + 5 + 6 + * + 2 = 21 + *.

A number divisible by 9 and greater than 21 is 27, so, 21 + * = 27. Thus, * = 6

So, the number 175662 is divisible by 9.

15. Among any three consecutive number, there will always be atleast one even number, which is divisible by 2. Also, there will always be at atleast one number that is divisible by 3.

So, the product of three consecutive numbers is always divisible by both 2 and 3, then it is always divisible by 6. Let us take three consecutive number 21, 22 and 23 .

Product of 21, 22 and 23 = 21 × 22 × 23 = 10626, which is divisible by 6.

Thus, the given statement is true.

16. (*a*) Sum of digits at odd places – sum of digits at even places = (9 + * + 8) – (2 + 3 + 9)

= 17 + * – 14

= 3 + *

Since, the given number is divisible by 11, so 3 + * should be either 0 or multiple of 11.

Thus, if * = 8, then the number 928389 is divisible by 11.

(*b*) Sum of digit at odd places – sum of digits at even places

= (8 + 9 + 8) – (* + 4 + 9)

= 25 – * – 13 = 12 – *

Since, the given number is divisible by 11, so 12 – * should be either 0 or multiple of 11.

Thus, * = 1, then the number 819489 is divisible by 11.

Quick Check (Page 163)

1. (*a*) Factors of 16 are 1, 2, 4, 8 and 16.

Factors of 64 are 1, 2, 4, 8, 16, 32 and 64.

Factors of 88 are 1, 2, 4, 8, 11, 22, 44, and 88.

Common factors are 1, 2, 4 and 8 but 8 is the greatest among these common factors.

Hence, the HCF of 16, 64 and 88 is 8.

(*b*) Same as part (*a*)

2. (*a*) Two consecutive numbers: 4 and 5 (we can take some other numbers also)

Factors of 4 are 1, 2 and 4 and factors of 5 are 1 and 5. Common factor of 4 and 5 is 1.

So, the HCF is 1.

(*b*) Two consecutive even numbers: 8 and 10

Factors of 8 are 1, 2, 4 and 8 and factors of 10 are 1, 2, 5 and 10.

Common factors of 8 and 10 are 1 and 2.

So, the HCF is 2.

(*c*) Two consecutive odd numbers: 13 and 15

Factors of 13 are 1 and 13 and factors of 15 are 1, 3, 5 and 15.

Common factor of 13 and 15 is 1.

So, the HCF is 1.

Think and Answer (Page 165)

We know that the smallest 4-digit number is 1000. But it is not exactly divisible by 18, 24 and 32.

The least number exactly divisible by 18, 24 and 32 is their LCM.

By division method,

2	18, 24, 32
2	9, 12, 16
2	9, 6, 8
3	9, 3, 4
	3, 1, 4

Here, LCM of 18, 24 and 32 = 2 × 2 × 2 × 4 × 3 × 3

= 288.

Since it's not a 4-digit number, we need to find the multiple of 288, close to 1000.

Now,
$$\begin{array}{r} 3 \\ 288\overline{)1000} \\ -864 \\ \hline 136 \end{array}$$

∴ Smallest 4-digit number exactly divisible by 288 is 1000 – 136 + 288 = 1152

Quick Check (Page 166)

1. Since 5 is a factor of 35, so the HCF of 5 and 35 is 5.

2. We know that the LCM of two co-primes is equal to their product. Since the number 6 and 25 are co-prime. Therefore, LCM of 6 and 25 is 150.

Practice Time 5F

1. (*a*)
$$\begin{array}{r|l} 2 & 18 \\ \hline 3 & 9 \\ \hline & 3 \end{array}$$
$18 = 2 \times 3 \times 3$

$$\begin{array}{r|l} 2 & 26 \\ \hline & 13 \end{array}$$
$26 = 2 \times 13$

$$\begin{array}{r|l} 2 & 72 \\ \hline 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline & 3 \end{array}$$
$72 = 2 \times 2 \times 2 \times 3 \times 3$

The common prime factor of 18, 26 and 72 is 2.

Thus, the HCF of 18, 26 and 72 is 2

(*b*)
$$\begin{array}{r|l} 2 & 118 \\ \hline & 59 \end{array}$$
$118 = 2 \times 59$

$$\begin{array}{r|l} 2 & 460 \\ \hline 3 & 230 \\ \hline 5 & 115 \\ \hline & 23 \end{array}$$
$460 = 2 \times 2 \times 5 \times 23$

Thus, HCF of 118 and 460 = 2

(*c*) Same as part (*a*)

2. (*a*) By long division method,
$$\begin{array}{r} 44\overline{)144}\,(3 \\ -132 \\ \hline 12\overline{)44}\,(3 \\ -36 \\ \hline 8\overline{)12}\,(1 \\ -8 \\ \hline 4\overline{)8}\,(2 \\ -8 \\ \hline 0 \end{array}$$
Since, 4 is the last divisor.

Thus, the HCF of 44 and 144 is 4.

(*b*) Same as part (*a*)

(*c*) First find the HCF of 40 and 56 by long division method,
$$\begin{array}{r} 40\overline{)56}\,(1 \\ -40 \\ \hline 16\overline{)40}\,(2 \\ -32 \\ \hline 8\overline{)16}\,(2 \\ -16 \\ \hline 0 \end{array}$$
Here, the last divisor is 8.

So, next find the HCF of 8 and 17.
$$\begin{array}{r} 8\overline{)17}\,(2 \\ -16 \\ \hline 1\overline{)8}\,(8 \\ -8 \\ \hline 0 \end{array}$$
Since the last divisor is 1.

So the HCF of 40, 56 and 17 is 1.

(*d*) Same as part (*c*).

3. (*a*)
$$\begin{array}{r|l} 2 & 28 \\ \hline 2 & 14 \\ \hline & 7 \end{array}$$
$28 = 2 \times 2 \times 7$

$$\begin{array}{r|l} 2 & 42 \\ \hline 3 & 21 \\ \hline & 7 \end{array}$$
$42 = 2 \times 3 \times 7$

Here, the factors 2, 3 and 7 occur maximum 2, 1 and 1 times respectively.

So, the LCM of 28 and 42 = $2 \times 2 \times 3 \times 7 = 84$

(*b*) - (*c*) Same as part (*a*)

4. (*a*) By division method,
$$\begin{array}{r|l} 3 & 30, 48, 120 \\ \hline 2 & 10, 16, 40 \\ \hline 5 & 5, 8, 20 \\ \hline 2 & 1, 8, 4 \\ \hline 2 & 1\ 4\ 2 \\ \hline & 1, 2, 1 \end{array}$$
Now, find the product of all the divisors and the quotients (except 1) in the last row.

Thus, the LCM of 30, 48 and 120

$= 3 \times 2 \times 5 \times 2 \times 2 \times 2 = 240$.

(*b*) - (*c*) Same as part (*a*)

5. To find the time when the traffic light will change again, we find the LCM of 48 seconds, 60 seconds and 72 seconds. By division method,
$$\begin{array}{r|l} 4 & 48, 60, 72 \\ \hline 3 & 12, 15, 18 \\ \hline 2 & 4, 5, 6 \\ \hline & 2, 5, 3 \end{array}$$

Now, find the product of all the divisors and the quotients in the last row.

Thus, the LCM of 48, 60 and 72 = 4 × 3 × 2 × 2 × 5 × 3 = 720 seconds = 12 minutes

Thus, the traffic light will change again after 12 minutes i.e., on 9:12 a.m.

6. Length of the room = 4 m 96 cm = 400 cm + 96 cm
= 496 cm

Breadth of the room = 4 m 3 cm = 400 cm + 3 cm
= 403 cm

Now, we find the LCM of length and breadth by long division method,

```
403)496(1
   -403
   ----
    93)403(4
      -372
      ----
       31)93(3
          -93
          ---
           0
```

Since, the last divisor is 31.

So, the HCF of 496 and 403 is 31.

Therefore, the largest possible square brick that can be paved on the floor of the room has a side of length 31 cm.

7. First, find the LCM of 15, 25 and 30 by division method, we get

5	15, 25, 30
3	3, 5, 6
	1, 5, 2

Now, find the product of all the divisors and the quotients (except 1) in the last row.

Thus, the LCM of 15, 25 and 30 = 5 × 3 × 5 × 2
= 150.

So, the required number is 150 + 8 = 158.

8. We know that the product of HCF × LCM
= Product of two numbers.

Thus, 55 × 7700 = 275 × other number

Other number = $\frac{55 \times 7700}{275} = 1540$

Thus, the other number is 1540.

9. First find the LCM of 36, 40 and 48 seconds.

By division method,

4	36, 40, 48
3	9, 10, 12
2	3, 10, 4
	3, 5, 2

Now, find the product of all the divisors and the quotients (except 1) in the last row.

Thus, the LCM of 36, 40 and 48
= 4 × 3 × 2 × 3 × 5 × 2 = 720 seconds

So, Raman, Veena, and Harish will meet again after 720 seconds or 12 minutes at the starting point.

Mental Maths (Page 167)

1. Since, factors of 9 are 1, 3 and 9. Also every odd number less than 9 is prime number. Thus, 9 is the smallest odd composite number.

2. The greatest prime number less than 100 is 97 as it is divisible by 1 and itself only.

3. Even numbers between 58 and 80 are 60, 62, 64, 66, 68, 70, 72, 74, 76 and 78.

Thus, the total even numbers between 58 and 80 is 10.

4. Composite number between 10 and 50 having digit 3 are 30, 32, 33, 34, 35, 36, 38 and 39.

Thus, there are 8 composite numbers between 10 and 50 that have digit 3.

5. The greatest 2-digit number = 99

Prime factorisation of 99 = 3 × 3 × 11.

Thus, the greatest 2-digit number have total 2 prime factors i.e., 3 and 11.

6. The smallest pair of consecutive odd number is 1 and 3. Their sum = 1 + 3 = 4

Thus, 4 is the largest number that divides the sum of any pair of consecutive odd numbers.

Brain Sizzlers (Page 167)

1. Five such palindromes which are obtained by multiplying prime numbers are as follows:

3 × 11 = 33
3 × 7 × 11 × 13 = 3003
2 × 7 × 11 × 13 = 2002
2 × 17 × 19 = 646
3 × 17 × 19 = 969 (Answer may vary)

2. Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, ...

Thus, the next two Fibonacci prime numbers after 2, 3, 5, 13 are 89 and 233, ...

3. Since a number is divisible by 12, so it must be divisible by 4 and 3.

Clearly, 4864 is divisible by 4 but not by 3.

So, 9 ★ 2 must be divisible by 3.

So, (9 + ★ + 2) must be divisible by 3.

∴ ★ = 1

4. Smallest perfect number is 6 and the smallest odd composite number is 9.
Prime factorisation of 6 = 2 × 3
Prime factorisation of 9 = 3 × 3
Since, the highest common factor is 3.
So, the HCF of 6 and 9 is 3.
Also, the product of all the prime factors (common factors count only once) of 6 and 9 is the LCM.
So, LCM of 6 and 9 = 2 × 3 × 3 = 18

5. Since 169 and 630 are two co-prime numbers. Thus, the HCF of 169 and 630 is 1.
So, the HCF of 169, 221 and 630 is 1, which is not a prime number.

Life Skills (Page 167)

1. Factors of 35 = 1, 5, 7 and 35.
But since in each row, number of people should be same and minimum and maximum people in a row can be 3 and 8, respectively.
Thus, the possible arrangements are 7 × 5 (i.e.,7 people in 5 rows) or 5 × 7 (i.e., 5 people in 7 rows).

2. Total people to arrange = 28 + 4 = 32
(*a*) Since, the maximum number of people in a row can be only 8, so this arrangement is not possible.
(*b*) Maximum number of people in a row = 8
And 4 × 8 = 32
So, this arrangement is possible for all the 32 people as it satisfies all the conditions.
(*c*) It does not satisfy the condition that an equal number of people should be in each row. So, this arrangement is not possible.
(*d*) If we arrange 4 students in 6 rows and 1 row for teachers then only 24 + 4 = 28 people can be arranged but still 4 students remain left.
So, this arrangement is not possible.

3. Larges-size photographs = 140 – 70 – 40 = 30
Total cost of small-size photographs = 70 × ₹60
= ₹4200
Total cost of medium-size photographs = 40 × ₹80
= ₹3200
Total cost of large-size photographs = 30 × ₹120
= ₹3600
∴ Total cost of all photographs
= ₹4200 + ₹3200 + ₹3600 = ₹11000
But, total money collected = ₹10500 < ₹11000
So, the collected money is not sufficient for 140 photographs.

Chapter Assessment

A.

1. Prime numbers between 16 and 80 = 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79
So, total prime numbers between 16 and 80 are 16.
Prime numbers between 90 and 100 is 97, i.e., only 1.
Thus, prime numbers between 16 and 80 are 15 more than those between 90 and 100.
Hence, the correct answer is option (*c*).

2. Since, the HCF of an even and an odd number is 1. So this is not true.
Hence, the correct answer is option (*d*).

3. Largest 4-digit number is 9999.
Prime factors of 9999 = 3 × 3 × 11 × 101.
Thus, the number of distinct prime factors of the largest 4-digit number is 3.
Hence, the correct answer is option (*b*).

4. Smallest 5-digit number is 10000.
Prime factors of 10000 = 2 × 2 × 2 × 2 × 5 × 5 × 5 × 5
Thus, the number of distinct prime factors of the smallest 5-digit number is 2.
Hence, the correct answer is option (*a*).

5. Let's take an odd natural number 3, its predecessor and successor are 2 and 4 respectively.
Product = 2 × 4 = 8 (divisible by 2, 4 and 8)
So, the greatest number which always divides the product of the predecessor and successor of an odd natural number is 8.
Hence, the correct answer is option (*d*).

6. By divisibility rule of 11, 22222222 is divisible by 11.
Hence, the correct answer is option (*c*).

7. LCM of two number = 180, its factors are 1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90 and 180
HCF is always a factor of LCM for the given numbers.
From the given options, 75 is not a factor of 180.
Therefore, 75 is not the HCF of the numbers.
Hence, the correct option is (*c*).

B.

1. Factors of 16 are 1, 2, 4, 8 and 16. And each factor is an exact divisor of the number.

Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). Hence, the correct answer is option (*a*).

2. Since, 4 + 8 + 0 + 9 = 21, which is divisible by 3.
So, by divisibility rule, 4089 is divisible by 3.
Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
Hence, the correct answer is option (*b*).

3. Prime factorisation of 20 = 2 × 2 × 5;
Prime factorisation of 24 = 2 × 2 × 2 × 3;
Prime factorisation of 32 = 2 × 2 × 2 × 2 × 2.
So, the highest common factors = 2 × 2 = 4.
So, the HCF of 20, 24 and 32 is 4.
∴ Assertion (A) is false but.
Reason (R) is true.
Thus, the correct answer is option (*d*).

C.

1. Prime factors of 1729 = 7 × 13 × 19
∴ Sum = 7 + 13 + 19 = **39**

2. Prime factorisation of 75 = 5 × 5 × 3;
Prime factorisation of 60 = 2 × 2 × 3 × 5;
Prime factorisation of 105 = 3 × 5 × 7
So, the common prime factors are 3 and 5. Thus, the number of common prime factors of 75, 60, and 105 is **2**.

3. The LCM of the two co-prime is equal to **product** of the numbers.

4. Prime factorisation of 10 = 2 × 5;
Prime factorisation of 15 = 3 × 5;
Prime factorisation of 20 = 2 × 2 × 5.
Thus, the HCF of 10, 15 and 20 is **5**.

5. Number 11 and 13 are prime numbers and 10, 12 and 14 numbers are even numbers.
Also, 15 = 3 × 5. So, the smallest odd composite number having two digits is **15**.

D.

1. Since 81 = 9 × 9.
So, 81 is not prime.
Hence, this statement is false.

2. Yes, every number is a multiple of itself.
So, this statement is true.

3. Smallest factor of each number is 1.
So, this statement is false.

4. Yes, every composite number has more than two factors. So, this statement is true.

5. Two prime numbers that differs by 2 are called twin primes.
So, this statement is false.

E.

1. Prime numbers between 40 and 100 are 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97.

2. (*a*) 44 = 3 + 41 or 7 + 37
(*b*) 50 = 19 + 31 or 3 + 47
(*c*) 64 = 3 + 61 or 5 + 59
(*d*) 88 = 5 + 83 or 17 + 71 (Answer may vary)

3. (*a*) 63 = 3 + 29 + 31 (*b*) 79 = 3 + 5 + 71
(*c*) 15 = 3 + 5 + 7 (*d*) 31 = 7 + 11 + 13
(Answer may vary)

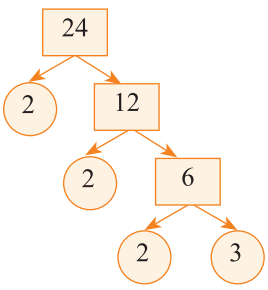
4. (*a*) Factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60.
Factors of 75 are 1, 3, 5, 15, 25 and 75.
Factors of 120 are 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60 and 120.
∴ Common factors = 1, 3, 5 and 15.
(*b*) - (*c*) Similar to part (*a*)

5. (*a*) First five common multiples of 2, 3 and 5 are the first five multiples of their LCM.
Since, 2, 3 and 5 are co-primes.
So, their LCM is 2 × 3 × 5 = 30.
First five multiples of 30 are 30, 60, 90, 120 and 150.
(*b*) - (*c*) Same as part (*a*)
(*d*) By division method,

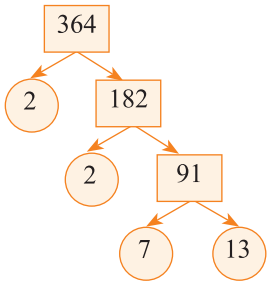
2	8, 12, 15
2	4, 6, 15
3	2, 3, 15
	2, 1, 5

LCM of 8, 12, 15 = 2 × 2 × 2 × 3 × 5 = 120
∴ First five common multiples of 8, 12, 15 are 120, 240, 360, 480 and 600.

6. (*a*)

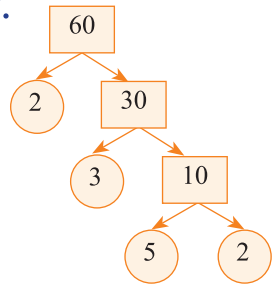


(*b*)



(*c*) - (*d*) Same as part (*b*)

7.



Sum of factors of missing place = 2 + 30 + 5 = 37

8. (13, 31), (17, 71), (37, 73) and (79, 97)

9. We know that the the 8th prime number is 19 and 11th prime number is 31, i.e.,

* = 19, # = 31. Thus, # – * = 31 – 19 = 12

10. Sum of digits at odd places – Sum of digits at even places = (5+ * +7) – (6 + 3 + 4)

= 12 +* – 13

= * – 1

Since, it is divisible by 11, So, * – 1 = 0 or * = 1.

11. (*a*) Prime factors of 72 = 2 × 2 × 2 × 3 × 3

Prime factors of 144 = 2 × 2 × 2 × 2 × 3 × 3

Prime factors of 234 = 2 × 3 × 3 × 13

Since, the common factors of 72, 144 and 234 are 2, 3 and 3. Thus, the HCF of 72, 144 and 234 is 2 × 3 × 3 = 18.

Thus, the greatest number of chairs in each row is 18.

(*b*) Total number of coloured chairs = 72 + 144 + 234 = 450

Since, the greatest number of chairs in each row = 18

∴ The minimum number of rows of chairs in the auditorium = $\frac{450}{18} = 25$

12. The given number is divisible by 80, so it must be divisible by 8 and 10.

By divisibility rule of 10, ones digir, i.e., # = 0

Now, the number 653 * 0 must be divisible by 8. So, by divisibility rule of 8, 3 * 0 should be divisible by 8.

