# Grade – 6 (Mathematics)

# (Spectrum)

## Chapter – 1 : Patterns in Mathematics

**NCERT CORNER**

**FIGURE IT OUT**

**1.** Yes, mathematics helps us in many daily activities such as:

- While shopping (calculating total cost, discounts, change)
- Cooking (measuring ingredients like grams, litres)
- Managing time (reading clocks, planning schedules)
- Travelling (calculating distance, speed, time)
- Banking (saving money, interest calculation)

**2.** Mathematics has played a major role in the development of humanity in the following ways:

- It helps in conducting scientific experiments and discoveries.
- It is used in building bridges, houses, and other structures.
- It supports the functioning of economy and democracy.
- It is essential in making machines and technology like TVs, mobile phones, and computers.
- It is used in transport systems such as cars, trains, and airplanes.
- It helps in designing calendars, clocks, and other daily-use systems.

**Figure it Out**

**Table 1: Examples of number sequences**

| | |
|---|---|
| 1, 1, 1, 1, 1, 1, 1, ... | (All 1's) |
| 1, 2, 3, 4, 5, 6, 7, ... | (Counting numbers) |
| 1, 3, 5, 7, 9, 11, 13, ... | (Odd numbers) |
| 2, 4, 6, 8, 10, 12, 14, ... | (Even numbers) |
| 1, 3, 6, 10, 15, 21, 28, ... | (Triangular numbers) |
| 1, 4, 9, 16, 25, 36, 49, ... | (Squares) |
| 1, 8, 27, 64, 125, 216, ... | (Cubes) |
| 1, 2, 3, 5, 8, 13, 21, ... | (Virahānka numbers) |
| 1, 2, 4, 8, 16, 32, 64, ... | (Powers of 2) |
| 1, 3, 9, 27, 81, 243, 729, ... | (Powers of 3) |

**1.**

Ans:

(a) 1, 1, 1, 1, 1, 1, 1, ……
The number '1' is repeated indefinitely.

(b) 1, 2, 3, 4, 5, 6, 7, ……
Counting numbers starting from '1'. Each number increases by 1.

(c) 1, 3, 5, 7, 9, 11, 13, ……
Odd numbers. Start from 1 and keep adding 2.

(d) 2, 4, 6, 8, 10, 12, 14, ……
Even numbers. Start from 2 and keep adding 2.

(e) 1, 3, 6, 10, 15, 21, 28, ……
Triangular numbers. Each term is the sum of the natural numbers up to that term.

(f) 1, 4, 9, 16, 25, 36, 49, ……
Square numbers. Each term is the square of its position (12 , 22 , 32 , ...).

(g) 1, 8, 27, 64, 125, 216, ……
Cube numbers. Each term is the cube of its position (12 , 22 , 32 , ...).

(h) 1, 2, 3, 5, 8, 13, 21, ……
Virahānka numbers (Fibonacci sequence). Each number is the sum of the two preceding numbers.

(i) 1, 2, 4, 8, 16, 32, 64, ……
Powers of 2. Each term is raised to the power of its position (20 , 21 , 22 , ...).

(j) 1, 3, 9, 27, 81, 243, 729, ……
Powers of 3. Each term is 3 raised to the power of its position (30 , 31 , 32 , ...).

**2.**

Ans:

(a) 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
The sequence consists of repeating the number 1. The next three numbers are also 1.

(b) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, …
This is a sequence of consecutive counting numbers. The next three numbers are 8, 9, and 10.

(c) 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, …
These are consecutive odd numbers, increasing by 2. The next three numbers are 15, 17, and 19.

(d) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, …
The sequence contains even numbers, increasing by 2. The next three numbers are 16, 18, and 20.