Therefore, by trial and error, we find * = 6

Thus, the minimum value of * + # = 6 + 0 = 6.

Model Test Paper – 1

A.

1. Since 6 × 12 = 72, 24 × 3 = 72.

So, 6, 12, and 24 are factors of 72 but 48 is not a factor of 72.

Hence, the correct answer is option (*d*).

2. From the given figure, $t \| z$.

Hence, the correct answer is option (*d*).

3. The largest 5-digit number is 99999, But its digit sum = 9 + 9 + 9 + 9 + 9 = 45.

Subtract 2 from 45, we get 45 – 2 = 43, i.e., we need to subtract 2 from 99999.

So, 99999 – 2 = 99997, which is a largest 5-digit numbers whose digit sum is 43

Hence, the correct answer is option (*c*).

4. A collection of numbers gathered to give some information is called data.

Hence, the correct answer is option (*a*).

5. A polygon with 9 sides is called a nonagon.

Hence, the correct answer is option (*b*).

6. Common multiples of 3, 5 and 10 are the multiple of their LCM. By division method,

3	3, 5, 10
5	1, 5, 10
	1, 1, 2

LCM = 3 × 5 × 2

= 30

So, multiples of 30 are 30, 60, 90, 120, ….

Hence, the correct answer is option (*d*).

7. Since 8 is the factor of the number and number is less than 50. So the possible numbers can be 8, 16, 24, 32, 40, 48.

Also, since the sum of digit is 5.

Thus, the required number is 32 (as 3 + 2 = 5).

Hence, the correct answer is option (*b*).

8. The degree measure of a complete angle is 360°.

Hence, the correct answer is option (*c*).

9. Factors of a number 24 are 1, 2, 3, 4, 6, 8, 12, 24 and each factor of a number divides the number exactly.

∴ Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

Hence, the correct answer is option (*a*).

10. Three or more points are said to be collinear if they lie in a straight line. In the given figure, points A, B and C lie on the straight line.

So, Assertion (A) is true but Reason (R) is false.

Hence, the correct answer is option (*c*).

B.

1. **36** is a triangular number as well as a square number other than 1.

2. Points that lie in the same plane are called **coplanar** points.

3. 636 is same for reading backwards and forwards. So, 636 is a **palindromic** number.

4. Tally mark is recorded in bunches of **five**.

5. The smallest 2-digit prime number, sum of whose digits is 10, is **19**.

C.

1. 2 is an even prime number, so this statement is false.

2. Each number smallest multiple of is itself. So, the given statement is true.

3. Each bar represents only one value of the numerical data. So, this statement is true.

4. Two parallel lines never intersects at one point. They are equidistant from each other.

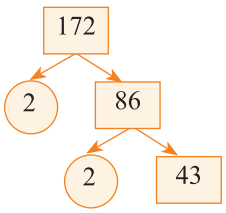
So, this statement is false.

5. Since difference of 17 and 19 is 2 and they are prime. So 17 and 19 are twin primes.

Thus, this statement is true.

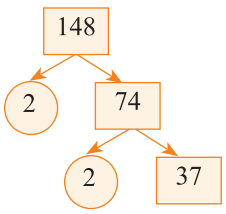
D.

1. (*a*)



Prime factor of 172 = 2 × 2 × 43

(*b*)



Prime factor of 148 = 2 × 2 × 37

2. To determine the maximum capacity of a container that can measure the diesel of the three containers an exact number of times, we need to calculate the HCF of 891, 1215 and 1377.

So, prime factorisation of 891, 1215 and 1377 are as follows,

$891 = 3 \times 3 \times 3 \times 3 \times 11$

$1215 = 3 \times 3 \times 3 \times 3 \times 3 \times 5$

$1377 = 3 \times 3 \times 3 \times 3 \times 17$

Here, we observe that $3 \times 3 \times 3 \times 3 = 81$ is the highest common factor of 891, 1215 and 1377. Therefore, the maximum capacity of the required container that can measure the diesel of the three containers an exact number of times will be 81 litres.

3. (*a*)

Corresponding sides	Midpoints
SP	T
PQ	L
QR	N

(*b*) *l* is the perpendicular bisector of line PQ.

m is the perpendicular bisector of line QR.

n is the perpendicular bisector of line PS.

4. The digit at 'T' and 'H' place is same and it is the second smallest positive odd number i.e., 3.

Also the digit at 'O' and 'Th' place is same and it is double that of 'T' digit i.e., 2 × 3 = 6

So, the required number is 6336.

5. (*a*) By divisibility rule of 3, the sum of digits of the number 52*664 is divisible by 3.

That is 5 + 2 + * + 6 + 6 + 4 = 23 + *

Check for possible values:

23 + 0 = 23 (not possible by 3)

23 + 1 = 24 (divisible by 3)

Since 5 + 2 + * + 6 + 6 + 4 = 23 + *

∴ * = 1

(*b*) By divisibility rule of 11, difference of sum of digits at even place and sum of digits at odd place is either 0 or multiple of 11.

That is, (8 + 8 + 9) – (2 + 4 + *) = 25 – 6 – * = 19 – * is divisible by 11.

So, 19 – * = 0 or 19 – * = 11

⇒ * = 19 (not possible) or * = 8

∴ * = 8.

6.

Years	Number of Employees
2018	◇ ◇ ◇ ◇ ◁
2019	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇
2020	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◁
2021	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇
2022	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇
2023	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇
2024	◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇ ◇
Key: 1 ◇ = 50 employees, ◁ = 25 employees	

(*a*) From the pictograph, we can see that the maximum number of employees is in year 2024 and the total number of symbols used to represent this number is 16.

(*b*) The symbols used to represent the total number of employees from 2022 to 2024 are 45.

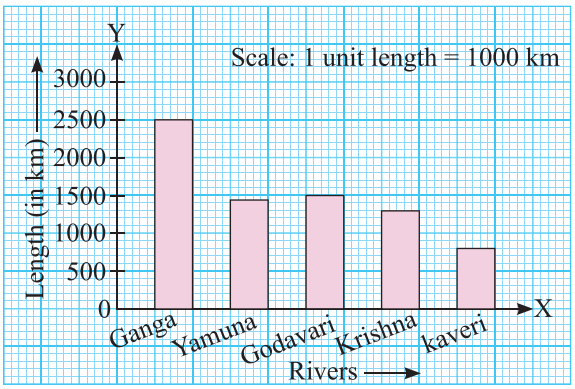
7. We know that LCM × HCF = Product of two numbers

$\Rightarrow 72 \times \text{HCF} = 36 \times 24$

$\Rightarrow \text{HCF} = \dfrac{36 \times 24}{72} = 12$

Thus, the HCF of the given numbers is 12.

8. (*a*)



(*b*) The length of the longest river = 2500 km
The length of the shortest river = 800 km
Difference = 2500 km – 800 km = 1700 km
∴ The difference between the longest and the shortest rivers is 1700 km.

(*c*) The length or river kaveri = 800 km
Thus, the palindromic numbers greater than 800 and less than 830 are 808, 818, 828.

CHAPTER 6 : PERIMETER AND AREA

Let's Recall

1. (*a*) Perimeter (*b*) Perimeter (*c*) Area
(*d*) Area (*e*) Perimeter (*f*) Area

2. (*a*) Side of each small square = 1 units
Area of each small square = 1unit × 1 unit = 1 sq. unit
Area of the figure = 12 × area of each small square = 12 × 1 sq. unit = 12 sq. units
Perimeter of the figure = sum of lengths of all sides of the boundary = 16 × 1 unit = 16 units

(*b*) Same as part (*a*) (*c*) Same as part (*a*)
(*d*) Same as part (*a*)

(*e*) Side of each small square = 1 unit
Area of each small square = 1unit × 1 unit = 1 sq. unit
Area of the figure = 14 × area of each small square = 14 × 1 sq. unit = 14 sq. units
Perimeter of figure = sum of lengths of all sides of the boundary = 30 × 1 unit = 30 units.

Quick Check (Page 177)

1. Perimeter of the figure = sum of lengths of all its side = 30 m + 60 m + 35 m + 40 m + 15 m + 25 m = 205 m

2. Perimeter of the figure = sum of lengths of all its side = 5 m + 2 m + 1 m + 2 m + 1 m + 2 m + 1 m + 6 m + 8 m + 12 m = 40 m.

Think and Answer (Page 179)

Perimeter of a regular hexagon = sum of length of all its sides

$\Rightarrow$ 6 × length of each side of hexagon = 24 cm

(∵ regular hexagon has six equal side)

$\Rightarrow$ Length of each side of hexagon = $\dfrac{24 \text{ cm}}{6} = 4$ cm

Now, perimeter of new figure formed = sum of length of all its sides = 4 cm + 4 cm + 4 cm + 4 cm + 4 cm + 4 cm + 4 cm + 4 cm + 4 cm + 4 cm = 10 × 4 cm = 40 cm

Think and Answer (Page 180)

1. To find the distance travelled by Mukulika and Shreya, we find the length (perimeter) of the track run by Mukulika and Shreya.

$\because$ Perimeter of rectangle = 2 (length + breadth)

$\therefore$ Length of the track run by Mukulika in 1 round = 2 (80 m + 50 m) = 2 × 130 m = 260 m

Length of the track run by Mukulika in 4 round = 4 × 260 m = 1040 m

Length of the track run by Shreya in 1 round = 2 (70 m + 40 m) = 2 × 110 m = 220 m

Length of the track run by Shreya in 6 round = 6 × 220 m = 1320 m

$\therefore$ Difference = 1320 m – 1040 m = 280 m

Thus, Shreya runs longer distance than Mukulika by 280 m.

2. (*a*) In 1 round, Mukulika runs 260 m.

So, 260 m + 40 m = 300 m

Thus, point P will be marked when Mukulika covers 1 complete round and next 40 m from starting point, see in figure (A) below.

(*b*) In 1 round, Shreya runs 220 m.

So, 2 × 220 m + 60 m = 500 m

Thus, point Q will be marked when Shreya covers 2 complete rounds, and next 60 m from starting point, see in figure (A) below.

(*c*) In 1 round, Mukulika runs 260 m.

So, 3 × 260 m = 780 m.

In 1 round, Shreya runs 220 m.

So, 4 × 220 m = 880 m.

Thus, to run 1000 m, Mukulika runs 3 complete rounds and Shreya runs 4 complete rounds.

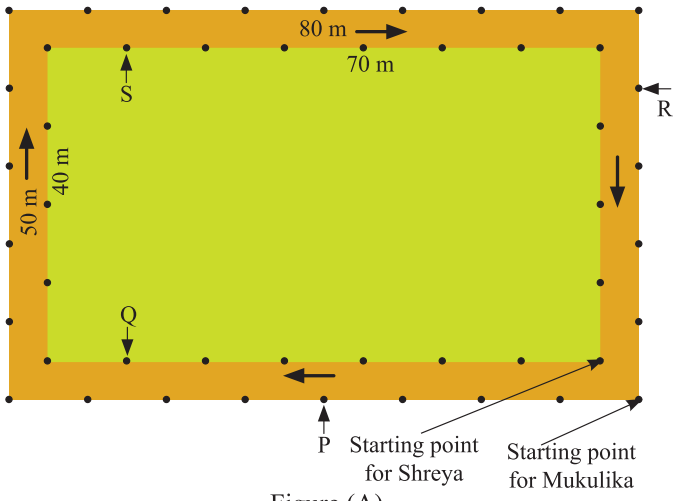


Figure (A)

Also, 780 m + 80 m + 50 m + 80 m + 10 m = 1000 m, i.e., point R

And 880 m + 70 m + 40 m + 10 m = 1000 m, i.e., point Q.

So, points R and S is marked on the figure (A) above.

Practice Time 6A

1. (*a*) We know that the perimeter of the rectangle = 2(length + breadth) = 2 (16 cm + 10 cm) = 2 × 26 cm = 52 cm

(*b*) Same as part (*a*)

2. (*a*) We know that the perimeter of a square = 4 × side of square = 4 × 15 cm = 60 cm

(*b*) Same as part (*a*)

3. (*a*) Side of an equilateral triangle = 10 cm

$\therefore$ Perimeter of an equilateral triangle = sum of lengths of its three sides = 10 cm + 10 cm + 10 cm = 30 cm

(*b*) Lengths of sides of the triangle are 16 cm, 8 cm and 12 cm.

$\therefore$ Perimeter of a triangle = sum of lengths of its three sides = 16 cm + 8 cm + 12 cm = 36 cm

(*c*) Length of two equal sides of an isosceles triangle = 8 cm and length of the third side = 10 cm

$\therefore$ Perimeter of an isosceles triangle = 2 × length of equal sides + length of the third side = 2 × 8 cm + 10 cm = 26 cm

(*d*) Length of the side of regular hexagon = 17 cm

$\therefore$ Perimeter of a regular hexagon = 6 × length of each side of regular hexagon = 6 × 17 cm = 102 cm

4. (*a*) Length of the side of an equilateral triangle = 18 cm

$\therefore$ Perimeter of an equilateral triangle = 3 × length of each side of equilateral triangle = 3 × 18 cm = 54 cm

(*b*) Length of the side of a square = 15 cm

$\therefore$ Perimeter of a square = 4 × length of each side of a square = 4 × 15 cm = 60 cm

(*c*) Length of the side of a regular pentagon = 9 cm

$\therefore$ Perimeter of a the regular pentagon = 5 × length of a each side of regular pentagon = 5 × 9 cm = 45 cm

(*d*) Length of the side of a regular hexagon = 8 cm

∴ Perimeter of a regular hexagon = 6 × length of each side of regular hexagon = 6 × 8 cm = 48 cm

Thus, the square with a side 15 cm has the largest perimeter.

5. Length of the lid = 2 m 15 cm = 200 cm + 15 cm = 215 cm (∵ 1 m = 100 cm)

Breadth of the lid = 2 m 25 cm = 200 cm + 25 cm = 225 cm

Thus, the length of the required tape = perimeter of the lid of rectangular box = 2 (length + breadth) = 2(215 cm + 225 cm) = 2 × 440 cm = 880 cm = 8 m 80 cm

6. Length of the table = 3 m and breadth of the table = 1 m

So, the length of the required steel frame = perimeter of the top of the table

= 2 (length+ breadth) = 2(3 m + 1 m)

= 2 × 4 m = 8 m

7. Length of the rectangular field = 38 m and breadth of the rectangular field = 20 m

∴ Perimeter of the rectangular field = 2(length + breadth) = 2 (38 m + 20 m) = 2 × 58 m = 116 m

So, the cost of fencing the rectangular field = ₹25 × 116 m = ₹2900

Now, the side of the square field = 30 m.

∴ Perimeter of the square field = 4 × side = 4 × 30 m = 120 m

So, the cost of fencing the square field = ₹25 ×120 = ₹3000

∴ The difference of cost of fencing the rectangular field and the square field = ₹3000 – ₹2900 = ₹100

Thus, the cost of fencing a square field is more than the rectangular field by ₹100.

8. Length of a rectangular park = 155 m and breadth of a rectangular field = 145 m

So, perimeter of a rectangular park = 2(length + breadth) = 2(155 m + 145 m) = 2 × 300 m = 600 m

Thus, the cost of fencing a rectangular park = ₹12 × 600 = ₹7200

9. (*a*) Total length of a piece of string = perimeter of an equilateral triangle = 42 cm

∵ Perimeter of an equilateral triangle = 3 × length of each side

∴ 42 cm = 3 × length of each side

$\Rightarrow$ Length of each side = $\frac{42 \text{ cm}}{3} = 14$ cm

(*b*) Total length of a piece of string = perimeter of a regular heptagon = 42 cm

∵ Perimeter of a regular heptagon = 7 × length of each side (∵ regular heptagon has 7 equal sides)

∴ 42 cm = 7 × length of each side

$\Rightarrow$ Length of each side = $\frac{42 \text{ cm}}{7} = 6$ cm

10. Side of the heptagon = 8 m and length of the rectangle = 15 m

Let the breadth of the rectangle be b m.

Since, perimeter of a regular heptagon = perimeter of rectangle

∴ 7 × length of each side of heptagon = 2(length+ breadth)

$\Rightarrow$ $7 \times 8 \text{ m} = 2(15 \text{ m} + b)$

$\Rightarrow$ $56 \text{ m} = 2(15 \text{ m} + b)$

$\Rightarrow$ $15 \text{ m} + b = \frac{56 \text{ m}}{2} = 28 \text{ m}$

$\Rightarrow$ $b = 28 \text{ m} - 15 \text{ m} = 13 \text{ m}$

Thus, the breadth of the rectangle is 13 m.

11. Length of the land = 18 m and the breadth of the land = 9 m

So, Length of the land = perimeter of the land = 2(length + breadth) = 2(18 m + 9 m) = 2 × 27 m = 54 m

Thus, the required length of the wire = 6 × length of the land = 6 × 54 m = 324 m

Practice Time 6B

1. (*a*) Area of each small square box = 1 sq. cm

∴ Area of figure = 16 × area of each small square box = 16 × 1 sq. cm = 16 sq. cm

(*b*) Area of each small square box = 1 sq. cm

Area of portion less than half a square = 0 sq. cm

Area of portion more than half-filled squares = 1 sq. cm

Area of portion Exactly half-filled squares $= \frac{1}{2}$ sq. cm

$\therefore$ Area of figure = 12 × area of each small square box + 8 × area of portion more than half-filled squares + 4 × area of portion less than half a square = 12 × 1 sq.cm + 8 × 1 sq. cm + 4 × 0 sq.cm = 20 sq. cm

(*c*) Same as part (*b*)

(*d*) Area of each small square box = 1 sq. cm; Area of portion exactly half-filled squares $= \frac{1}{2}$ sq. cm

$\therefore$ Area of figure = 6 × area of each small square box + 4 × area of portion exactly half-filled squares = 6×1 sq. cm $+ 4 \times \frac{1}{2}$ sq. cm = 8 sq. cm

(*e*) Area of each small square box = 1 sq. cm; Area of portion exactly half-filled squares = $\frac{1}{2}$ sq. cm; Area of portion more than half-filled squares = 1 sq. cm; Area of portion less than half a square = 0 sq. cm

$\therefore$ Area of figure = 7 × area of each small square box + 3 × area of portion more than half-filled squares + 3 × area of portion exactly half-filled square + 2 × area of portion less than half-filled square = 7×1 sq. cm $+ 3 \times 1$ sq. cm $+ 3 \times \frac{1}{2}$ sq. cm $+ 2 \times 0$ sq. cm = $11\frac{1}{2}$ sq. cm

(*f*) same as part (*e*) (*g*) Same as part (*e*)

(*h*) Same as part (*e*)

2. (*a*) Area of each small square box = 1 sq. cm

$\therefore$ Area of the figure = 12 × area of each small square box = 12 × 1 sq.cm = 12 sq. cm

Length of side of each small square box = 1 cm

$\therefore$ Perimeter of the figure = Sum of length of all sides = 22 × 1 cm = 22 cm

(*b*) Same as part (*a*)

3. Area of each small square = 1 sq. cm;

Area of portion less than half a square = 0 sq. cm; Area of portion more than half-filled squares = 1 sq. cm;

Area of portion exactly half-filled squares = $\frac{1}{2}$ sq. cm

$\therefore$ Area of the figure = 9 × Area of each small square + 18 × area of portion more than half-filled squares + 2 × area of portion exactly half-filled squares + 18 × area of portion less than half a square

$= (9 \times 1 + 18 \times 1 + 2 \times \frac{1}{2} + 18 \times 0)$ sq. cm = 28 sq. cm

Quick Check (Page 185)

1. Length of rectangle = 15 cm

Breadth of rectangle = 8 cm

$\therefore$ Area or rectangle = length × breadth = 15 cm × 8 cm = 120 sq. cm

2. Side of square = 12 cm

$\therefore$ Area of square = side × side = 12 cm × 12 cm = 144 sq. cm

Practice Time 6C

1. Length of rectangle = 18 cm

Breadth of rectangle = 5 cm

So, area of rectangle = length × breadth = 18 cm × 5 cm = 90 sq. cm

2. Side of square park = 60 m

$\therefore$ Area of square park = side × side = 60 m × 60 m = 3600 sq. m

3. Area of hall = length × breadth = 30m × 12 m = 360 sq. m

Area of carpet = length × breadth = 3 m × 2 m = 6 sq. m

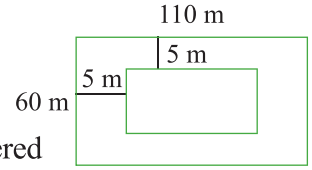
Number of required carpet

$= \frac{\text{Area of hall}}{\text{Area of carpet}} = \frac{360 \text{ sq. cm}}{6 \text{ sq. cm}} = 60$

4. Same as above question.

5. Length of plot = 110 m

Breadth of plot = 60 m



Length of plot which covered with grass

= 110 m – 5 m – 5 m

= 100 m

Breadth of plot which covered with grass

= 60 m – 5 m – 5 m = 50 m

$\therefore$ Area of plot laid with grass = Length × breadth = 100 m × 50 m = 5000 sq. m

6. Area of piece of land = length × breadth = 7 m × 5 m = 35 sq. m

Area of each flower bed = side × side = 2 m × 2 m = 4sq. m

So, the area of the remaining part of the land = Area of piece of land – 4 × Area of each flower bed = 35 sq. m – 4 × 4 sq. m = 35 sq. m – 16 sq. m = 19 sq. m

7. Area of room = length × breadth = 12 m × 10 m = 120 sq. m = 1200000 sq. cm

Area of brick = length × breadth = 20 cm × 6 cm = 120 sq. cm

∴ Required number of bricks

$$= \frac{\text{Area of room}}{\text{Area of brick}} = \frac{1200000 \text{ sq.cm}}{120 \text{ sq.cm}} = 10000$$

Now, cost of 100 bricks = ₹220

∴ Cost of 10000 bricks = ₹220 × 100 = ₹22000

8. Length of piece of cloth = 4 m = 400 cm

(∴ 1 m = 100 cm)

Breadth of piece of cloth = 1 m 50 cm = 150 cm

Area of a piece of cloth = Length × breadth = 400 cm × 150 cm = 60000 sq. cm = 6 sq. m

9. Let the length of the rectangle be l cm.

Now, Area of the rectangle = length × breadth

⇒ 750 sq. m = l × 25 m

$$\Rightarrow l = \frac{750 \text{ sq.m}}{25 \text{ m}} = 30 \text{ m}$$

So, perimeter of rectangle = 2(length + breadth) = 2(30 m + 25 m) = 2 × 55 m = 110 m

10. Area of room = length × breadth = 24 m × 14 m = 336 sq. m

Since, a border with square tiles of 1m are laid on all along its sides.

So, length of room excluding tiles = (24 – 1 – 1) m = 22 m and breadth of room excluding tiles = (14 – 1 –1) m = 12 m

∴ Area of floor excluding tile = 22 m × 12 m = 264 sq. m

Thus, area of border = 336 sq. m – 264 sq. m = 72 sq. m

Since, area of a tile = 1 sq. m

Thus, the number of such tiles required

$$= \frac{72 \text{ sq.m}}{1 \text{ sq.m}} = 72$$

11. Let the breadth of rectangle is b cm.

Now, area of rectangle = area of square

⇒ length × breadth = side ×side

⇒ 25 cm × b = 20 cm × 20 cm

$$\Rightarrow b = \frac{400 \text{ sq.cm}}{25 \text{ cm}} = 16 \text{ cm}$$

⇒ Thus, the required breadth of the rectangle is 16 cm.

12. Let the side of square be a unit

Area of square = side ×side = a unit × a unit = a^2 sq. units

New length of side of square = $2a$ unit

So, new area of square = $2a \times 2a$ sq. units = $4a^2$ sq. units

So, new area of square = 4 × area of square

Thus, when the side of a square is doubled, the area becomes quadrupled (4 times).

13. Area of tiles = length × breadth = 12 cm × 5 cm = 60 sq. cm

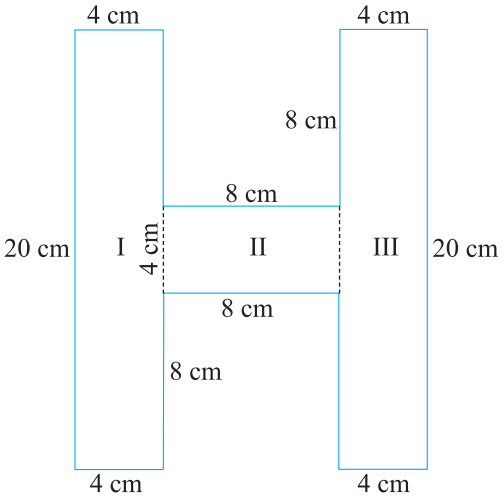
(a) Area of rectangular region = length × breadth = 200 cm × 144 cm = 28800 sq. cm

∴ Required number of tiles =

$$\frac{\text{Area of rectangular region}}{\text{Area of tiles}} = \frac{28800 \text{ sq.cm}}{60 \text{ sq.cm}} = 480$$

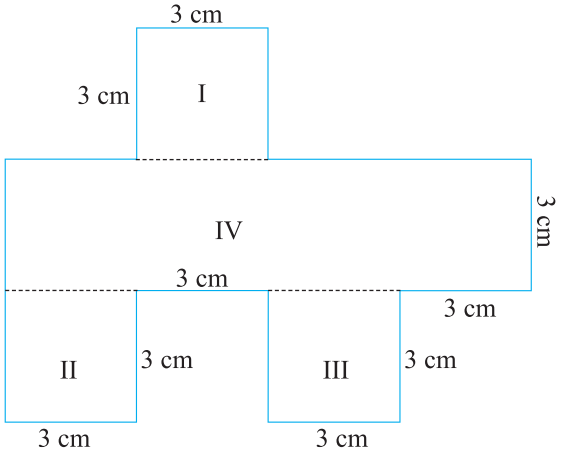
(b) Same as part (a)

14. (a) Perimeter of the figure = Sum of all its side = 20 cm + 4 cm + 8 cm + 8 cm + 8 cm + 4 cm + 20 cm + 4 cm + 8 cm + 8 cm + 8 cm + 4 cm = 104 cm



Area of the figure = Area of region I + area of region II + area of region III = 20 cm × 4 cm + 8 cm × 4 cm + 20 cm × 4 cm = 80 sq. cm + 32 sq. cm + 80 sq. cm = 192 sq. cm

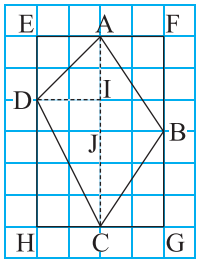
(b) Perimeter of the figure = Sum of all its side = 6 cm + 3 cm + 3 cm + 3 cm + 3 cm + 6 cm + 3 cm + 3 cm + 3 cm + 3 cm + 3 cm + 3 cm + 3 cm + 3 cm = 48 cm



Area of the figure = Area of region I + area of region II + area of region III + area of region IV = 3 cm × 3 cm + 3 cm × 3 cm + 3 cm × 3 cm + 12 cm × 3 cm = 9 sq. cm + 9 sq. cm + 9 sq. cm + 36 sq. cm = 63 sq. cm

Quick Check (Page 191)

1.



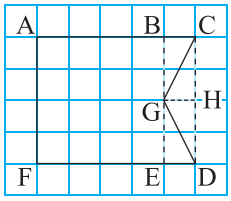
Area of figure ABCD = area of triangle ADI + area of triangle DIC + area of triangle ABC

$= \frac{1}{2}$ area of rectangle AEDI + $\frac{1}{2}$ area of rectangle DICH + $\frac{1}{2}$ area of rectangle AFGC

$= \frac{1}{2} \times (2 \times 2)$ sq units + $\frac{1}{2} \times (4 \times 2)$ sq units + $\frac{1}{2} \times (6 \times 2)$ sq units

= 2 sq. units + 4 sq. units + 6 sq. units = 12 sq. units

2.



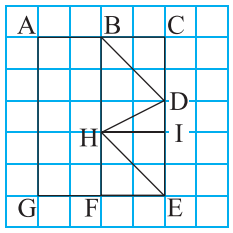
Area of figure ACGDF = area of square ABEF + area of triangle BCD + area of triangle GED

= (4 ×4) sq. units + $\frac{1}{2}$ area of rectangle BCHG + $\frac{1}{2}$ area of rectangle GHDE

= 16 sq. units + $\frac{1}{2} \times (2 \times 1)$ sq. units + $\frac{1}{2}$ (2×1) sq. units

= 18 sq. units.

3.



Area of figure ABDHEG = area of rectangle ABFG + area of triangle BDH + area of triangle HEF

= (5 × 2) sq. units + $\frac{1}{2}$ area of rectangle BCIH + $\frac{1}{2}$ area of rectangle HDEF

= 10 sq. units + $\frac{1}{2} \times (3 \times 2)$ sq. units + $\frac{1}{2} \times (2 \times 2)$ sq. units

= 10 sq. units + 3 sq. units + 2 sq. units

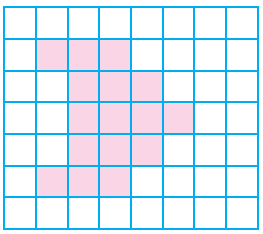
= 15 sq. units

In actual calculations, figure 2 has the greatest area.

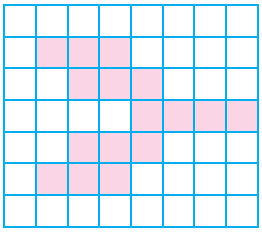
Think and Answer (Page 191)

1. Perimeter of Rahul's shading = sum of all sides = 26 units

Let us shift a unit square in two different places, then perimeter is as follows:



Perimeter of the figure = Sum of all side = 22 units

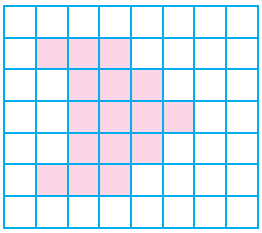


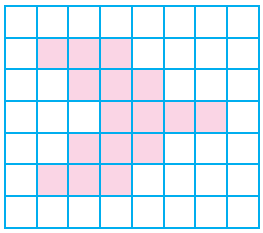
Perimeter of the figure = Sum of all side = 30 units

Thus, in first figure perimeter decreases and in second figure perimeter increases.

So, the perimeter of the figure is depending on its shape.

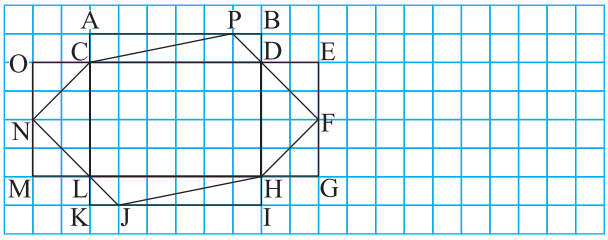
2. The figures with 16 sq. units which have different perimeter are as follows:





Practice Time 6D

1.



Area of the figure = Area of triangle PCD + area of triangle DFH + Area of triangle HJL + Area of triangle CNL + Area of rectangle CDHL = $\frac{1}{2}$ area of rectangle ABDC + $\frac{1}{2}$ area of rectangle DEGH + $\frac{1}{2}$ area of rectangle LHIK + area of rectangle OCLM + Area of rectangle CDHL

$= \frac{1}{2} \times (6 \times 1)$ sq. units + $\frac{1}{2} \times (4 \times 2)$ sq. units + $\frac{1}{2} \times (6 \times 1)$ sq. units + $\frac{1}{2} \times (4 \times 2)$ sq. units + (6×4) sq. units

= 3 sq. units + 4 sq. units + 3 sq. units + 4 sq. units + 24 sq. units

= 38 sq. units

2. Given that area of rectangle = 6 cm × 8 cm + 5 cm × 10 cm = 48 sq. cm + 50 sq. cm = 98 sq. cm

So, the possible dimension of the rectangle with area 98 sq. cm are 1 cm × 98 cm; 2 cm × 49 cm; 7 cm × 14 cm.

3. Perimeter of square = Sum of perimeter of two rectangles = 2(10 cm + 9 cm) + 2(6 cm + 7 cm)

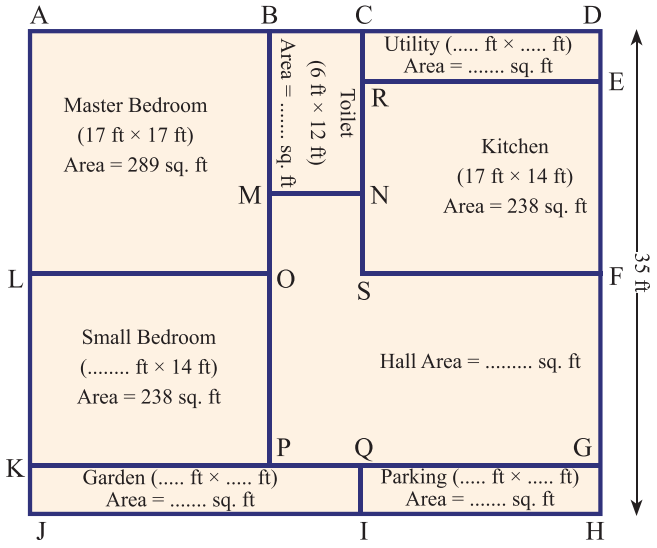
= 38 cm + 26 cm = 64 cm

We know that perimeter of square = 4 × side

$\Rightarrow$ 64 cm = 4 × side

$\Rightarrow$ Side $= \frac{64 \text{ cm}}{4} = 16$ cm

5. (*a*)



Toilet measurement = BC × BM = 6 ft × 12 ft; Area = 6 ft × 12 ft = 72 sq. ft

Master bedroom measurement = AB × AL = 17 ft × 17 ft = 289 sq. ft

So, AB = LO = 17 ft = AL = BO

$\therefore$ Small bedroom measurement = LO × Lk = 17 ft × 14 ft = 238 sq. ft

Now, BC = 6 ft = PQ and KP = LO = 17 ft

So, KQ = KP + PQ = 17 ft + 6 ft = 23 ft

Since, in kitchen measurement, RE = 17 ft = SF = CD, RS = EF = 14 ft

And AL = BO = CS = DF = 17 ft,

So, DE = DF – EF = 17 ft – 14 ft = 3 ft

So, utility measurement = CD × DE = 17 ft × 3 ft = 51 sq. ft

Now, LK = OP = FG = SQ = 14 ft and DH = 35 ft

So, GH = DH – DE – EF – FG = 35 ft – 3 ft – 14 ft – 14 ft = 4 ft and GH = QI = KJ = 4 ft

So, garden measurement = KQ × KJ = 23 ft × 4 ft = 92 sq. ft

Parking measurement = QG × GH = 17 ft × 4 ft = 68 sq. ft ($\because$ QG = RE)

Now, MO = NS = BO – BM = 17 ft – 12 ft = 5 ft; MN = BC = 6 ft

And PG = OF = PQ + QG = BC + CD = 6 ft + 17 ft = 23 ft

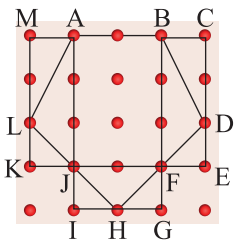
Hall area = area of POFG + area of MNSO = OP × PG + MN × MO = 14 ft × 23 ft + 6 ft, × 5 ft = 322 sq. ft + 30 sq. ft = 352 sq. ft

(*b*) Since, AD = AB + BC + CD = (17 + 6 + 17) ft = 40 ft and DH = 35 ft

$\therefore$ Area of rectangular plot = AD × DH = 40 ft× 35 ft = 1400 sq. ft

Practice Time 6E

1. (*a*)



By chop method, Area of the given figure = Area of triangle ALJ + Area of triangle BDF + Area of triangle JHF + Area of rectangle ABFJ

$= \frac{1}{2}$ area of rectangle AJKM + $\frac{1}{2}$ area of rectangle BCEF + $\frac{1}{2}$ area of rectangle JFGI + $\frac{1}{2}$ area of rectangle ABFJ

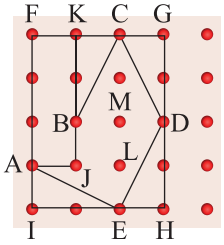
$= \frac{1}{2} \times (3 \times 1)$ sq. units + $\frac{1}{2} \times (3 \times 1)$ sq. units + $\frac{1}{2} \times (2 \times 1)$ sq. units + (3 × 2) sq. units

$= \frac{3}{2}$ sq. units + $\frac{3}{2}$ sq. units + 1 sq. units + 6 sq. units = 10 sq. units

(*b*) Same as part (*a*) (*c*) Same as part (*a*)

(*d*) Same as part (*a*) (*e*) Same as part (*a*)

2. (*a*) Build a rectangle completely around the shape and count the number of unit squares to find the area of the complete figure.



Area of rectangle FGHI = (4 × 3) sq. units = 12 sq. units

Now, chop the figure to get the area of the figure AJBCDE.

Area of the figure ABCDE = Area of rectangle FGHI – Area of rectangle AFKJ – Area of triangle BKC – Area of triangle CGD – Area of triangle DHE – Area of triangle AIE

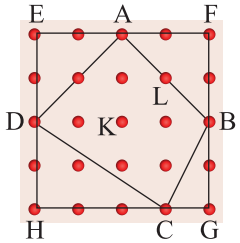
= Area of rectangle FGHI – Area of rectangle AFKJ – $\frac{1}{2}$ Area of rectangle BKCM – $\frac{1}{2}$ Area of rectangle CGDM – $\frac{1}{2}$ Area of rectangle DHEM – $\frac{1}{2}$ Area of rectangle ALEI

$= (12 - (3 \times 1) - \frac{1}{2} \times (2 \times 1) - \frac{1}{2} \times (2 \times 1) - \frac{1}{2} \times (2 \times 1) - \frac{1}{2} \times (2 \times 1))$ sq. units

= 5 sq. units

(*b*) Same as part (*a*) (*c*) Same as part (*a*)

3. (*a*) Build a rectangle completely around the shape and count the number of unit squares to find the area of the complete figure.



Now, chop the figure to get the area of the quadrilateral ABCD.