(e) 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, …
A sequence of triangular numbers where each number is the sum of the natural numbers up to a certain point.
$28 + 8 = 36$
$36 + 9 = 45$
$45 + 10 = 55$

(f) 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, …
Square numbers are formed by multiplying a number by itself. The next three are 64, 81, and 100.
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$

(g) 1, 8, 27, 64, 125, 216, 343, 512, 729, …
A sequence of cube numbers where each number is the cube of a natural number. The next three numbers are 343, 512, and 729.
$7^3 = 343$
$8^3 = 512$
$9^3 = 729$

(h) 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, …
This is the Fibonacci (Virahanka) sequence, where each number is the sum of the previous two. The next three numbers are 34, 55, and 89.
$13 + 21 = 34$

21 + 34 = 55
34 + 55 = 89

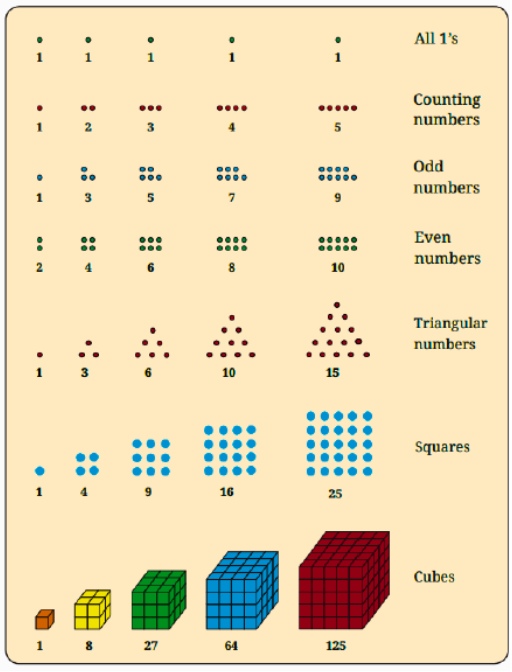
(i) 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, …
This shows powers of 2, where each number is multiplied by 2. The next three numbers are 128, 256, and 512.
64 × 2 = 128
128 × 2 = 256
256 × 2 = 512

(j) 1, 3, 9, 27, 81, 243, 729, 2187, 6561, 19683, …
This shows powers of 3, where each number is multiplied by 3. The next three numbers are 2187, 6561, and 19683.
729 × 3 = 2187
2187 × 3 = 6561
6561 × 3 = 19683

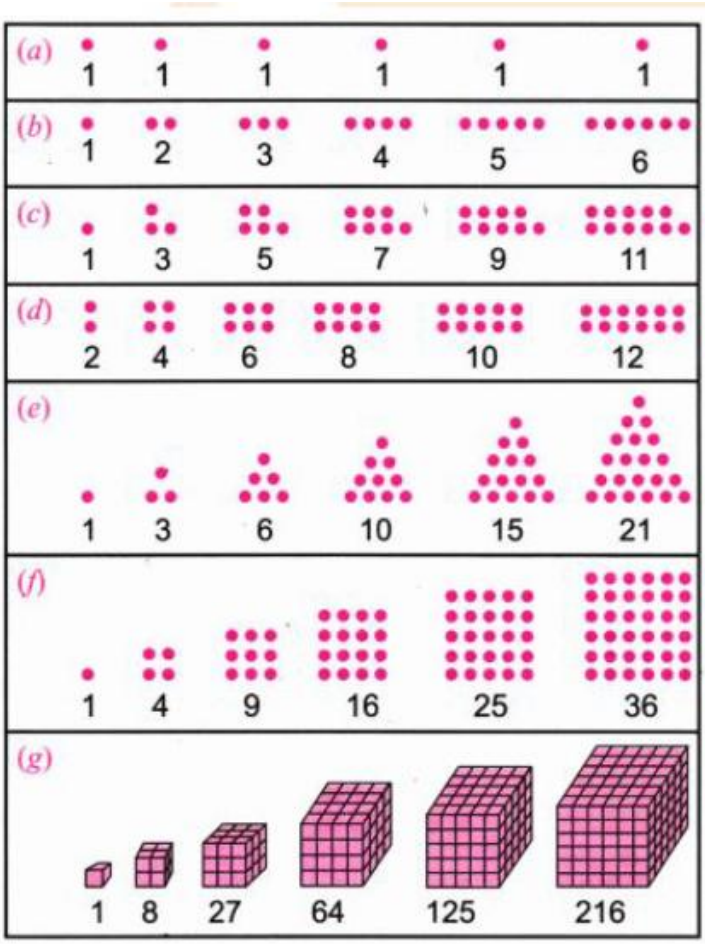
## Figure it Out

**1.**

**Table 2 Pictorial representation of some number sequences**




Ans:



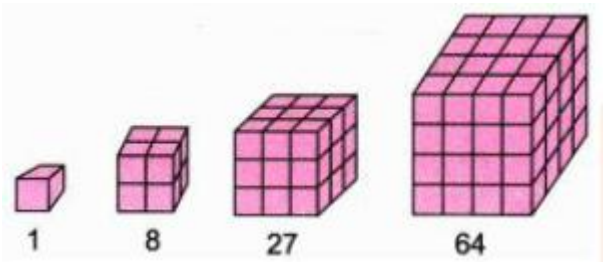

**2.**

Ans:

1, 3, 6, 10, 15, … are called triangular numbers because they can be arranged in the shape of an equilateral triangle. For example, 3 can be arranged as a triangle with 2 dots in the base and 1 dot at the top. Each number represents the total number of dots forming a triangle in increasing rows.


1, 4, 9, 16, 25, … are called square numbers because they represent the area of a square. For example, 4 is the area of a square with side 2 (2 × 2 = 4). Each number is formed by multiplying a number by itself.

1, 8, 27, 64, 125, … are called cubes because they represent the volume of a cube. For example, 8 is the volume of a cube of side 2 (2 × 2 × 2 = 8).



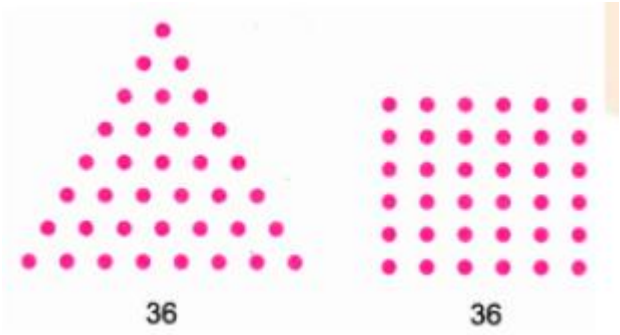

**3.**

Ans:

36 can be arranged:

- As a square (6 × 6)
- As a triangle

This shows that some numbers can be represented in multiple ways.




**4.**

Ans: These are called hexagonal numbers.

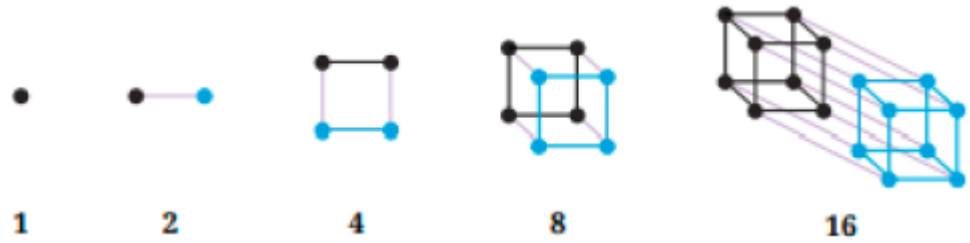
Pattern:

1st = 1
2nd = 1 + 6 = 7
3rd = 7 + 12 = 19
4th = 19 + 18 = 37
5th = 37 + 24 = 61

Next number:
61 + 30 = **91**

**5.** Ans:

Pictorial representation of power of 2




Pictorial representation of power of 3

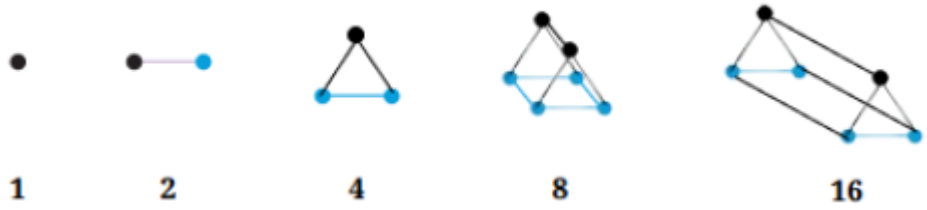
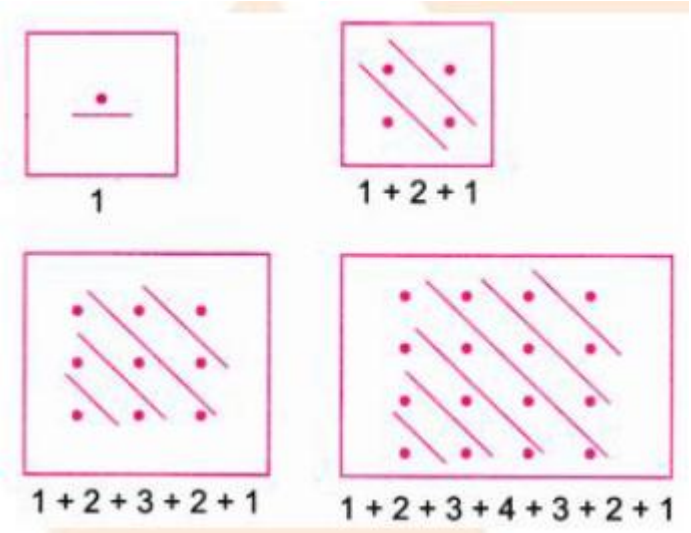