Area of quadrilateral ABCD = Area of square EFGH – Area of triangle AED – Area of triangle AFB – Area of triangle BGC – Area of triangle DHC

$= \text{Area of square EFGH} - \frac{1}{2}\text{ Area of rectangle AEDK} - \frac{1}{2}\text{ Area of rectangle AFBK} - \frac{1}{2}\text{Area of rectangle BLCG} - \frac{1}{2}\text{Area of rectangle DLCH}$

$= (4 \times 4)\text{ sq. units} - \frac{1}{2} \times (2 \times 2)\text{ sq. units} - \frac{1}{2} \times (2 \times 2)\text{ sq. units} - \frac{1}{2} \times (2 \times 1)\text{ sq. units} - \frac{1}{2} \times (3 \times 2)\text{ sq. units}$

= 8 sq. units

(*b*) Same as part (*a*) (*c*) Same as part (*a*)

4. (*a*) Area of P = 2 unit square + 4 half square = 2 × 1 sq. units + 4 × $\frac{1}{2}$ sq. units = 4 sq. units

Area of R = 6 unit square + 4 half square = 6 × 1 sq. units + 4 × $\frac{1}{2}$ sq. units = 8 sq. units

Area of Q = 4 unit square + 8 half square = 4 × 1 sq. units + 8 × $\frac{1}{2}$ sq. units = 8 sq. units

Area of S = 2 unit square + 4 half square = 2 × 1 sq. units + 4 × $\frac{1}{2}$ sq. units = 4 sq. units

Area of T = 6 unit square + 4 half square = 6 × 1 sq. units + 4 × $\frac{1}{2}$ sq. units = 8 sq. units

Area of U = 12 unit square + 8 half square = 12 × 1 sq. units + 8 × $\frac{1}{2}$ sq. units = 16 sq. units

Area of V = 12 unit square + 8 half square = 12 × 1 sq. units + 8 × $\frac{1}{2}$ sq. units = 16 sq. units

(*b*) P and S have the same area; U and V have the same area. Q, R and T are three different shapes but they have the same area.

(*c*) Perimeter of shape P = 4 straight units (s) + 4 diagonal units (*d*) = 4s + 4d units

Perimeter of shape R = 8 straight units (s) + 4 diagonal units (*d*) = 8s + 4d units

Perimeter of shape Q = 8 diagonal units (*d*) = 8d units

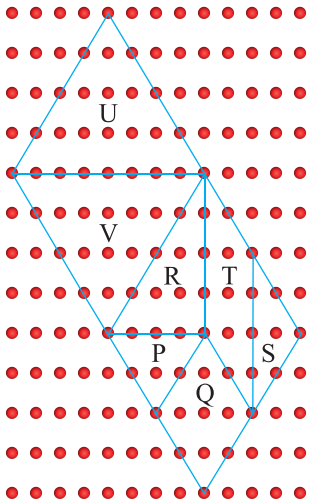
Perimeter of shape S = 4 straight units (s) + 4 diagonal units (*d*) = 4s + 4d units

Perimeter of shape T = 8 straight units (s) + 4 diagonal units (*d*) = 8s + 4d units

Perimeter of shape U = 8 straight units (s) + 8 diagonal units (*d*) = 8s + 8d units

Perimeter of shape V = 8 straight units (s) + 8 diagonal units (*d*) = 8s + 8d units

(*d*) Yes we are rearrange the seven pieces to form a rectangle.



Mental Maths (Page 199)

1. Area of rectangle = Length × breadth = 125 cm × 1m = 125 cm × 100 cm = 12500 sq. cm

(∵ 1 m = 100 cm)

2. Perimeter of a square park = 4 × side = 4 × 250 m = 1000 m

So, cost of fencing a square park = ₹20 × 1000 = ₹20000

3. Perimeter of rectangular shape string = 2(length + breadth) = 2(20 cm + 10 cm) = 60 cm

Since, Perimeter of rectangular shape string = Perimeter of square shape

$\Rightarrow$ $60 \text{ cm} = 4 \times \text{side}$

$\Rightarrow$ $\text{Side} = \frac{60 \text{ cm}}{4} = 15 \text{ cm}$

$\therefore$ Length of each side of a square is 15 cm.

4. Distance travelled by a person in one round of a square park = perimeter of square park

$= 4 \times \text{side}$

$= 4 \times 80 \text{ m}$

$= 320 \text{ m}$

$\therefore$ Total distance travelled by a person in six rounds of a square park = $6 \times 320 \text{ m} = 1920 \text{ m}$

5. Let length of the rectangular field is l cm

Now, perimeter of rectangular field = 2(length + breadth)

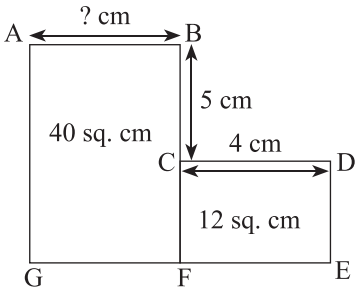
$\Rightarrow$ $320 \text{ m} = 2(l + 60 \text{ cm})$

$\Rightarrow$ $l + 60 \text{ cm} = 160 \text{ cm}$

$\Rightarrow$ $l = 160 \text{ cm} - 60 \text{ cm} = 100 \text{ cm}$

So, area of rectangular field = length × breadth = 100 cm × 60 cm = 6000 sq. cm

6. (*a*)



Area of rectangle CDEF = CD × CF

$\Rightarrow$ 12 sq. cm = 4cm × CF

$\Rightarrow$ $\text{CF} = \frac{12 \text{ sq.cm}}{4 \text{ cm}} = 3 \text{ cm}$

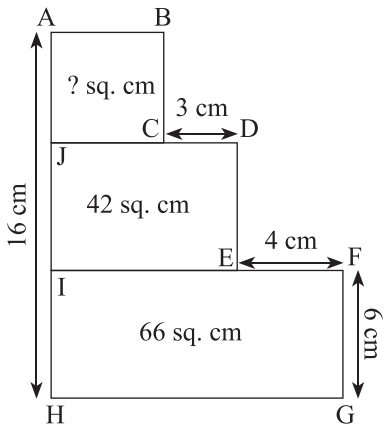
So, BF = BC + CF = 5 cm + 3 cm = 8 cm

Now, Area of rectangle ABFG = AB × BF

$\Rightarrow$ 40 sq. cm = AB × 8cm

$\Rightarrow$ $\text{AB} = \frac{40 \text{ sq.cm}}{8 \text{ cm}} = 5 \text{ cm}$

(*b*)



Area of HIFG = IF × FG

$\Rightarrow$ 66 sq. cm = IF × 6 cm

$\Rightarrow$ $\text{IF} = \frac{66 \text{ sq.cm}}{6 \text{ cm}} = 11 \text{ cm}$

Now IE = JD = IF – EF = 11 cm – 4 cm = 7 cm

Also, JC = JD – CD = 7 cm – 3 cm = 4 cm = AB

Now, area of rectangle JDEI = JD × JI

$\Rightarrow$ 42 sq. cm = 7 cm × JI

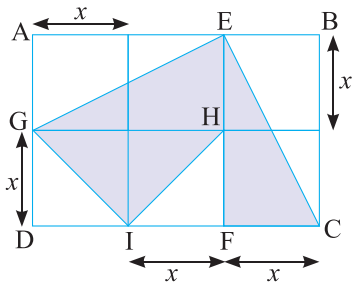
$\Rightarrow$ $\text{JI} = \frac{42 \text{ sq.cm}}{7 \text{ cm}} = 6 \text{ cm}$

So, AJ = AH – JI – HI = 16 cm – 6 cm – 6 cm = 4 cm

$\therefore$ Area of ABCJ = AB × AJ = 4 cm × 4 cm = 16 sq. cm

Brain Sizzlers (Page 200)

1.



Let the length of each side of square is x as the given figure contains the 6 identical squares.

So AB = $3x$ and AD = $2x$

Now, Perimeter of the rectangular land = 2(AB + AD) = $2(3x + 2x) = 10x$

$\Rightarrow$ $40 \text{ m} = 10x$

$\Rightarrow$ $x = \frac{40 \text{ m}}{10} = 4 \text{ m}$

Now area of the land used to grow vegetables = Area of triangle GEH + Area of triangle CEF + Area of triangle GIH

$= \frac{1}{2} \times$ area of rectangle AEHG + $\frac{1}{2} \times$ area of rectangle BCFE + $\frac{1}{2} \times$ area of rectangle DGHF

$= \frac{1}{2} \times (AE \times HE) + \frac{1}{2} \times (BE \times EF) + \frac{1}{2} \times (HG \times GD)$

$= \frac{1}{2} \times (8\text{ m} \times 4\text{ m}) + \frac{1}{2} \times (4\text{ m} \times 8\text{ m}) + \frac{1}{2} \times (8\text{ m} \times 4\text{ m})$

= 48 sq. m

Chapter Assessment

A.

1. In regular decagon, all sides are equal.

∴ Perimeter of regular decagon = sum of all sides = 10 × side = 10 × 8 cm = 80 cm

Hence, the correct answer is option (*b*).

2. Two plane figures A and B coincide with each other if they should completely overlap each other which is only possible when they have same shape and same size. Thus, they have equal areas and perimeters.

Hence, the correct answer is option (*c*).

3. Let the square of side $2x$ units cut into two identical rectangles.

Then, length of rectangle = $2x$ units and breadth of rectangle = x units

So, Perimeter of square = 4 × side = 4 × $2x$ units = $8x$ units

And perimeter of 2 identical rectangles = 2 × 2(length + breadth) = $4(2x + x)$ units = $12x$ units

∴ $12x = 1\frac{1}{2} \times 8x$

Also, area of square = side × side = $(2x \times 2x)$ sq. units = $4x^2$ sq. units

And area of 2 identical rectangles = 2(length × breadth) = $2(2x \times x)$ sq. units = $4x^2$ sq. units

Hence, the correct answer is option (*c*).

4. Number of required tiles

$$= \frac{\text{Area of floor}}{\text{Area of each tile}} = \frac{8100\text{ sq.m}}{0.9\text{ m} \times 0.9\text{ m}} = 10000$$

Hence, the correct answer is option (*a*).

5. Let the new side of square = 3 × side of square = 3 × 12 cm = 36 cm

Perimeter of given square = 4 × side = 4 × 12 cm = 48 cm

And perimeter of new square = 4 × side = 4 × 36 cm = 144 cm = 3 times the perimeter of given square.

Hence, the correct answer is option (*b*).

B.

1. (*a*) Area of square = side × side

⇒ 64 sq. m = side × side ⇒ side = 8 m

So, perimeter of a square = 4 × side = 4 × 8 m = 32 m

∴ Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion. Thus, the correct answer is options (*a*).

2. (*c*) Since the length of the wire is same, so the perimeter will be same no matter it is square rectangle or triangle.

But, side of square, rectangle and triangle are not always same.

So, Assertion (A) is true but Reason (R) is false.

∴ The correct answer is option (*c*).

C.

1. Area of a rectangular ground = 30 m × 24 m = 720 sq. m

So, the cost of levelling a rectangular ground = ₹1.25 × 720 = ₹900

Thus, the given statement is true.

2. Perimeter of a square = 4 × side = 16 cm

$\Rightarrow$ side = $\frac{16\text{ cm}}{4} = 4$ cm

Then the area of the square = side × side = 4 cm × 4 cm = 16 sq. cm

Thus, the given statement is true.

3. Let the side of square = x unit, so the length of rectangle formed by joining identical squares = $2x$ unit and the breadth of rectangle formed by joining identical squares = x unit.

So, perimeter of square = $4x$ unit

And perimeter of rectangle = $2(2x \text{ unit} + x \text{ unit})$ = $6x$ unit

Thus, the given statement is false.

4. Length of rectangle = l, then new length = $\frac{l}{2}$;

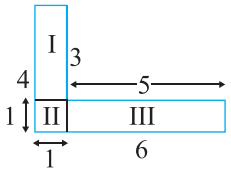
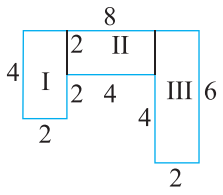
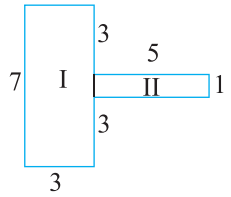
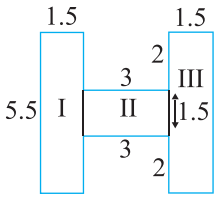
Breadth of rectangle = b, then new breadth = $3b$

So, area of rectangle = length × breadth = $l \times b$;

And, new area of rectangle = $\frac{l}{2} \times 3b = \frac{3}{2} lb$

Thus, the given statement is false.

D.

Figure	Perimeter	Area
1. 	Perimeter = Sum of all sides = (4 + 1 + 3 + 5 + 1 + 6) units = 20 units	Area = Area of (region I + region II + region III) = (3 × 1 + 1 × 1 + 5 × 1) sq. units = 9 sq. units 1 → (*d*) → (*ii*)
2. 	Perimeter = Sum of all sides = 4 + 8 + 6 + 2 + 4 + 4 + 2 + 2) units = 32 units	Area = Area of (region I + region II + region III) = [(4 × 2) + (2 × 4) +(6 × 2)] sq. units = (8 + 8 + 12) sq. units = 28 sq. units 2 → (*c*) → (*i*)
3. 	Perimeter = Sum of all sides = (7 + 3 + 3 + 5 + 1 + 5 + 3 + 3) units = 30 units	Area = Area of (region I + region II) = [(7 × 3) + (5 × 1)] sq. units = (21 + 5) sq. units = 26 sq. units 3 → (*b*) → (*iv*)
4. 	Perimeter = Sum of all sides = (5.5 + 1.5 + 2 + 3 + 2 + 1.5 + 5.5 + 1.5 + 2 + 3 + 2 + 1.5) units = 31 units	Area = Area of (region I + region II + region III) = [(5.5 × 1.5) + (3 × 1.5) + (5.5 × 1.5)] sq. units = (16.5 + 4.5) sq. units = 21 sq. units 4 → (*a*) → (*iii*)

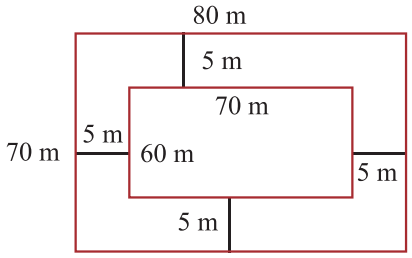
E.

1. Number of marble slabs required

$$= \frac{\text{Area of square shape floor}}{\text{Area of each marble slab}}$$

$$= \frac{3 \text{ m} \times 3 \text{ m}}{30 \text{ cm} \times 30 \text{ cm}}$$

$$= \frac{300 \text{ cm} \times 300 \text{ cm}}{30 \text{ cm} \times 30 \text{ cm}} = 100 \quad (\because \ 1 \text{ m} = 100 \text{ cm})$$

2. 

Length of the inner rectangular plot = 70 m

Breadth of the inner rectangular plot = 60 m

∴ Length of the outer rectangular plot = (70 + 5 + 5) m = 80 m;

Breadth of the outer rectangular plot = (60 + 5 + 5) m = 70 m

So, Area of the inner rectangular plot = length × breadth = 60 m × 70 m = 4200 sq. m

Area of the outer rectangular plot = length × breadth = 70 m × 80 m = 5600 sq. m

Thus, the area of the lawn = Area of Outer rectangular plot – Area of inner rectangular plot

= 5600 sq. m – 4200 sq. m

= 1400 sq. m

3. Length of Garden with road = 20 m + 1 m + 1 m

= 22 m

Breadth of Garden with road = 5 m + 1 m + 1 m

= 7 m

Area of rectangular garden = length × breadth = 20 m × 5 m = 100 sq. m

Area of rectangular garden with road = length × breadth = 22 m × 7 m = 154 sq. m

So, the area of the road = Area of rectangular garden with road – Area of rectangular garden

= 154 sq. m – 100 sq. m = 54 sq. m

Thus, the cost of metalling the road at 200 per sq. m = ₹200 × 54 = ₹10800

4. Number of required square shaped tin sheets

$$= \frac{\text{Area of lagrer square tin sheet}}{\text{Area of smaller square tin sheet}}$$

$$= \frac{1\text{ m} \times 1\text{ m}}{20\text{ cm} \times 20\text{ cm}}$$

$$= \frac{100\text{ cm} \times 100\text{ cm}}{20\text{ cm} \times 20\text{ cm}} = 25 \qquad [\because \quad 1\text{ m} = 100\text{ cm}]$$

5. Perimeter of rectangular field = 2(length + breadth)

$\Rightarrow$ 200 m = 2(length + 40 m)

$\Rightarrow$ length + 40 m = $\frac{200\text{ m}}{2}$ = 100 m

$\Rightarrow$ length = 100 m – 40 m = 60 m

So, the area rectangular field = length × breadth = 60 m × 40 m = 2400 sq. m

6. Number of required marble tiles

$$= \frac{\text{Area of wall}}{\text{Area of each tile}} = \frac{4\text{ m} \times 3\text{ m}}{30\text{ cm} \times 25\text{ cm}}$$

$$= \frac{400\text{ cm} \times 300\text{ cm}}{30\text{ cm} \times 25\text{ cm}} = 160$$

7. Area of floor of bathroom = length × breadth = 5 m × 3 m 50 cm = 500 cm × 350 cm = 175000 sq. cm

Area of square tiles = side × side = 25 cm × 25 cm = 625 sq. cm

Required number of tiles

$$= \frac{\text{Areaof floor of bathroom}}{\text{Area of square tile}}$$

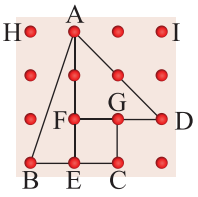
$$= \frac{175000\text{ sq.cm}}{625\text{ sq.cm}} = 280$$

Thus, the cost of tiles at the rate of ₹60 per tile

= ₹60 × 280

= ₹16800

8.



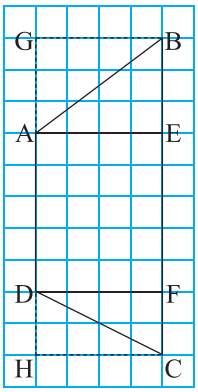
Area of the figure ABCGD = Area of triangle ABE + Area of triangle AFD + Area of rectangle FECG

$= \frac{1}{2}$ × area of rectangle AEBH + $\frac{1}{2}$ × area of rectangle AIDF + area of rectangle FECG

$= \frac{1}{2} \times (3 \times 1)$ sq. units + $\frac{1}{2} \times (2 \times 2)$ sq. units + (1×1) sq. units

$= \frac{3}{2}$ sq. units + 2 sq. units + 1 sq. units = $4\frac{1}{2}$ sq. units

9. (*a*) Area of the quadrilateral ABCD = Area of triangle ABE + Area of triangle DFC + Area of rectangle AEFD



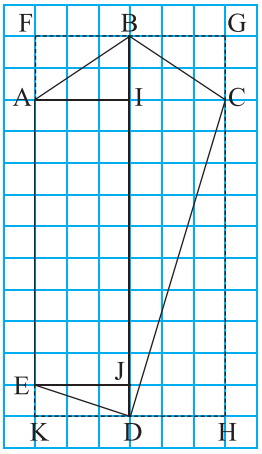
$= \frac{1}{2}$ area of rectangle AEBG + $\frac{1}{2}$ area of rectangle DFCH + area of rectangle AEFD

$= \frac{1}{2} \times (4 \times 3)$ sq. units + $\frac{1}{2}$ × (4 × 2) sq. units + (5 × 4) sq. units

= 6 sq. units + 4 sq. units + 20 sq. units

= 30 sq. units

(*b*)



Area of the figure ABCDE = area of triangle ABI + area of triangle EJD + area of triangle BCI + area of triangle CID + area of rectangle AIJE

$= \frac{1}{2} \times$ area of rectangle AIBF + $\frac{1}{2} \times$ area of rectangle EJDK + $\frac{1}{2} \times$ area of rectangle BGCI + $\frac{1}{2} \times$ area of rectangle CHDI + $\frac{1}{2} \times$ area of rectangle AIJE

$= \frac{1}{2} \times (3 \times 2)$ sq. units + $\frac{1}{2} \times (3 \times 1)$ sq. units + $\frac{1}{2} \times (3 \times 2)$ sq. units + $\frac{1}{2} \times (10 \times 3)$ sq. units + (9×3) sq. units

$= 3$ sq. units + $\frac{3}{2}$ sq. units + 3 sq. units + 15 sq. units + 27 sq. units

$= 49\frac{1}{2}$ sq. units

10. (*a*) Total area of a badminton court = 44 ft × 20 ft = 880 sq. ft

(*b*) Length of badminton court including clearance area = 44 ft + 2 ft + 2 ft = 48 ft

Breadth of badminton court including clearance area = 20 ft + 2 ft + 2 ft = 24 ft

∴ Perimeter of badminton court including clearance area = 2(length + breadth) = 2(48 ft + 24 ft) = 144 ft = 43.89 m

(*c*) Length of the net = 6.1 m;

Height/Breadth of the net = 1.55 m − 0.76 m = 0.76 m

(*d*) Perimeter of the net = 2(length + breadth)
= 2(6.1 m + 0.79 m)
= 13.78 m

Area of the net = length × breadth
= 6.1 m × 0.79 m
= 4.819 sq. m

CHAPTER 7 : FRACTIONS

Let's Recall

1. An Improper fraction has the numerator greater than or equal to the denominator. So, option (*b*) is correct.

2. Fraction for shaded parts

$= \frac{\text{Number of shaded parts}}{\text{Total number of parts}}$

(*a*) $\frac{5}{8}$ (*b*) $\frac{2}{4}$ (*c*) $\frac{4}{8}$ (*d*) $\frac{2}{3}$

3. (*a*) $\frac{5}{8}$ (*b*) $\frac{7}{8}$ (*c*) $\frac{3}{8}$ (*d*) $\frac{1}{8}$

Hence the correct option is (*c*).