**Figure it out**

**Exercise 1.4**

**1.**

Ans:



$1 = 1^2$
$1 + 2 + 1 = 4 = 2^2$
$1 + 2 + 3 + 2 + 1 = 9 = 3^2$

Next:

$1 + 2 + 3 + 4 + 3 + 2 + 1 = 16 = 4^2$
$1 + 2 + 3 + 4 + 5 + 4 + 3 + 2 + 1 = 25 = 5^2$
$1 + 2 + 3 + 4 + 5 + 6 + 5 + 4 + 3 + 2 + 1 = 36 = 6^2$

**2. Find the value of the expression**

Ans:

1. Understand the Pattern: The sequence starts with increasing numbers from 1 up to 100 and then decreases back to 1. It forms a symmetrical pattern around the number 100.
2. The sum of Increasing Sequence:

Sum 1 to 100 = 100 × (100 + 1) / 2 = 100 × 101 / 2 = 5050

3. The sum of Decreasing Sequence:

Sum 1 to 99 = 99 × (99 + 1) / 2 = 99 × 100 / 2 = 4950

4. Add the Two Sums:

Total Sum = 5050 + 100 + 4950 = 10000

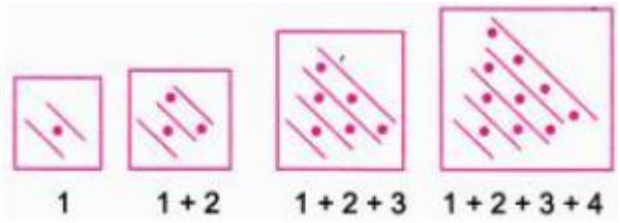
So, the value of 1 + 2 + 3 + ... + 99 + 100 + 99 + … + 3 + 2 + 1 is 10,000.

**3.**

Ans: When adding up a sequence of 1's, such as 1 + 1 + 1 + 1, the result is 4.

Similarly, when adding down a sequence of 1's, such as 1 + 1 + 1 + 1, the sum remains 4. This shows that whether you add the 1's up or down, the total sum is the same in both cases.

**4.**




Ans:
When you add up the counting numbers sequentially, you get the following sequence:

1. Start with 1.
2. Next, add 1 + 2 to get 3.
3. Then, add 1 + 2 + 3 to get 6.
4. Finally, add 1 + 2 + 3 + 4 to get 10.

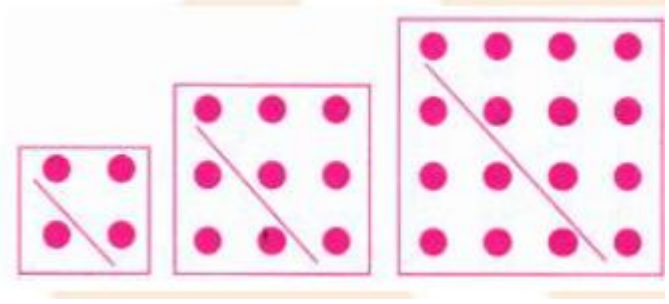
**5.** Ans: Identify the Triangular Numbers: Triangular numbers are: 1, 3, 6, 10, 15, …

Add the First Pair:
1 + 3 = 4
This is the first pentagonal number.

Add the Second Pair:
3 + 6 = 9
This is the second pentagonal number.

Add the Third Pair:
6 + 10 = 16
This is the third pentagonal number.

Add the Fourth Pair:
10 + 15 = 25
This is the fourth pentagonal number.



Each sum of consecutive triangular numbers forms a pentagonal number because the total number of dots creates a pentagon shape. This pattern reflects the arrangement of dots in a pentagonal figure.