4. (*a*) $\frac{5}{17}$ (*b*) $\frac{4}{9}$ (*c*) $\frac{3}{8}$

Quick Check (Page 207)

A week has 7 days.

Hence, fraction of a week with Sunday $= \frac{1}{7}$

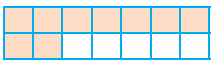
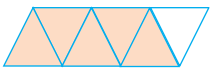
Practice Time 7A

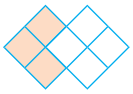
1. (*a*) $\frac{3}{4}$, out of 4 triangles, 3 are shaded.

(*b*) $\frac{3}{5}$, out of 5 triangles, 3 are shaded.

(*c*) $\frac{8}{16}$, out of 16 small squares, 8 are shaded.

(*d*) $\frac{7}{8}$, out of 8 sectors, 7 are shaded.

2. (*a*)  (*b*) 

(*c*) 

3. (*a*) Numerator = 5, Denominator = 9

(*b*) Numerator = 19, Denominator = 71

(*c*) Numerator = 99, Denominator = 101

(*d*) Numerator = 131, Denominator = 1000

4. (*a*) $\frac{1}{6}$ of 12 notebook $= \frac{1}{6} \times 12 = 2$ notebooks.

(*b*) $\frac{1}{6}$ of 24 mangoes $= \frac{1}{6} \times 24 = 4$ mangoes.

(*c*) $\frac{1}{6}$ of 30 toffees $= \frac{1}{6} \times 30 = 5$ toffees.

5. (*a*) 11 hours out of 24 hours in a day $= \frac{11}{24}$

(*b*) 3 Kiwis taken from a total of 8 Kiwis $= \frac{3}{8}$

(*c*) 15 days out of 31 days in December $= \frac{15}{31}$

(*d*) ₹71 out of a total of ₹100 = $\frac{71}{100}$

6. Total balls = 12 + 17 = 29 balls

Fraction of black balls = $\frac{\text{Black ball}}{\text{Total balls}} = \frac{17}{29}$

Practice Time 7B

1. (*i*) A unit fraction has 1 as its numerator.

Here $\frac{1}{5}$ and $\frac{1}{9}$ are unit fraction.

Hence, the correct option (*d*).

(*ii*) In proper fraction,

numerator < denominator.

Hence, the correct option is (*a*).

(*iii*) 1 unit has been divided into 5 subunits. Here the segment starts at 0 and end at the third small division after 1. So, the total length $= 1 + \frac{3}{5} = \frac{8}{5}$

Hence, the correct option is (*c*).

(*iv*) $\frac{93}{15} = 6\frac{3}{15}$

$$\begin{array}{r|l} 15 & 93 \\ & -90 \\ \hline & 3 \end{array}\quad 6$$

Hence, the correct option is (*d*).

2. (*a*) As $\frac{2}{5}$ is a proper fraction, divide the distance between 0 and 1 into 5 equal parts and insert a dot on the 2nd mark counting from 0.

(*b*) As $\frac{3}{8}$ is a proper fraction, divide the distance between 0 and 1 into 8 equal parts and insert a dot on the 3rd mark counting from 0.

(*c*) As $3\frac{1}{4} = 3 + \frac{1}{4}$; divide the distance between 3 and 4 into 4 equal parts and insert a dot on the 1st mark counting from 3.

(*d*) As $5\frac{1}{3} = 5 + \frac{1}{3}$; divide the distance between 5 and 6 into3 equal parts and insert a dot on the 1st mark counting from 5.

3. In like fractions, denominator has to be the same.

$\therefore$ $\frac{2}{9}, \frac{15}{29}, \frac{17}{29}, \frac{19}{29}$ and $\frac{23}{29}$... are five like fractions.

(Answer may vary)

4. (*a*) $1\frac{3}{5} = \frac{5+3}{5} = \frac{8}{5}$

(*b*) $2\frac{3}{8} = \frac{2\times 8+3}{8} = \frac{19}{8}$

(*c*) $5\frac{12}{19} = \frac{5\times 19+12}{19} = \frac{107}{19}$

(*d*) $5\frac{6}{13} = \frac{5\times 13+6}{13} = \frac{71}{13}$

5. (*a*) $\frac{15}{8} = 1\frac{7}{8}$ (*b*) $\frac{43}{7} = 6\frac{1}{7}$

(*c*) $\frac{119}{13} = 9\frac{2}{13}$ (*d*) $\frac{136}{9} = 15\frac{1}{9}$

6. 1 rupee = 100 paise

2009 paisa = $\frac{2009}{100} = 20\frac{9}{100}$

7. Total volunteers = 120

Clean up services = 72

Local food bank = 75

(*a*) Clean up services = $\frac{72}{120}$

(*b*) Local food bank = $\frac{75}{120}$

(*c*) In both services = $\frac{75+72-120}{120}$

$= \frac{147-120}{120} = \frac{27}{120}$

Think and Answer (Page 215)

1. Let the fraction be $\frac{x}{y}$.

Now, $\frac{x}{y} = \frac{35}{9}$

i.e., $x = 35t, y = 9t$

Also, $x + y = 88$

$\Rightarrow 35t + 9t = 88$

$\Rightarrow 44t = 88$

$\Rightarrow t = 2$

So, $x = 35 \times 2 = 70$, $y = 9 \times 2 = 18$ and required fraction $= \frac{x}{y} = \frac{70}{18}$.

Practice Time 7C

1. (*a*) $\frac{1}{3}$ (one portion out of 3 is shaded)

(*b*) $\frac{2}{6}$ (two portions out of 6 are shaded)

(*c*) $\frac{3}{9}$ (three portions out of 9 are shaded)

$\because \frac{1}{3} = \frac{2}{6} = \frac{3}{9}$

Hence, they are equivalent fraction.

2. (*a*) $\frac{5}{6} = \frac{5\times2}{6\times2} = \frac{5\times3}{6\times3} = \frac{5\times4}{6\times4} = \frac{5\times5}{6\times5}$

$\frac{5}{6} = \frac{10}{12} = \frac{15}{18} = \frac{20}{24} = \frac{25}{30}$

So, the four fractions equivalent to $\frac{5}{6}$ are $\frac{10}{12}, \frac{15}{18}, \frac{20}{24}$ and $\frac{25}{30}$.

(*b*) $\frac{3}{8} = \frac{3}{8}\times\frac{2}{2} = \frac{3}{8}\times\frac{3}{3} = \frac{3}{8}\times\frac{4}{4} = \frac{3}{8}\times\frac{5}{5}$

So, the four fractions equivalent to $\frac{3}{4}$ are $\frac{6}{10}, \frac{9}{24}, \frac{12}{32}$ and $\frac{15}{40}$.

(*c*) $\frac{9}{13} = \frac{9}{13}\times\frac{2}{2} = \frac{9}{13}\times\frac{3}{3} = \frac{9}{13}\times\frac{4}{4} = \frac{9}{13}\times\frac{5}{5}$

$\frac{9}{13} = \frac{18}{24} = \frac{27}{34} = \frac{36}{52} = \frac{45}{65}$

So, the four fractions equivalent to $\frac{9}{13}$ are $\frac{18}{26}$, $\frac{27}{39} = \frac{36}{52} = \frac{45}{65}$.

(*d*) $\frac{30}{90} = \frac{30\div2}{90\div2} = \frac{30\div3}{90\div3} = \frac{30\div5}{90\div5} = \frac{30\div10}{90\div10}$

$\frac{30}{90} = \frac{15}{45} = \frac{10}{30} = \frac{6}{18} = \frac{3}{9}$

So, the four fractions equivalent to fractions $\frac{30}{90}$ are $\frac{15}{45}, \frac{10}{30}, \frac{6}{18}$ and $\frac{3}{9}$

(Answer may vary)

3. (*a*) $\frac{30}{72} = \frac{30}{72}\times\frac{2}{2} = \frac{60}{144}$

(*b*) $\frac{30}{72} = \frac{30\div6}{72\div6} = \frac{5}{12}$

(*c*) $\frac{30}{72} = \frac{30}{72}\times\frac{4}{4} = \frac{120}{288}$

(*d*) $\frac{30}{72} = \frac{30\div3}{72\div3} = \frac{10}{24}$

4. (*a*) $\frac{5}{7} = \frac{5}{7}\times\frac{5}{5} = \frac{25}{35}$

Hence, $\frac{5}{7}$ and $\frac{25}{35}$ are equivalent fractions.

(*b*) $\frac{11}{17} = \frac{11}{17}\times\frac{4}{4} = \frac{44}{68}$

Hence, $\frac{11}{17}$ and $\frac{44}{68}$ are equivalent fractions.

(*c*) $\frac{23}{77} = \frac{23}{77}\times\frac{2}{2} = \frac{46}{154}$

$\therefore \frac{23}{77} = \frac{46}{154} \neq \frac{46}{164}$

Hence, $\frac{23}{77}$ and $\frac{46}{164}$ are not equivalent fractions.

5. (*a*) $\frac{13}{169} = \frac{13\div13}{169\div13} = \frac{1}{13}$

(*b*) $\frac{102}{119} = \frac{102\div17}{119\div17} = \frac{6}{7}$

(*c*) $\frac{175}{275} = \frac{175\div25}{275\div25} = \frac{7}{11}$

(*d*) $\frac{840}{1700} = \frac{840\div20}{1700\div20} = \frac{42}{85}$

6. (*a*) $\frac{3}{8} = \frac{\square}{72}$

$\frac{3}{8} = \frac{3\times 9}{8\times 9} = \frac{\boxed{27}}{72}$

(*b*) $\frac{136}{144} = \frac{136\div 8}{144\div 8} = \frac{17}{\boxed{18}}$

(*c*) $\frac{4}{\square} = \frac{60}{75} = \frac{64}{\square}$

Since, $60 \div 4 = 15$

$\frac{60}{75} = \frac{60\div 15}{75\div 15} = \frac{4}{5}$

$\frac{4}{5} = \frac{4\times 16}{5\times 16} = \frac{64}{80}$

$\frac{4}{\boxed{5}} = \frac{60}{75} = \frac{64}{\boxed{80}}$

7. (*i*) HCF of 42 and 147 is 21.

$\frac{42}{147} = \frac{42\div 21}{147\div 21} = \frac{2}{7}$

Hence, the correct options (*b*).

(*ii*) $\frac{25 \text{ cm}}{1 \text{ m}} = \frac{25 \text{ cm}}{100 \text{ cm}} = \frac{25\div 25}{100\div 25} = \frac{1}{4}$

Hence, the correct option is (*d*).

Quick Check (Page 216)

When denominator are same, the fraction with greater numerator is greater:

$$\frac{3}{11} < \frac{4}{11} < \frac{7}{11} < \frac{9}{11}$$

Practice Time 7D

1. (*a*) Since both fractions have the same denominator, the fraction with the greater numerator is greater.

$9 < 19$

$\therefore \quad \frac{9}{29} \boxed{<} \frac{19}{29}$

(*b*) Since both fractions have the same numerator, the fraction with the smaller denominator is greater.

$\therefore \quad \frac{1}{4} \boxed{>} \frac{1}{9}$

(*c*) LCM of 3 and 5 = 15

Convert both to like fractions:

$\frac{2}{3} = \frac{2\times 5}{3\times 5} = \frac{10}{15}, \frac{4}{5} = \frac{4\times 3}{5\times 3} = \frac{12}{15}$

Now, $10 < 12 \Rightarrow \frac{2}{3} < \frac{4}{5}$

Alternate method:

$\frac{2}{3} \boxed{<} \frac{4}{5} \Rightarrow 2\times 5 \square 3\times 4 \Rightarrow 10 \boxed{<} 12$

(*d*) LCM of 4 and 19 = 76

Convert both to like fractions:

$\frac{3}{8} = \frac{3\times 19}{4\times 19} = \frac{57}{76}, \frac{18}{19} = \frac{18\times 4}{19\times 4} = \frac{72}{76}$

Now $57 < 72 \Rightarrow \frac{3}{4} < \frac{18}{19}$

Alternate method:

$3\times 19 \square 4\times 18 \Rightarrow 57 \boxed{<} 72$

(*e*) LCM of 4 and 13 = 52

Convert both to like fractions:

$\frac{13}{4} = \frac{13\times 13}{4\times 13} = \frac{169}{52}, \frac{4}{13} = \frac{4\times 4}{13\times 4} = \frac{16}{52}$

Now $169 < 16 \Rightarrow \frac{13}{4} > \frac{4}{13}$

Alternate method:

$\frac{13}{4} \square \frac{4}{13} \Rightarrow 13\times 13 \boxed{>} 4\times 4 \Rightarrow 169 \boxed{>} 16$

(*f*) LCM of 42 and 30 = 210

Convert both to like fractions:

$\frac{5}{42} = \frac{5\times 5}{42\times 5} = \frac{25}{210}, \frac{7}{30} = \frac{7\times 7}{30\times 7} = \frac{49}{210}$

Now, $25 < 49 \Rightarrow \frac{5}{42} < \frac{7}{30}$

Alternate method:

$\frac{5}{42} \square \frac{7}{30} \Rightarrow 5\times 30 \square 7\times 42 \Rightarrow 150 \boxed{<} 294$

2. (*a*) LCM of 9 and 7 = 63

Convert both to like fractions:

$\frac{5}{9} = \frac{5\times 7}{9\times 7} = \frac{35}{63}, \frac{2}{7} = \frac{2\times 9}{7\times 9} = \frac{18}{63}$

Since $35 > 18$, $\frac{5}{9}$ is larger.

(*b*) LCM of 8 and 3 = 24

Convert both to like fractions:

$$\frac{3}{8}=\frac{3\times3}{8\times3}=\frac{9}{24},\frac{5}{3}=\frac{5\times8}{3\times8}=\frac{40}{24}$$

Since $9<40$, $\frac{5}{3}$ is larger.

(*c*) Convert to improper fractions:

$$2\frac{5}{6}=\frac{17}{6},\ 3\frac{3}{4}=\frac{15}{3}$$

LCM of 6 and 4 = 12

Convert both to like fractions:

$$\frac{17}{6}=\frac{17\times2}{6\times2}=\frac{34}{12},\frac{15}{4}=\frac{15\times3}{4\times3}=\frac{45}{12}$$

Since $34<45$, $3\frac{3}{4}$ is larger.

3. (*a*) Since, denominators are same, the numerator value have to be arranged in ascending order:

$\frac{3}{8}<\frac{5}{8}<\frac{7}{8}<\frac{13}{8}$.

(*b*) Since, numerator are same, the least value of denominator in this case will give maximum value. Hence, the denominator has to be arranged in descending order: $\frac{9}{17}<\frac{9}{7}<\frac{9}{5}<\frac{9}{4}$.

(*c*) LCM of denominator

7	8, 7, 23, 63
	8, 1, 23, 9

LCM = $7\times8\times23\times9=11592$

$$\frac{3}{8}\times\frac{1449}{1449}=\frac{4347}{11592}$$

$$\frac{1}{7}\times\frac{1656}{1656}=\frac{1656}{11592}$$

$$\frac{13}{23}\times\frac{504}{504}=\frac{6552}{11592}$$

$$\frac{12}{63}\times\frac{184}{184}=\frac{2208}{11592}$$

Therefore, $\frac{1656}{11592}<\frac{2208}{11592}<\frac{4347}{11592}<\frac{6552}{11592}$

Hence, $\frac{1}{7}<\frac{12}{63}<\frac{3}{8}<\frac{13}{23}$.

4. (*a*) LCM of 7, 30, 15, 9

3	7, 30, 15, 9
5	7, 10, 5, 3
	7, 2, 1, 3

LCM = $3\times5\times7\times2\times3=630$

$$\frac{2}{7}\times\frac{90}{90}=\frac{180}{630}$$

$$\frac{2}{30}\times\frac{21}{21}=\frac{42}{630}$$

$$\frac{2}{15}\times\frac{42}{42}=\frac{84}{630}$$

$$\frac{2}{9}\times\frac{70}{70}=\frac{140}{630}$$

Therefore, $\frac{180}{630}>\frac{140}{630}>\frac{84}{630}>\frac{42}{630}$

Hence, $\frac{2}{7}>\frac{2}{9}>\frac{2}{15}>\frac{2}{30}$.

(*b*) LCM of 7, 21, 49, 42

7	7, 21, 49, 42
3	1, 3, 7, 6
	1, 1, 7, 2

LCM = $7\times3\times7\times2=294$

$$\frac{2}{7}\times\frac{42}{42}=\frac{84}{294}$$

$$\frac{5}{21}\times\frac{14}{14}=\frac{70}{294}$$

$$\frac{8}{49}\times\frac{6}{6}=\frac{48}{294}$$

$$\frac{3}{42}\times\frac{7}{7}=\frac{21}{294}$$

Therefore, $\frac{84}{294}>\frac{70}{294}>\frac{48}{294}>\frac{21}{294}$

Hence, $\frac{2}{7}>\frac{5}{21}>\frac{8}{49}>\frac{3}{42}$.

(*c*) LCM of 7, 8, 5, 4

2	7, 8, 5, 4
2	7, 4, 5, 2
	7, 2, 5, 1

LCM = $2\times2\times7\times2\times5=280$

$$\frac{6}{7}\times\frac{40}{40}=\frac{240}{280}$$

$$\frac{7}{8}\times\frac{35}{35}=\frac{245}{280}$$

$$\frac{4}{5}\times\frac{56}{56}=\frac{224}{280}$$

$$\frac{3}{4}\times\frac{70}{70}=\frac{210}{280}$$

Therefore, $\frac{245}{280}>\frac{240}{280}>\frac{224}{280}>\frac{210}{280}$

Hence, $\frac{7}{8}>\frac{6}{7}>\frac{4}{5}>\frac{3}{4}$.

5. Soumya delivered a lecture on the first day $=\frac{3}{5}$

and that on the second day $=\frac{7}{8}$

LCM of 5, 8 = 40

$$\frac{3}{5}\times\frac{8}{8}=\frac{24}{40} \quad \text{and} \quad \frac{7}{8}\times\frac{5}{5}=\frac{35}{40}$$

Since, $24 < 35$.