**6.** Ans: When you start adding up powers of 2, you get a sequence of numbers that are one less than the next power of 2. Here's a detailed explanation:

Adding Powers of 2:

1. Start with 1: 1
2. Add the next power of 2 (2): 1 + 2 = 3
3. Add the next power of 2 (4): 1 + 2 + 4 = 7
4. Add the next power of 2 (8): 1 + 2 + 4 + 8 = 15
5. Add the next power of 2 (16): 1 + 2 + 4 + 8 + 16 = 31

Adding 1 to Each Number:

1. Add 1 to 1: 1 + 1 = 2
2. Add 1 to 3: 3 + 1 = 4
3. Add 1 to 7: 7 + 1 = 8
4. Add 1 to 15: 15 + 1 = 16
5. Add 1 to 31: 31 + 1 = 32

Explanation:

When you add up powers of 2, the sum is always one less than the next power of 2.

The sum of the first n powers of 2 is:
$2^0 + 2^1 + 2^2 + ... + 2^{n-1}$

This sum can be simplified using the formula for a geometric series:
$S = 2^n - 1$

Therefore, when you add 1 to this sum, you get $2^n$, which is the next power of 2.

So, the sequence you get after adding 1 to each of these sums is 2, 4, 8, 16, 32, … This is the sequence of powers of 2.

**7.** Ans:

Triangular numbers follow the sequence: 1, 3, 6, 10, 15, 21, etc. When you multiply each triangular number by 6 and add 1, you get a new sequence:

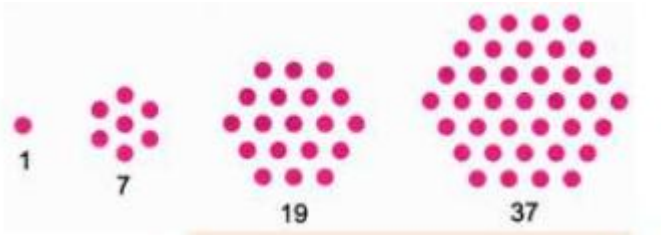
$1 \times 6 + 1 = 7$

$3 \times 6 + 1 = 19$ (increase of 12)

$6 \times 6 + 1 = 37$ (increase of 18)

$10 \times 6 + 1 = 61$ (increase of 24)

$15 \times 6 + 1 = 91$ (increase of 30)




Thus, the sequence becomes 7, 19, 37, 61, 91, and so on. This pattern shows that each term increases by 6 more than the previous increase.

**8.** Ans:

Hexagonal numbers follow the sequence: 1, 7, 19, 37, and so on. When you sum these numbers sequentially, you observe the following results:

- The sum of the first hexagonal number is 1, which equals $1^3$ (the cube of 1).
- Adding the second hexagonal number 7 gives $1 + 7 = 8$, which is $2^3$ (the cube of 2).
- Adding the third hexagonal number 19 results in $1 + 7 + 19 = 27$, which is $3^3$ (the cube of 3).
- Adding the fourth hexagonal number 37 yields $1 + 7 + 19 + 37 = 64$, which is $4^3$ (the cube of 4).
- Adding the fifth hexagonal number 61 gives $1 + 7 + 19 + 37 + 61 = 125$, which is $5^3$ (the cube of 5).

This pattern illustrates that the cumulative sum of the first n hexagonal numbers equals $n^3$, demonstrating an interesting relationship between hexagonal numbers and perfect cubes.