Hence, $\frac{7}{8}>\frac{3}{5}$ i.e., she delivered longer lecture on the second day.

Quick Check (Page 220)

$$\frac{9}{14}+\frac{8}{16}=\frac{72+56}{112}=\frac{128}{112}=\frac{8}{7}$$

$$\frac{1}{4}+\frac{2}{5}=\frac{5+8}{20}=\frac{13}{20}$$

$$\frac{9}{14}-\frac{1}{4}=\frac{18-7}{28}=\frac{11}{28}$$

$$\frac{8}{16}-\frac{2}{5}=\frac{1}{2}-\frac{2}{5}=\frac{5-4}{10}=\frac{1}{10}$$

$$\frac{8}{7}-\frac{13}{20}=\frac{160-91}{140}=\frac{69}{140}$$

$$\frac{11}{28}+\frac{1}{10}=\frac{55+14}{140}=\frac{69}{140}$$

$\frac{9}{14}$	$\frac{8}{16}$	$\frac{8}{7}$
$\frac{1}{4}$	$\frac{2}{5}$	$\frac{13}{20}$
$\frac{11}{28}$	$\frac{1}{10}$	$\frac{69}{140}$

Practice Time 7E

1. (*a*) LCM of 5, 9 = 45

$$\frac{2}{5}+\frac{2}{9}=\frac{2\times9}{5\times9}+\frac{2\times5}{9\times5}=\frac{18}{45}+\frac{10}{45}=\frac{28}{45}$$

(*b*) $2\frac{3}{7}+1\frac{4}{7}=\frac{17}{7}+\frac{11}{7}=\frac{17+11}{7}=\frac{28}{7}=4$

(*c*) $2\frac{3}{5}+1\frac{4}{10}+\frac{7}{15}$

$=\frac{13}{5}+\frac{14}{10}+\frac{7}{15}$ [$\because$ LCM of 5, 10, 15 = 30]

$=\frac{13}{5}\times\frac{6}{6}+\frac{14}{10}\times\frac{3}{3}+\frac{7}{15}\times\frac{2}{2}$

$=\frac{78}{30}+\frac{42}{30}+\frac{14}{30}$

$=\frac{78+42+14}{30}=\frac{134}{30}=\frac{67}{15}=4\frac{7}{15}$

2. (*a*) $\frac{6}{48}-\frac{2}{48}=\frac{6-2}{48}=\frac{4}{48}$

(*b*) $4\frac{13}{14}-\frac{6}{7}=\frac{69}{14}-\frac{6}{7}=\frac{69-12}{14}=\frac{57}{14}=4\frac{1}{14}$

(*c*) $7\frac{1}{8}-3\frac{1}{4}-2\frac{1}{12}=\frac{57}{8}-\frac{13}{4}-\frac{25}{12}$

$\frac{57}{8}-\frac{13}{4}-\frac{25}{12}$ [$\because$ LCM of 8, 4, 12 = 24]

$=\frac{171-78-50}{24}=\frac{43}{24}=1\frac{19}{24}$

3. (*a*) $3\frac{3}{4}+2\frac{1}{3}-5\frac{1}{6}$

$=\frac{15}{4}+\frac{7}{3}-\frac{31}{6}$ [$\because$ LCM of 4, 3, 6 = 12]

$=\frac{45+28-62}{12}$

$=\frac{73-62}{12}=\frac{11}{12}$

(*b*) $1+\frac{13}{15}-\frac{4}{9}$ [$\because$ LCM of 1, 9, 15 = 45]

$=\frac{45+39-20}{45}=\frac{64}{45}=1\frac{19}{45}$

(*c*) $6\frac{1}{3}-2\frac{1}{3}+1\frac{2}{7}$ [$\because$ LCM of 4, 3, 7 = 21]

$$= \frac{19}{3} - \frac{7}{3} + \frac{9}{7} = \frac{133 - 49 + 27}{21} = \frac{111}{21} = \frac{37}{7}$$

$$= 5\frac{2}{7}$$

4. $14\frac{3}{5} + ? = 20$

Therefore, $? = 20 - 14\frac{3}{5}$

$$= 20 - \frac{73}{5} = \frac{100 - 73}{5} = \frac{27}{5} = 5\frac{2}{5}.$$

5. Lace left = Total – Used lace

$$= 3\frac{1}{2} - 1\frac{3}{4}$$

$$= \frac{7}{2} - \frac{7}{4}$$

$$= \frac{14 - 7}{4} = \frac{7}{4} = 1\frac{3}{4} \text{ m}$$

6. Money spent on Math = $\frac{2}{5}$

Comic book = $\frac{1}{6}$

Horror book = $\frac{4}{15}$

Total money spent $= \frac{2}{5} + \frac{1}{6} + \frac{4}{15}$

$$= \frac{12 + 5 + 8}{30} = \frac{25}{30}$$

Money left $= 1 - \frac{25}{30} = \frac{5}{30} = \frac{1}{6}$

7. Weight of wheat bag = $4\frac{3}{4} = \frac{19}{4}$ kg

Weight of rice bag = $2\frac{1}{10} = \frac{21}{10}$ kg

$\frac{19}{4} \square \frac{21}{10}$

On cross multiplication $19 \times 10 \square 21 \times 4$

$190 > 84$

Hence, $\frac{19}{4} > \frac{21}{10}$

Wheat bag is heavier.

Maths Connect (Page 221)

1. Length of the playing area of the court

$$= 28\frac{1}{3}\text{ m} - \frac{5}{3}\text{ m} - \frac{5}{3}\text{ m} = \frac{75}{3}\text{ m} = 25\text{ m}$$

Breadth of the playing area

$$= 14\frac{2}{3}\text{ m} - \frac{4}{3}\text{ m} - \frac{4}{3}\text{ m} = \frac{36}{3}\text{ m} = 12\text{ m}$$

$\therefore$ Perimeter of the playing area = 2(length + breadth)

= 2(25 m + 12 m)

= 2 × 37 m

= 74 m

Brain Sizzlers (Page 222)

(*a*) $\frac{1}{6} + \frac{1}{3} + \frac{1}{2} = \frac{1 + 2 + 3}{6} = \frac{6}{6} = 1$

Therefore, the three different unit fractions that add up to 1 are $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}$.

(*b*) $\frac{1}{28} + \frac{1}{14} + \frac{1}{7} + \frac{1}{4} + \frac{1}{2} = \frac{1 + 2 + 4 + 7 + 14}{28}$

$$= \frac{28}{28} = 1$$

Therefore, the three different unit fractions that add up to 1 are $\frac{1}{2}, \frac{1}{4}, \frac{1}{7}, \frac{1}{14}, \frac{1}{28}$.

Chapter Assessment

A.

1. All fractions have the same numerator (17). The larger the denominator, the smaller the value of the fraction.

$\therefore$ $15 > 11 > 9 > 6$

So, the correct option is (*c*) $\frac{17}{15}$.

2. (*a*) $\frac{1}{4} = \frac{\square}{12}$

$\frac{1}{4} = \frac{1 \times 3}{4 \times 3} = \frac{3}{12}$

So, the correct option is (*a*).

3. (*a*) $\frac{8}{10} = \frac{4}{5}$

(*c*) $\frac{12}{15} = \frac{4}{5}$

(*d*) $\frac{24}{30} = \frac{4}{5}$

$\therefore \quad \frac{8}{10} = \frac{12}{15} = \frac{24}{30}$ are equal.

So, the correct options (*b*).

4. $\frac{19}{9} - \frac{5}{9} = \frac{19-5}{9} = \frac{14}{9}$

So, the correct options (*b*).

5. $\frac{7}{9} = \frac{42}{\square}$

$\frac{7\times6}{9\times6} = \frac{42}{54}$

So, the correct option is (*d*)

6. $\frac{17}{2} + 3\frac{1}{2} = \frac{17}{2} + \frac{7}{2} = \frac{24}{2} = 12$

So, the correct options (*d*).

7. $\frac{17}{34} = \frac{17\div17}{34\div17} = \frac{1}{2}$

So, the correct options (*a*).

8. (*c*) $\frac{11}{7} = 1\frac{4}{7}$

So, the correct options (*c*).

B.

1. In proper fraction $N^r < D^r$. Hence Assertion is true. Also, Reason is the correct explanation of Assertion.

Hence, option (*a*) is correct.

2. (*d*) $\frac{6}{7} = \frac{18}{21} = \frac{6\times3}{7\times3}$

$\frac{6}{7} = \frac{6\times6}{7\times6} = \frac{36}{42}$

$\frac{6}{7} = \frac{6\times12}{7\times12} = \frac{72}{84}$

Hence, $\frac{6}{7} = \frac{18}{21} = \frac{36}{42} = \frac{72}{84}$ are equivalent fraction.

So, Assertion is true.

Reason is true but reason is not the correct explanation of Assertion.

Hence, option (*b*) is correct.

3. There are infinite number of fractions that are equivalent to $\frac{3}{8}$.

So, Assertion is false but Reason is true.

Hence, option (*d*) is correct.

4. $\frac{9}{4} = 2\frac{1}{4}$ Assertion is true. Also, Reason is the correct explanation of Assertion.

Hence, option (*a*) is correct.

C.

1. False; the unshaded portion represents $\frac{1}{6}$, not $\frac{5}{6}$.

2. True

3. False $\frac{21}{48} = \frac{7}{16}$ is the lowest form.

4. True $\frac{1}{2} + \frac{1}{2} = 1$

D.

1. Box I: $\frac{12}{13}, \frac{5}{29}$

Box II: $\frac{5}{5}$

Box III: $\frac{13}{12}, \frac{41}{40}, \frac{25}{11}, \frac{100}{11}$

2. A square has been divided into 4 triangle

Total Δ = 60

Unshaded = $4 \times 4 = 16$

Unshaded fraction = $\frac{16}{60} = \frac{4}{15}$

3. Paakhi ate : $\frac{3}{7}$

Ishaani ate : $\frac{2}{5}$

$\frac{3}{7} \square \frac{2}{5}$

$3 \times 5 > 2 \times 7$

Hence, $\frac{3}{7} > \frac{2}{5}$

So, Paakhi ate more.

Now, find difference: $\frac{3}{7} - \frac{2}{5} = \frac{15-14}{35} = \frac{1}{35}$ of the donut.

4. House left for painting $= 1 - \frac{3}{5} = \frac{2}{5}$

5. Distance between A and B $= 2\frac{2}{5} = \frac{12}{5}$

Distance between B and C $= \frac{3}{5}$

Distance between A and C $= \frac{12}{5} + \frac{3}{5} = \frac{15}{5} = 3$ km

6. Walking $= \frac{1}{2}$ km

Bus $= 4\frac{1}{4} = \frac{17}{4}$ km

Battery rickshaw $= \frac{1}{4}$ km

Total distance covered $= \frac{1}{2} + \frac{17}{4} + \frac{1}{4}$

$= \frac{2+17+1}{4} = 5$ km

Yes it is less than 6 km.

7. For trouser $= 2\frac{2}{3} = \frac{8}{3}$ m

For top $= 1\frac{1}{4} = \frac{5}{4}$ m

Total cloth $= \frac{8}{3} + \frac{5}{4} = \frac{32+15}{12} = \frac{47}{12}$

$= 3\frac{11}{12}$ m

8. Weight on Wednesday $= 51\frac{2}{5} + 1\frac{1}{3}$

$= \frac{257}{5} + \frac{4}{3}$

$= \frac{771+20}{15}$

$= \frac{791}{15} = 52\frac{11}{15}$ kg

9. 16 parts represent the fraction $\frac{1}{4}$ of the rectangle.

Hence, the rectangle has been divided into $16 \times 4 =$ **64** parts

10. Total time spent $= 1\frac{2}{5} + 1\frac{1}{5} + \frac{1}{6}$

$= \frac{7}{5} + \frac{6}{5} + \frac{1}{6}$

$= \frac{42+36+5}{30}$

$= \frac{83}{30} = 2\frac{23}{30}$ hours

11. Probability has 11 letters and O, A, I, I are 4 vowels.

(*a*) Fraction $= \frac{4}{11}$

(*b*) Consonant $= \frac{7}{11}$

(*c*) Fraction of all letters $= \frac{11}{11}$

(*d*) $\frac{4}{11} + \frac{7}{11} = \frac{11}{11}$ yes.

Unit Test – 3

A.

1. (*b*) Perimeter of the rectangle
$= 2$(length + breadth)
$= 2(30 \text{ cm} + 25 \text{ cm})$
$= 110$ cm

2. (*d*) Length of the string
= perimeter of square formed
$= 4 \times$ side

$\Rightarrow$ $60 \text{ cm} = 4 \times \text{side}$

$\Rightarrow$ $\text{side} = \frac{60 \text{ cm}}{4} = 15 \text{ cm}$

3. (*c*) Total months in a year = 12

So, fraction of a year in 8 months $= \frac{8}{12} = \frac{2}{3}$

4. (*b*) Numerator = 98; Denominator = 407

So, Sum = Numerator + Denominator
$= 98 + 407 = 505$

5. (*c*) Since $\frac{3}{7} = \frac{(3\times9)}{(7\times9)} = \frac{27}{63}, \frac{3}{7} = \frac{(3\times12)}{(7\times12)} = \frac{36}{84},$

$\frac{3}{7} = \frac{(3\times19)}{(7\times19)} = \frac{57}{133}$

and $\frac{3}{7} = \frac{(3\times17)}{(7\times17)} = \frac{51}{119}$

So, $\frac{51}{109}$ is not equivalent to $\frac{3}{7}$.

6. (*a*) Perimeter of triangle = sum of all sides

$\Rightarrow$ 63 cm = 19 cm + 23 cm + Length of third side

$\Rightarrow$ Length of third side = 63 cm – 19 cm – 23 cm

= 21 cm

7. (*c*) Area of rectangular park = length × width

$\Rightarrow$ 975 sq. m = 65 m × width

$\Rightarrow$ Width $= \frac{(975 \text{ sq.m})}{65 \text{ m}} = 15$ m

8. (*d*) Total part in the given figure = 8, Shaded part = 5

So, fraction represent the shaded part

$= \frac{(\text{Shaded part})}{(\text{Total part})} = \frac{5}{8}$

9. (*a*) Since the denominator is same of all fractions. So, they are like fractions.

10. (*c*) Perimeter of regular hexagon = 6× side = 6 × 15 cm = 90 cm

Reason is not always true.

B.

1. Perimeter of a regular decagon is **10** times its side length.

2. Area of square = side × side = 3 cm × 3 cm = 9 sq. cm

So, Area of square of side 3 cm is **9 sq. cm.**

3. Fraction is called **bhinna** in Sanskrit.

4. Since $\frac{(21\div7)}{(28\div7)} = \frac{3}{4}$. Thus, the simplest form of $\frac{21}{28}$ is $\frac{3}{4}$.

5. Since $\frac{15 \text{ cm}}{2\text{m}} = \frac{15 \text{ cm}}{200 \text{ cm}} = \frac{3}{40}$. So, equivalent fraction of $\frac{15 \text{ cm}}{2 \text{ m}}$ is $\mathbf{\frac{3}{40}}$.

C.

1. $\frac{3}{5} - \frac{1}{9} = \frac{(3\times9)-(1\times5)}{45} = \frac{(27-5)}{45} = \frac{22}{45}$

[$\because$ LCM of 5 and 9 is 45]

So, the given statement is false.

2. Since Perimeter of any closed figure = Sum of all its side.

So, the given statement is true.

3. Given statement is true.

4. In $\frac{195}{17}$, numerator is less than denominator. So, it is not a proper fraction. Given statement is false.

5. In improper fractions, numerator is greater than denominator. So, they always lie on the right side of 1 on the number line. So, the given statement is false.

D.

1. Perimeter of rectangle = Perimeter of square

$\Rightarrow$ 2(length + breadth) = 4 × side

$\Rightarrow$ 2(19 cm + breadth) = 4 × 20 cm

$\Rightarrow$ 19 cm + breadth $= \frac{80 \text{ cm}}{2}$

= 40 cm

$\Rightarrow$ breadth = 40 cm – 19 cm

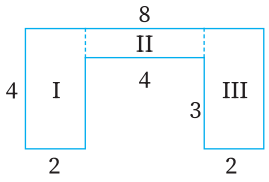
= 21 cm

So, area of rectangle = length × breadth

= 19 cm × 21cm

= 399 sq. cm

2.



Area of the figure = Area of region I + Area of region II + Area of region III

= (4 × 2) sq. units + (4 × 1) sq. units

+ (4 ×2) sq. units

= 8 sq. units + 4 sq. units + 8 sq. units

= 20 sq. units

3. LCM of 9, 5, 4 and 6 is 180.

So, $= \frac{4}{9} = \frac{(4\times20)}{(9\times20)} = \frac{80}{180}$,

$\frac{2}{5} = \frac{(2\times36)}{(5\times36)} = \frac{72}{180}, \frac{3}{4} = \frac{(3\times45)}{(4\times45)} = \frac{135}{180}$,

$\frac{1}{6} = \frac{(1\times30)}{(6\times30)} = \frac{30}{180}$

We know that if denominator is same, then number with greater numerator is greater.

So, the numbers in ascending order are as follows;

$\frac{30}{180}, \frac{72}{180}, \frac{80}{180}, \frac{135}{180}$

$\Rightarrow \frac{1}{6}, \frac{2}{5}, \frac{4}{9}, \frac{3}{4}$

4. Time spend in playing $= 2\frac{3}{5}$; Time spend in watching movies $= 1\frac{3}{4}$; Time spend in studying $= 3\frac{2}{7}$

Total time spend in all activities = Time spent in (playing + watching movies + studying)

$= 2\frac{3}{5} + 1\frac{3}{4} + 3\frac{2}{7}$

$= \frac{13}{5} + \frac{7}{4} + \frac{23}{7} = \frac{(13 \times 28 + 7 \times 35 + 23 \times 20)}{140}$

($\because$ LCM of 5,4 and 7 is 140)

$= \frac{(364 + 245 + 460)}{140} = \frac{1069}{140} = 7\frac{89}{140}$ hours

Thus, total time spend in all activities is $7\frac{89}{140}$ hours.

5. Side of the square = 15 cm; Perimeter of square = 4 × side = 4 × 15 cm = 60 cm

New side of the square = 4 × 15 cm = 60 cm; Perimeter of new square = 4 × 60 cm = 240 cm

Since, 240 = 4 × 60.

So, the perimeter of the square becomes 4 times if the side of the square becomes four times.

6. Area of the rectangular ground

$= \frac{\text{Total cost}}{\text{Cost of per sq.cm}} = \frac{900}{2} = 450$ sq.m

Now, area of rectangular ground = length × width

$\Rightarrow$ 450 sq.m = 25 m × width

$\Rightarrow$ $\text{width} = \frac{(450 \text{ sq.m})}{25 \text{ m}} = 18$ m

7. $3\frac{1}{5} + 4\frac{1}{10} - 5\frac{1}{15} + 9 + \frac{1}{3} = \frac{16}{5} + \frac{41}{10} - \frac{76}{15} + 9 + \frac{1}{3}$

LCM of 5, 10, 15, and 3 is 30.