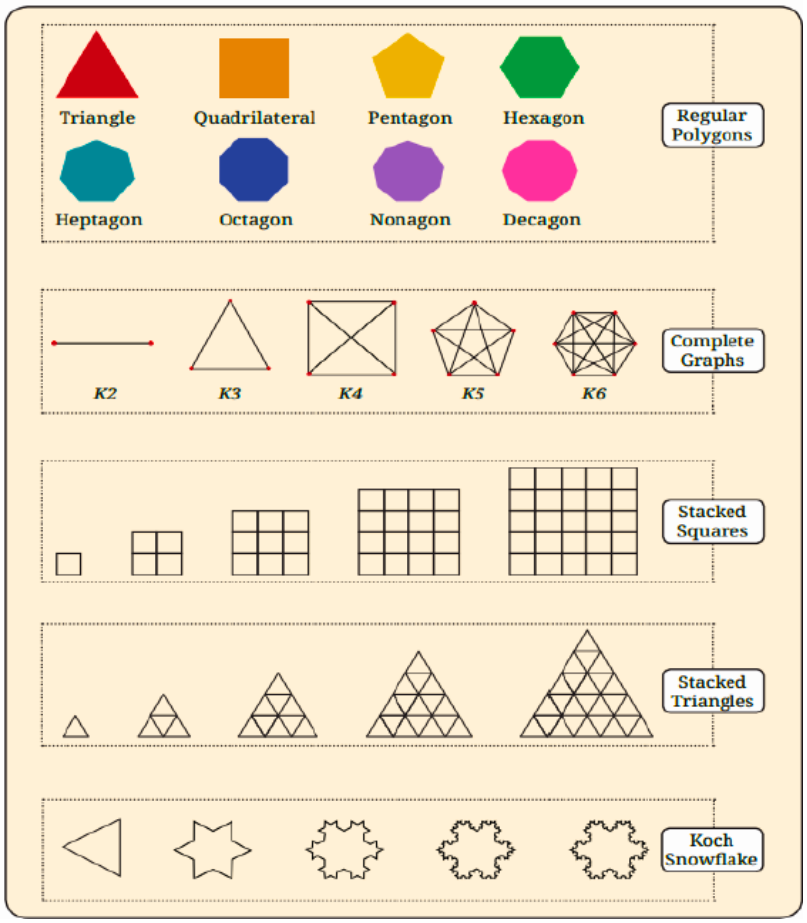
**9.** Ans: Here are two simple patterns:

1. Multiples of 3: The sequence 3, 6, 9, 12, 15, 18, … includes numbers that are multiples of 3. Each number is 3 more than the previous one.
2. Starting at 10 and Increasing
3. by 5: The sequence 10, 15, 20, 25, … starts at 10, with each number increasing by 5.

In the first sequence, each term is 3 times a whole number. In the second sequence, each term starts at 10 and adds 5 each time. Both sequences show how regular patterns can be created with simple rules.

**Figure it out**

**Table 3 Examples of shape sequences**




Ans:

(a) **Regular Polygons:** Examples include triangle, quadrilateral, pentagon, and hexagon. In these shapes, the number of sides increases by 1 with each step, starting from 3. This forms a continuous number sequence where each polygon has one more side than the previous one.

(b) **Complete Graphs**

| $K_2$ | $K_3$ | $K_4$ | $K_5$ | $K_6$ | **Complete Graphs** |
|---|---|---|---|---|---|
|  |  |  |  |  | |
| 1 | 3 | 6 | 10 | 15 | |

The number of lines in the sequence is as follows:

For $K_2 = 1$, $K_3 = 3$, $K_4 = 6$, $K_5 = 10$, and $K_6 = 15$. The resulting series is 1, 3, 6, 10, 15, …. This forms a triangular number sequence, where each term represents the total number of lines that can form a triangle. Triangular numbers are generated by adding consecutive natural numbers, making this sequence grow in a predictable pattern.

(c) **Stacked Squares:**

The number of small squares in each layer follows the pattern: 1, 4, 9, 16, 25, and so on. This sequence represents square numbers, where each term is the result of squaring a natural number ($1^2$, $2^2$, $3^2$, etc.).

| | | | | | **Stacked Squares** |
|---|---|---|---|---|---|
|  |  |  |  |  | |
| 1<br>$1\times1=1^2$ | 4<br>$2\times2=2^2$ | 9<br>$3\times3=3^2$ | 16<br>$4\times4=4^2$ | 25<br>$5\times5=5^2$ | |

The arrangement visually forms a perfect square, showing how the number of small squares increases as the layers grow, perfectly fitting into a square grid. Hence, it's a clear representation of a square number sequence.

(d) **Stacked Triangles:**

The number of small triangles in each layer follows the pattern.

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  | **Stacked Triangles** |
| 1<br>1×1 | 4<br>2×2 | 9<br>3×3 | 16<br>4×4 | 25<br>5×5 | |

Thus, it is also a square number sequence represented through triangular formations.

(e) **Koch Snowflake:**

Number of sides in each becomes 4 times.

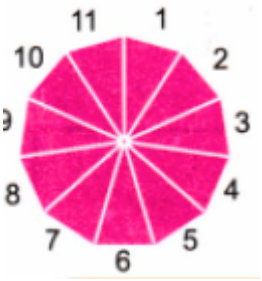
| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  | **Koch Snowflake** |
| 3 | 3 × 4 = 12 | 12 × 4 = 48 | 48 × 4 = 192 | 192 × 4 =768 | |

The number of sides in each increases by a factor of 4.

**2.**

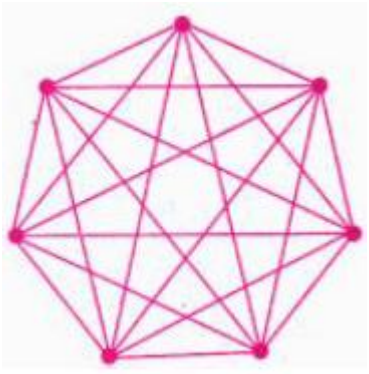
Ans:

(a) Regular Polygon



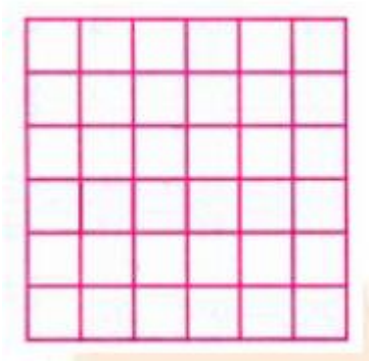

A polygon with 11 sides is known as a hendecagon.

(b) $K_6$



The image shows a complete graph with 7 vertices ($K_7$), where every point is connected to every other point with straight lines.

(c) **Stacked Squares**

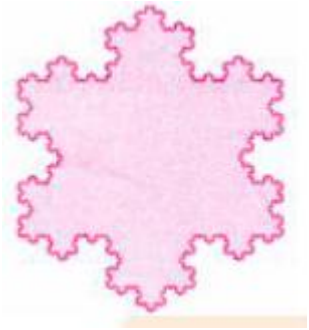


The total number of squares is $6 \times 6 = 36$. This calculation represents a perfect square, showing how the number of small squares forms a $6 \times 6$ grid.

(d) **Stacked Triangles**

The total number of triangles is $1 + 3 + 5 + 7 + 9 + 11 = 36$. This sum represents the sequential addition of odd numbers, resulting in the total number of triangles in the arrangement.

(e) **Koch Snowflake**



The shape is a Koch snowflake, created by repeatedly adding triangular bumps to each side of an equilateral triangle.

## Figure it Out

1. Ans:

| Polygon | Equilateral Triangle | Square | Regular Pentagon | Regular Hexagon | Regular Heptagon | Regular Octagon |
|---|---|---|---|---|---|---|
| No. of sides | 3 | 4 | 5 | 6 | 7 | 8 |
| No of corners or vertices | 3 | 4 | 5 | 6 | 7 | 8 |

Both sequences are the same because, in a regular polygon, the number of sides equals the number of vertices.

**2.**

Ans:

| Graph | $K_2$ | $K_3$ | $K_4$ | $K_5$ | $K_6$ |
|---|---|---|---|---|---|
| No. of lines | 1 | 3 | 6 | 10 | 15 |

Therefore, the sequence is 1, 3, 6, 10, 15, and so on. This is known as a triangular number sequence.

**3.**

Ans:

| No of small squares on each side | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Total no. of small squares | 1 | 4 | 9 | 16 | 25 | 36 | 49 |

We obtain the sequence 1, 4, 9, 16, 25, 36, and so on. This sequence represents square numbers.

**4.**

Ans:

| No of rows of small triangles | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Total no. of small triangles | 1 | 4 | 9 | 16 | 25 | 36 | 49 |

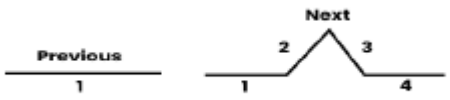
Sequences 1, 4, 9, 16, 25, 36, and 49 represent square numbers. By adding a stacked triangle at the bottom, we can determine the next number in this square sequence.

**5.**

Ans:

| No of rows of small triangles | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Total no. of small triangles | 1 | 4 | 9 | 16 | 25 | 36 | 49 |

The sequence 3, 12, 48, 192, 768, and so on begins with 3. Each subsequent term is found by multiplying the previous term by 4. Similarly, in the next Koch Snowflake iteration, four new lines are added for each line of the previous shape.




## Exam Time

A.