Now,

$\frac{16}{5} = \frac{(16 \times 6)}{(5 \times 6)} = \frac{96}{30}$, $\frac{41}{10} = \frac{(41 \times 3)}{(10 \times 3)} = \frac{123}{30}$,

$\frac{76}{15} = \frac{(76 \times 2)}{(15 \times 2)} = \frac{152}{30}$, $\frac{1}{3} = \frac{(1 \times 10)}{(3 \times 10)} = \frac{10}{30}$,

$\frac{9}{1} = \frac{(9 \times 30)}{(1 \times 30)} = \frac{270}{30}$

So, $3\frac{1}{5} + 4\frac{1}{10} - 5\frac{1}{15} + 9 + \frac{1}{3}$

$= \frac{16}{5} + \frac{41}{10} - \frac{76}{15} + 9 + \frac{1}{3}$

$= \frac{96}{30} + \frac{123}{30} - \frac{152}{30} + \frac{270}{30} + \frac{10}{30}$

$= \frac{347}{30} = 11\frac{17}{30}$

8. Letters in word MATHEMATICS are M, A, T, H, E, M, A, T, I, C, S.

Vowels are A, A, E, I and consonants are M, T, H, M, T, C, S.

So, total number of letters in word = 11; Number of vowels = 4; Number of consonants = 7

(*a*) Fraction of vowel $= \frac{\text{Number of vowel}}{\text{Total number of letters}}$

$= \frac{4}{11}$

(*b*) Fraction of consonants $= \frac{\text{Number of consonant}}{\text{Total number of letters}}$

$= \frac{7}{11}$

CHAPTER 8 : PLAYING WITH CONSTRUCTION

Practice Time 8A

1. (*a*) Since an open curve does not enclose any area within itself and has two endpoints. So, it is a open curve.

(*b*) Since a closed curve has no endpoints and encloses an area (or a region). So, it is a closed curve.

(*c*) Same as part (*a*)

(*d*) Same as part (*b*)

(*e*) Same as part (*b*)

5. (*d*) This is a square as all its side are equal and all angles are 90°

Chapter Assessment

A.

1. (*d*) The instrument used to draw a circle is compass.

2. (*d*) The distance between the center of the circle and any point on the circle = radius of circle = 7 cm

3. (*d*) More than half i.e., 5 cm

4. (*b*) No, it stays the same

5. (*a*) Diameter of larger circle = diameter of both inner circle = $2 \times 4 + 2 \times 6 = 8 + 12 = 20$

So, radius of larger circle = $\frac{d}{2} = \frac{20}{2} = 10$ cm

6. (*c*) Circle is a closed curve all of whose points are at the same distance from a fixed point.

7. (*d*) A rectangle has four right angle.

8. (*b*) Circles

B.

1. (*a*) Assertion is true and the Reason correctly cuplains why the assertion is true.

2. (*d*) A compass can draw only circle and arcs but not straight lines. Hence, the Assertion is false, but the reason is true.

3. (*d*) A compass can draw only circle and arcs but not straight lines. Hence, the Assertion is false, but the reason is true.

C.

1. True

2. True

3. False as the diagonals of a square are of equal length.

4. True

D.

3. Since, figure A, D, F and G have equal opposite sides with each angle is 90°. So, they form rectangle.

Also in figure B and C, all sides are of equal length and each angle is 90°. So they form square.

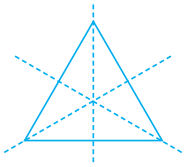
CHAPTER 9 : SYMMETRY

Refer to the book answer key

Unit Test – 4

A.

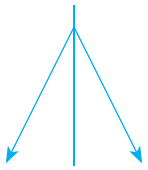
1. (*c*) An equilateral triangle has 3 lines of symmetry.



2. (*c*) Diameter = 16 cm

$$\text{Radius} = \frac{16}{2} = 8 \text{ cm}$$

3. (*b*) Divider has one line of symmetry.



4. (*c*) **5.** (*d*) **6.** (*b*)

7. Alphabet H, has both reflection and rotational symmetry.

8. (*b*) 

9. (*d*) Side of square = 8 cm

Length of rectangle = 18 cm

Breadth of rectangle = 6 cm

Here, $6 < 8$ and $18 < 3 \times 8$

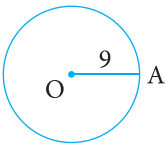
Hence, Assertion is false but Reason is true.

10. (*a*) A regular pentagon has 5 lines of symmetry because it has 5 equal sides and angles.

Hence, both statements are true and R correctly explains A.

B.

1.



2. A Circle consists of a set of points on a plane that are all at a fixed distance from a single point.

3. The letter H has a rotational symmetry of order 2.

4. In regular tiling pattern, the equilateral triangle can be duplicated infinitely to fill a plane without gaps.

5. The line that divides an object into two identical parts is called the line of symmetry.

C.

1. False, it has four line of symmetry.

2. True

3. True, if the right triangle is an isosceles right triangle.

4. False, a rectangle has a rotational symmetry of order 2.

5. True

D.

1. (*a*) ƎWOT (*b*) NAITAИ

2. (*a*) $\frac{360°}{3} = 120°$

Angle of rotation that map it onto itself:

120°, 240° and 360°.

(*b*) $\frac{360°}{6} = 60°$

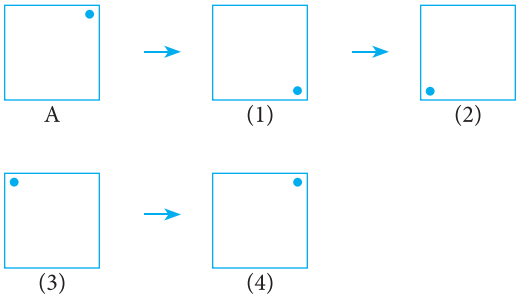
Angle of rotation that map it onto itself:

60°, 120°, 180°, 240°, 300° and 360°.

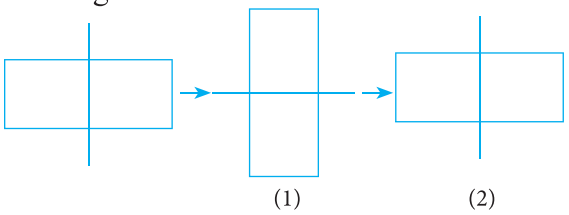
3. A, P, Q, L, G and J have rotational symmetry of order 1. (Answer may vary)

5. Rotational symmetry for

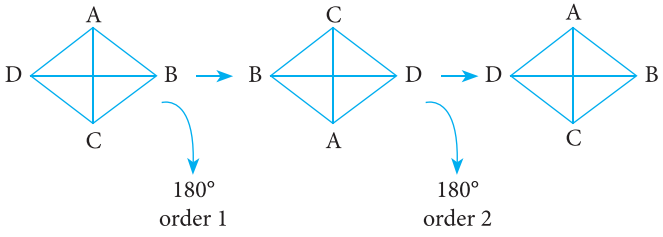
(*a*) Square–4



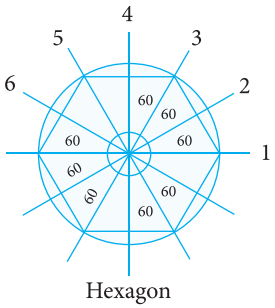
(*b*) Rectangle–2



(*c*) Rhombus–2



(*d*) Hexagon–6



6. No. 360° cannot be divided by 19.

CHAPTER 10 : THE OTHER SIDE OF ZERO

Let's Recall

1. (*a*) Successor number of 6745 is the next number i.e., 6746 and precedesor of 2024 is the previous number i.e., 2023.

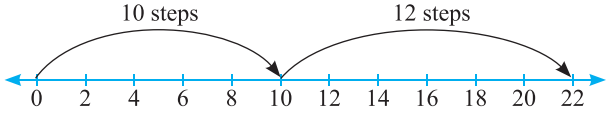
(*b*) 1 and 0

(*c*) Below

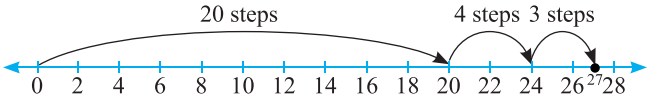
2. (*a*) True, because the smallest natural number is 1,

(*b*) True

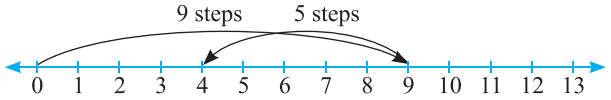
3. (*a*) 10 + 12 = 22



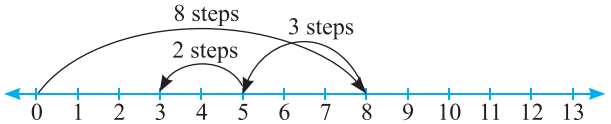
(*b*) 20 + 4 + 3 = 27



(*c*) 9 – 5 = 4



(*d*) 8 – 3 – 2 = 3



4. (*a*) Below (*b*) Loss

(*c*) Decrease (*d*) Smita

(*e*) Negative

Think and Answer (Page 283)

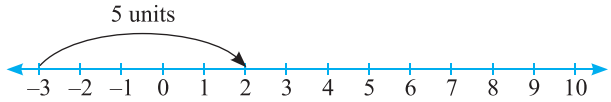
1. Maximum marks = 17 → Vaishali
   Minimum marks = –15 → Smita
2. Smita scored less than Shailza.

Maths connect (Page 284)

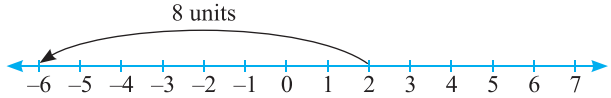
1. Since, iron image will be an inverted image. So, design will look like option 2 when printed on a T-shirt.

Practice Time 10A

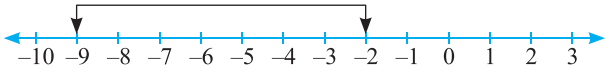
1. Integers are neither decimal nor fraction.
   Hence, –142, 254, –7, 0, 547 are integers.
2. (*a*) 50 m rise in water level
   (*b*) 9°C above 0°C
   (*c*) Increase in marks
   (*d*) 1899 BCE
3. (*a*) +12 cm (*b*) –₹700
   (*c*) +6 kg (*d*) –₹5100
4. (*a*) –3 + 5 = 2



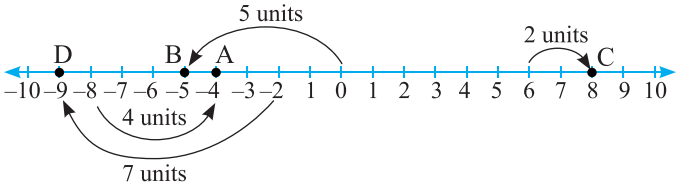
   (*b*) 2 – 8 = –6

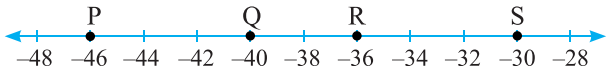


5. (*a*) False, because the smallest whole number is 0.
   (*b*) True (*c*) True
   (*d*) True
   (*e*) False, because absolute value of an integer is always its numerical value irrespective of its sign.
   (*f*) True
   (*g*) False, because whole numbers are 0, 1, 2, … .
6. 6 i.e., (–8, –7, –6, –5, –4, –3)



7. (*a*) –8 + 4 = –4 (*b*) 0 – 5 = –5
   (*c*) 6 + 2 = 8 (*d*) –2 – 7 = –9

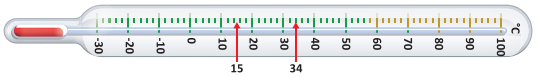


8. 

9. (*a*) 2 < 9 (*b*) 0 < 7 (*c*) –9 < –1 (*d*) 28 > –12
10. (*a*) –39 < –33 < 0 < 10 < 33
    (*b*) –31 < –21 < –17 < 8 < 15
    (*c*) –10 < – 7 < –6 < 8 < 9
11. (*a*) 3 > 0 > –1 > –3 > –4 > –6
    (*b*) 110 > 58 > 7 > –230 > –330
    (*c*) 25 > 24 > –7 > –24 > –25
12. (*a*) Integers less than –23 are –24, –25, –26, –30, –100 etc.
    (*b*) Integers greater than –3 are –2, – 1, 0, 1, 2 etc.
    (Answer may vary)
13. (*a*) | –233 | = 233
    (*b*) –| –23 | = –(23) = –23
    (*c*) 89 – | 7 | = 89 – 7 = 82
14. 

    Missing positive integer is 20.

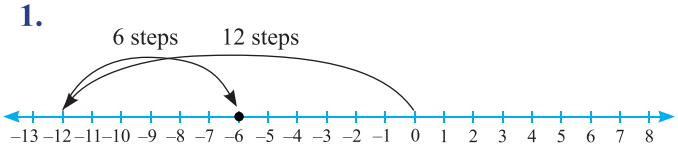
15. 15°C



16. Temperatures from coldest to warmest means arrange temperatures in increasing order: –10°C, –6°C, 0°C, 15°C, 38°C, 45°C, 70°C
17. Each gap is represented by $\frac{1000}{5} = 200$.

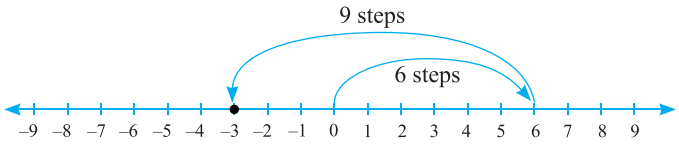
    P = 2000 + 4 × 200 = 2800 m
    Q = –1000 m
    R = 200 × 3 = 600 m
    S = –2000 + 2 × –200 = –2400 m
    T = 2000 + 2 × 200 = 2400 m
    U = –200 × 2 = –400 m
    V = 200 × 1 = +200 m

Quick Check (Page 287)

1. 

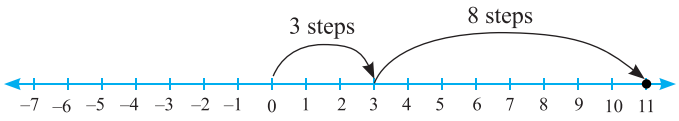
   ∴ –12 + 6 = –6

2.



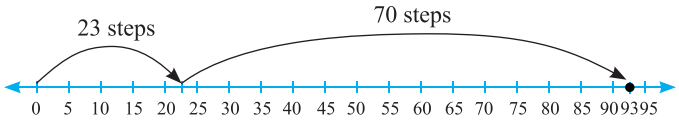
$\therefore$ $6 + (-9) = -3$

3.



$\therefore$ $3 + 8 = 11$

4.



$\therefore$ $23 + 70 = 93$

Quick Check (Page 289)

1. $(a + b) + c = a + (b + c)$ (Associative law for addition).

Hence, $[12 + (-19)] + (-34) = 12 + [(-19) + (-34)]$

2. $a + b = b + a$ (Commutative law for addition)

$\therefore$ $(-123) + 341 = 341 + (-123)$

3. $a + 0 = a = 0 + a$ (Additive identity)

$(-123) + 0 = (-123)$

4. $(-a) + a = 0 = a + (-a)$ (Additive inverse)

$\therefore$ $(-2) + 2 = 0 = 2 + (-2)$

Practice Time 10B

1.

+	–6	–4	–2	0	2	4	6
6	0	2	4	6	8	10	12
4	–2	0	2	4	6	8	10
2	–4	–2	0	2	4	6	8
0	–6	–4	–2	0	2	4	6
–2	–8	–6	–4	–2	0	2	4
–4	–10	–8	6	–4	–2	0	2
–6	–12	–10	–8	–6	–4	–2	0

From the table

(*a*) $6 + (-6) = 0$

$4 + (-4) = 0$

$2 + (-2) = 0$

$0 + 0 = 0$

$-2 + 2 = 0$

$-4 + 4 = 0$

$-6 + 6 = 0$

$\therefore$ the pairs of integers are 6, – 6; 4, –4; 2, – 2; 0, 0; –2, 2; –4, 4; –6, 6.

(*b*) Yes, $-4 - 2 = -6$

2. (*a*) $|5| + |-5| + 4 = 5 + 5 + 4 = 14$

(*b*) $7 + |5| - 7 = 7 + 5 - 7 = 5$

(*c*) $27 - |-10| + 6 = 27 - 10 + 6 = 23$

3. (*a*) $|-12 + (-15)| = |-12 - 15| = |-27| = 27$

(*b*) $|25 - (-45 + 15)| = |25 - (-30)| = |25 + 30| = 55$

(*c*) $|(-3) + (-4) + (-5)| = |-3 - 4 - 5| = |-12| = 12$

4. (*a*) $(-71) + (-302) + 36 = -71 - 302 + 36$

$= -373 + 36 = -337$

(*b*) $147 + (-254) + (-136) = 147 - 254 - 136$

$= 147 - 390 = -243$

(*c*) $(-379) + (-546) = -379 - 546$

$= -925$

5. (*a*) $30 + (-23) + (-63) + (+55) = 30 - 23 - 63 + 55$

$= 85 - 86 = -1$

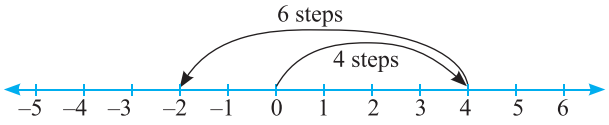
(*b*) $(27) + (-6) + (-56) + (-4) = 27 - 6 - 56 - 4$

$= 27 - 66 = -39$

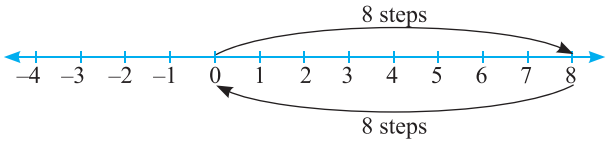
(*c*) $(-12) + 19 + (-16) + (-35) = -12 + 19 - 16 - 35$

$= 7 - 51 = -44$

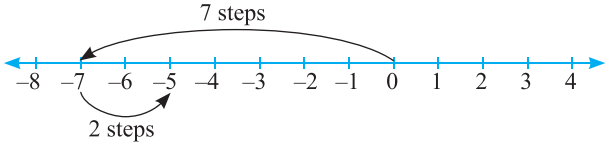
6. (*a*) $4 + (-6) = 4 - 6 = -2$



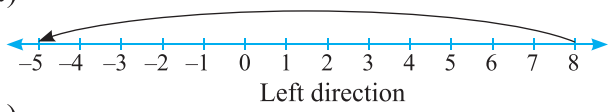
(*b*) $8 + (-8) = 0$



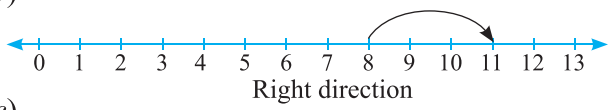
(*c*) $-7 + 2 = -5$



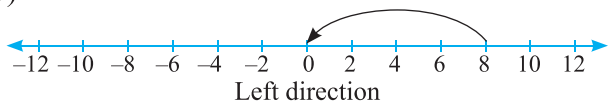
7. (*a*)



(*b*)



(*c*)



8. (*a*) Additive inverse of 17 = –17

(*b*) Additive inverse of (–357) = 357

(*c*) Additive inverse of 0 = 0

9. (*a*) True

(*b*) False as (–1) + 4 = 3, which is a positive integer

(*c*) True

(*d*) False as (–3) + 2 + 1 = –3 + 3 = 0

Life Skills (Page 292)

Withdrawal amount means Radhika spends some amount from the existing balance, while deposit amount means she add some amount.

∴ Radhika's balance amount at the end of the month = ₹89,000 + ₹8,000 – ₹9,500 + ₹2,000 – ₹950 – ₹1,050 + ₹1,500 = ₹89,000

Practice Time 10C

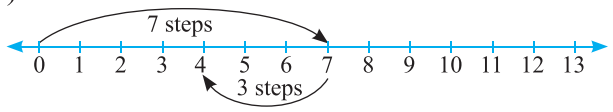
1. (*a*) (–19) + (–11) = (–11) + (–19)

(*b*) (–235) + 0 = –235

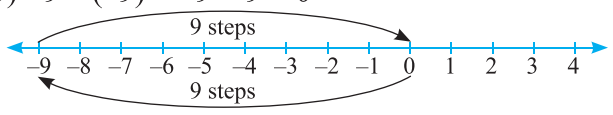
(*c*) 2367 + (–1234) = (–1234) + 2367

(*d*) 675 + {–345 + (–888)}
= {675 + (–345)} + (–888)

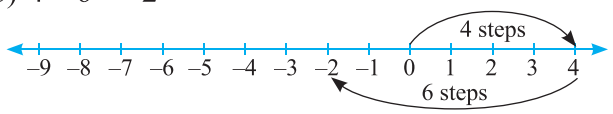
2. (*a*) 7 – 3 = 4



(*b*) –9 – (–9) = –9 + 9 = 0



(*c*) 4 – 6 = –2



3. (*a*) 9 – (–18) = 9 + 18 = 27

(*b*) –3 – (–12) = –3 + 12 = 9

(*c*) –7 – (–9) = –7 + 9 = 2

(*d*) –13 – (–5) = –13 + 5 = –8

(*e*) 1695 – 134 = 1561

(*f*) –54 – (89) = –54 – 89 = –143

4. (*a*) LHS = (–15) + (–23)
= –15 – 23 = –38

RHS = (–12) + (–32)
= –12 – 32 = –44

Hence, –38 > – 44

(*b*) LHS = (–12) + 23 – (–43)
= –12 + 23 + 43
= –12 + 66
= 54

RHS = 92 + (–34) – (–23)
= 92 – 34 + 23
= 115 – 34 = 81

Hence, 54 < 81

(*c*) LHS = (–20) – (–20) + 30
= –20 + 20 + 30 = 30

RHS = 20 + (–650) + (–12)
= 20 – 662 = –642

Hence, 30 > –642

(*d*) LHS = 123 – (–233) = 123 + 233 = 356

RHS = 234 – (0 – 14 + 17)
= 234 – 3 = 231

Hence, 356 > 231

5. (*a*) [58 – (–8)] + [12 – (–6)]
= (58 + 8) + (12 + 6)
= 66 + 18 = 84

(*b*) [–24 – (–32)] + [–52 – (–36)]
= (–24 + 32) + (–52 + 36)
= 8 – 16 = –8

6. (*a*) –45 + 242 – 32 + 67 – 777 – 23 + 721 – 34
= (–45 – 32 – 777 – 23 – 34) + (242 + 67 + 721)
= –911 + 1030 = 119

(*b*) –23 + 34 – 45 + 56 – 67 + 78 – 89 + 98 – 100
= (–23 – 45 – 67 – 89 – 100) + (34 + 56 + 78 + 98)
= –324 + 266 = –58

(*c*) 12 – 23 + 33 – 445 – 566 + 66 – 888 + 34
= (12 + 33 + 66 + 34) – (23 + 445 + 566 + 888)
= 145 – 1922 = – 1777

(*d*) 5 – 55 + 555 – 5555 + 654
= (5 + 555 + 654) – (55 + 5555)
= 1214 – 5610 = –4396

7. (*a*) Sum of –160 + 175 = 15
Sum of 115 – 315 = –200
Hence, (115 – 315) – (–160 + 175)
= –200 – 15 = –215

(*b*) [–2100 + (–2001)] – (–5308)
= (–2100 – 2001) + 5308
= –4101 + 5308
= 1207

8. Other integer = 85 – (–17) = 85 + 17 = 102

9. Utkarsha final score = 12 – 9 + 4 + 6 – 3
= 3 + 4 + 6 – 3 = 10

10. Initial temperature = +8°C
Temperature in 1st hour = (8 + 5)°C
= 13°C
Temperature in 2nd hour = (13 – 3)°C
= 10°C

11. Score of Nilabh = –10 + 20 – 5 – 20 + 50
= (–10 – 5 – 20) + (20 + 50)
= –35 + 70
= 35
Score of Nishtha = 0 – 30 + 10 + 50 – 20
= –50 + 60
= 10
Hence, Nilabh scored more than by Nishtha.

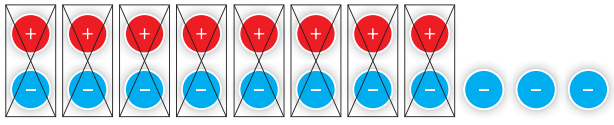
12. Net calories = Calories burned – Calories gained
380 – 207 = 173.
∴ Aakriti lose 173 calories on that particular day.

Quick Check (Page 296)

1. 5 + 8

Total number of token = 13
∴ 5 + 8 = 13

2. 8 – 11



∴ 8 + 11 = –3

3. Same as part (2)

4. –5 – 6

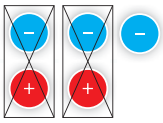
Total number of token = 11
∴ –5 – 6 = –11

5. Same as part (2)

6. Same as part (2)

7. (–3) – (–2)

But, we have to subtract (–2), so below 2 tokens have to be inverted, we get



∴ –3 – (–2) = –3 + 2 = –1

8. Same as part (2)

Think and Answer (Page 296)

–6	–4	–2
–5		–7
–1	–8	–3

Practice Time 10D

1. (*a*) –6, –5, –4, –3, –2, –1
(*b*) –29, –28, –27, –26, –25, –24
(*c*) –14, –13, –12, –11, –10, –9
(*d*) –249, –248, –247, –246, –245, –244
–243, –242, –241, –240, –239, –238, –237, –236
(*e*) –2, –1, 0, 1, 2
(*f*) 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

2. (*a*)

–10	–2	16
5		–5
9	2	–7

(*b*)

6	8	–16
11		–5
–19	–2	19

(*c*)

7	–7	–8
–10		–5
–1	–8	5

3. (*a*)

–6	–1	–8
–7	–5	–3
–2	–9	–4

(*b*)

–5	0	–7
–6	–4	–2
–1	–8	–3

4. Number an both dice = –1, 2, –3, 4, –5 and 6

Minimum sum = –5 + (–5) = –10

Maximum sum = 6 + 6 = 12

Numbers that can't be obtained = –9, –7, –5, 0, 2, 7, 9 and 11.

5. (*a*)

3	~~–2~~	~~1~~	~~–7~~
~~4~~	~~–1~~	2	~~–6~~
~~0~~	–5	~~–2~~	~~–10~~
~~9~~	~~–4~~	~~7~~	–1

Sum = 3 + 2 – 5 – 1 = –1

(*b*)

~~7~~	~~–2~~	–11	~~–20~~
10	~~1~~	~~–8~~	~~–7~~
~~13~~	~~4~~	~~–5~~	–14
~~16~~	7	~~–2~~	~~–11~~

Sum = –11 + 10 – 14 + 7

= –1 – 7

= –8

(*c*)

–11	~~–7~~	~~–3~~	~~1~~
~~–10~~	–6	~~–2~~	~~2~~
~~–9~~	~~–5~~	–1	~~3~~
~~–8~~	~~–4~~	~~0~~	4

Sum = –11 – 6 – 1 + 4

= –14

Mental Maths (Page 298)

1. In a magic square, sum of all elements in a row, column or in diagonal is same.

(*a*)

0	5	–2
–1	1	3
4	–3	2

(*b*)

–4	1	0
3	–1	–5
–2	–3	2

(*c*)

–2	3	–4
–3	–1	1
2	–5	0

(*d*)

–2	3	2
5	1	–3
0	–1	4

2. (–5) – (–9) – (+18) – (+7) = –5 + 9 – 18 – 7

= 4 – 18 – 7 = –21

3. Solve it with example,

(*a*) 4 – (–5) = 4 + 5 = 9 — Positive

or 4 – (–1) = 4 + 1 = 5 — Positive

(*b*) 5 + (–3) = 5 – 3 = 2 — Positive

5 + (–8) = 5 – 8 = –3 — Negative

(*c*) (–5) + (–8) = –5 – 8 = –13 — Negative

(*d*) (–5) – (–8) = –5 + 8 = 3 — Positive

(–8) – (–5) = –8 + 5 = –3 — Negative

(*e*) (–5) – (8) = –5 – 8 = –13 — Negative

(*f*) (–5) + (8) = –5 + 8 = +3 — Positive

(–15) + (8) = –15 + 8 = –7 — Negative

Chapter Assessment

A.

1. (*c*) The number line is as follows:

So, the integers lying between –2 and 2 are –1, 0 and 1.

That is total 3.

2. (*b*) The whole number are 0, 1, 2, 3, …

So, the whole numbers lying between –6 and 6 are 0, 1, 2, 3, 4, 5

Thus, the number of whole numbers lying between –6 and 6 are 6.

3. (*b*) 11 – 0 = 11, 9 – (–3) = 12, –7–(–14) = 7, 0 – (–6) = 6

Thus the maximum temperature rise from –3°C to 9°C.

4. (*d*) [–58 – 18 = –76]

5. (*b*) [| –10 | + | 11 | = 21]

6. (*c*) –6464 – 2446 = –8910

7. (*d*) Since –4°C < –1°C. And difference

= –1°C – (–4°C) = 3°C

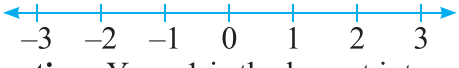
∴ A is cooler than B.

8. (*d*) [–25 + 4 – 75 – 12 + 6 = –102]

9. (*b*) other number = –20 + 6 = –14.

B.

1. (*a*)



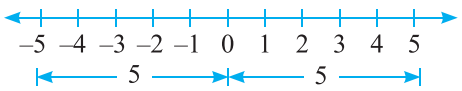
Assertion: Yes, –1 is the largest integer which is negative.

Reason: The closest integer to –1 is 0. Hence A and R both are correct.

2. (*d*) **A:** $-5-(-10)=-5+10=5\neq-15$

Here, A is false but R is true. correct option is (*d*)

3. (*a*)



A: Yes the distance is the same

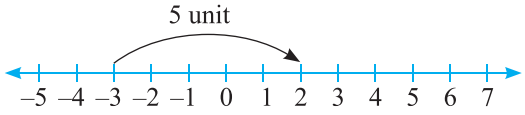
R: Absolute value is always positive. Hence, A and R both are true. Correct option is (*a*).

C.

1. Since, $-7+7=0$. So, the additive inverse of –7 is 7

∴ Option (*d*) is correct. So, 1 → (*d*)

2.



So, $-3+5=2$

∴ Option (*a*) is correct. So, 2 → (*a*)

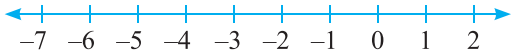
3. –1 is the largest negative integer and $0>-1$. So, 0 is the smallest integer greater than every negative integer.

∴ Option (*e*) is correct. So, 3 → (*e*)

4. $77+(-15)+(-35)=77+(-50)=27$

∴ Option (*b*) is correct. So, 4 → (*b*)

5.



So, the number lies one the lift side of –6 is –7.

∴ Option (*c*) is correct. So, 5 → (*c*)

D.

1. Since $6>4=-6<-4$. So, the given statement is False.

2. $(-1)+(-2)=-3$, which is also a negtive integer. So, the given statement is false.

3. $(-3)-(-13)=-3+13=10>-16$. So, the given statement is false.

4.

So, the given statement is true.

5. Addtive inverse of 2 is –2. so $2-(-2)=2+2=4$, even number and additive inverse of 3 is –3. So $3-(-3)=3+3=6$, even number

∴ The given statement is true.

6. Successor of 2 is 3 and predecessor is 1.

∴ Sum = 3 + 1 = 4, even integer.

So, given statement is false.

7. Let –3 be integer. So $-3+(-3)=-3-3=-6$

But, $-6<-3$

So, the given statement is false.

E.

1. Consider $49-(-40)-(-3)+69$

$=49+40+3+69=161$

2. (*a*) Since opposite of down is up. So, the opposite of 15 floors down is 15 floors up.

(*b*) Since, opposite of above is below.

So, the opposite of 20 m above the danger mark of river Ganga is 20 m below the danger mark.

(*c*) Opposite of gain is loss.

So, opposite of a gain of ₹450 is a loss of ₹450.

(*d*) Since, opposite of winning is losing.

So, the opposite of winning by a margin of 1500 votes is losing by a margin of 1500 votes.

3. In each jump, kitten moves 4 steps forward and 3 steps backward.

So, net movement per jump

$=4-3=1$ step forward

Now, the points in sequence are:

$$A\rightarrow B\rightarrow C\rightarrow D\rightarrow E\rightarrow F\rightarrow G$$

Since each jump the kitten moves 1step forward, So, the kitten will need 6 jumps to reach point G.

4. At the end of 5th round, Kartik score

$=60-90+55-30+25$

$=140-120=20$

5. (*a*) $[245+(-518)]-51=-324$

(*b*) $[3321+(-4312)]+(-2043)$

$=-991-2043=-3034$

6. Current solution $=21-9-13$

$=21-22=-1$

instead of subtracting 22, she added 22. The reason being she learnt that two negative numbers when added will get the sign of larger number but failed to apply.

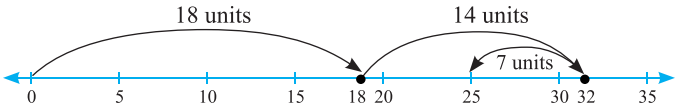
7. Priyanshi parked her car in the third basement, i.e., –3, and took elevator to the next sixth floor, i.e., 6.

So, $-3+6=3$ i.e. 3rd floor above the ground level.

So, she ended up on 3rd floor.

8. 18 + 14 –7

= 25 ice cream



9. Score of team A = –10 + 12 + 19 = 21

Score of team B = 21 + 10 – 17 = 14

Score of team C = 25 + 18 – 20 = 23

Score of team D = 20 + 5 – 10 = 15

Thus, team C had the highest score.

10. –2 – 3 + 2 + 3 + 5 = 5;

–1 – 2 + 2 + 1 + 5 = 5

11. (*a*) Point A = + 8 km, since, it is 8 km above sea level.

Point B = – 12 km, since it is 12 km below sea level

Point C = + 11 km, since it is 11 km below sea level

Point D = – 9 km, since it is 9 km below sea level.

(*b*) Point C

(*c*) Distance between points B and C = 12 + 11 = 23 km

(*d*) Point B = 12 km below sea level = –12 km

So, elevation of point E = –12 km – 5 km

= –17 km

∴ The elevation of point E is 17 km below sea level.

Brain Sizzlers (Page 303)

Niharika's Movement:

+ 24 + (–27) + 24 + (–27) + 24 + (–27) + 24 + (–27) + 24 = 120 + (–108) = 12

Nidhi's Movement:

+ 37 + (–32) + 37 + (–32) + 37 + (–32) + 37 + (–32) + 37 = 185 + (–128) = 57

So, Nidhi is at higher level by 57 – 12 = 45 units.

Model Test Paper – 2

A.

1. (*d*) 1, 6, 15, 28, …, are hexagonal numbers as they form hexagonal dots.

2. (*c*) $\frac{5}{9} = \frac{5 \times 12}{9 \times 12} = \frac{60}{108}$

3. (*c*) Two sets of data on the same graph is shown by double bar graph.

4. (*c*) Let the side of a square = *a*

∴ Perimeter = 4*a*

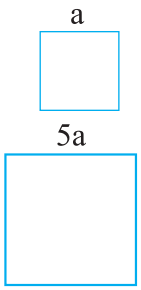
If the new side = 5*a*

∴ New Perimeter = 4 × 5*a*

= 20 *a*

= 5(4*a*)

= 5 × Perimeter



Hence, perimeter becomes five times (*c*)

5. (*c*) no line of symmetry

6. (*c*) A complete turn = 360°

So, three-quarter turn = $\frac{3}{4} \times 360°$

= 270°

7. (*b*) 2394 – (–4128)

= 2394 + 4128

= 6522

8. (*d*) Since 24 × 1 = 24,

24 × 3 = 72,

24 × 6 = 144

But 218 is not divisible by 24. So 218 is not a multiple of 24.

9. (*b*) Perimeter = 24 cm

Side = $\frac{24}{4}$ = 6 cm.

(∵ Perimeter of a square = 4 × side)

So, Area = $(6)^2$ = 36 sq. cm.

Assertion is true so as Reason but reason is not the correct explanations. hence (*b*).

10. (*a*) A and R are both true and A is correct explanation of R.

B

1. properties

2. perimeter = 6 × 6 cm = 36 cm.

3. 1

4. diagonal

5. twin

C.

1. Successor of –9058 is – 9058 + 1 = –9057

So, this statement is false.

2. 19 + 38 + 57 + 76 + 95

= 19(1 + 2 + 3 + 4 + 5)

= 19 × 15 = 285. So, this statement is true.

3. Both are required as P = 2(l + b). So, this statement is false.

4. True

5. True

D.

1. (a) –459 + 301 + (–50) + 109

= –459 + 301 – 50 +109 = –99

Therefore, the additive inverse of –99 = 99 as –99 + 99 = 0.

(b) 30 + (–48) + (–15) – 80

= 30 – 48 – 15 – 80 = –113

Therefore, the additive inverse of –113 is 113 as – 113 + 113 = 0

2. (a) AD||CB, DC||AB, LT||AB, AD||MN, DC||LT, MN||CB.

(b) MN⊥AB, LT⊥BC, NN⊥DC, LT⊥AD

(c) AC and BD, MN and LT.

3. HCF × LCM = Product of two numbers.

32 × 480 = 160 × other number

$$\text{Other number} = \frac{32 \times \cancel{480}^{3}}{\cancel{160}} = 32 \times 3 = 96$$

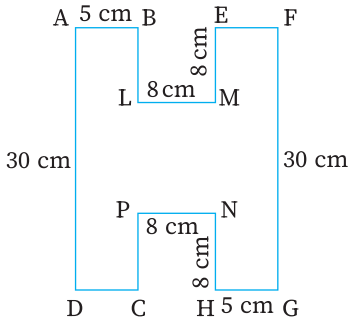
4. BL = EM = 8 cm

LP = 30 – 8 – 8 = 14 cm

or (LMPN) = 8 cm × 14 cm = 112 sq. cm.

or (EFGH) = 30 cm × 5 cm = 150 sq. cm

or (ABCD) = 30 cm × 5 cm = 150 sq. cm



Total area = (112 + 150 + 150) sq. cm

= 412 sq. cm

5. Word H and S have rotational symmetry of order2 as it looks same when rotated about180 degrees.

6. Distance covered by walking = $\frac{1}{3}$ km

Distance covered by bus = $3\frac{1}{5}$ km = $\frac{16}{5}$ km

Distance covered by Battery rickshaw = $\frac{1}{4}$ km

Total distance covered = $\left(\frac{1}{3}+\frac{16}{5}+\frac{1}{4}\right)$ km

$= \frac{20+192+15}{60}$ km = $\frac{227}{60}$ km = $3\frac{47}{60}$ km

$= 3\frac{47}{60}$ km < 4 km

8. Total number of people = 155

Number of people who do regular meditation = 45

Number of people who do Regular exercise = 95

Number of people who do Yoga = 155 – 45 –95 = 15

(a) Fraction of total number of people who do yoga

$= \frac{15}{155} = \frac{3}{31}$

(b) Yes as the numerator is smaller than denominator.

(c) Meditation = $\frac{\cancel{45}^{9}}{\cancel{155}_{31}} = \frac{9}{31}$

Exercise = $\frac{\cancel{95}^{19}}{\cancel{155}_{31}} = \frac{19}{31}$

Yoga = $\frac{15}{155} = \frac{\mathbf{3}}{\mathbf{31}}$