1. Next term of 2, 3, 5, 7, ...

This sequence adds 1, then adds 2 alternately.

2 + 1 = 3

3 + 2 = 5

5 + 2 = 7

Next: 7 + 2 = 9

Answer: (a) 9

2.

The pattern is adding 3:

1 + 3 = 4

4 + 3 = 7 (missing)

7 + 3 = 10

10 + 3 = 13

13 + 3 = 16

16 + 3 = 19 (next missing)

19 + 3 = 22

22 + 3 = 25

So, the missing terms are 7 and 19.

**Q3.**

Step 1: Differences
+2, +3, +4, +5

Step 2: Pattern → sum of natural numbers

Answer: **(c) Triangular Numbers**

**Q4.**

Step 1: Even numbers = divisible by 2

Answer: (b) **2, 4, 6, 8, 10, …**

**Q5.**

Step 1:
1 = 1
1+3 = 4
1+3+5 = 9

Step 2: Result = squares

Answer: **(a) Squares**

**Q6. 1, 7, 19, 37**

Step 1: Differences
+6, +12, +18

Step 2: Pattern → hexagonal numbers

Answer: **(d) Hexagonal Numbers**

**Q7. Sequence of cubes**

Step 1:
$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$

Answer: **(a)**

**Q8. 1, 3, 6, __, 15**

Step 1: Differences
+2, +3, +4

Step 2:
6 + 4 = **10**

Answer: **(c) 10**

**Q9.**

Step 1: Write numbers
1, 3, 5, 7, 9

Step 2: Add
1+3 = 4
4+5 = 9

9+7 = 16
16+9 = **25**

Answer: **(b) 25**

**Q10.**

Step 1: Shapes with increasing sides

Answer: **(a) Regular polygons**

**Q11.**

Step 1: Best way to see patterns → pictures

Answer: **(c) Pictures**

**B. Fill in the Blanks**

**Q1. 0, 1, 1, 2, 3, 5, __**

Step 1: Pattern → Fibonacci
Next = 3 + 5

**Answer = 8**

**Q2. 1, 10, __, 1000, 10000**

Step 1: Pattern → ×10
1 ×10 = 10
10 ×10 = **100**

**Answer = 100**

**Q3. 3, 6, 9, __, 15**

Step 1: Pattern → +3
9 + 3 = **12**

**Answer = 12**

**Q4. A ____ polygon**

Step 1: Equal sides + angles

**Answer = Regular**

**Q5. 1, 4, 9, 16**

Step 1:
$1^2, 2^2, 3^2, 4^2$

**Answer = Squares / square numbers**

**Q6. 1, 3, 5, 7, 9**

Step 1: Numbers increase by 2

**Answer = Odd numbers**

**C. True / False (Step-wise)**

**1.** True

**2.** False

**3.** True

**4. 1,3,9,__,81**

Step: 3×3 = 9, 9×3 = 27
False

**5.** False

**6.** True

**7.** True

**D. Match the Columns**

(i) 1, 3, 9, 27 → multiply by 3
**(c) Powers of 3**

(ii) 1, 2, 3, 5, 8 → Fibonacci
**(d) Virahanka Numbers**

(iii) 1, 3, 6, 10 → triangular
**(a)**

(iv) 1, 3, 5, 7 → odd
**(b)**

**E. Very Short Answer**

1. 3, 6, 9, 12

+3 → 15

**2. O, △, O, △**

Pattern repeats
**O**

**3.** 2, 4, 6

+2 → **8**

**4.** 1, 2, 4, 8

×2 → **16**

**5.** 5, 10, 15

+5 → **20**

**F. Short Answer**

**1. Rule**

(i) 5,10,15 → +5

(ii) 2,6,10 → +4

**2. Next terms**

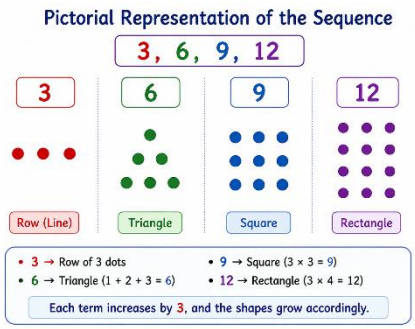
(i) +5 → 23, 28, 33

(ii) +10 → 50, 60, 70

(iii) +4 → 20, 24, 28

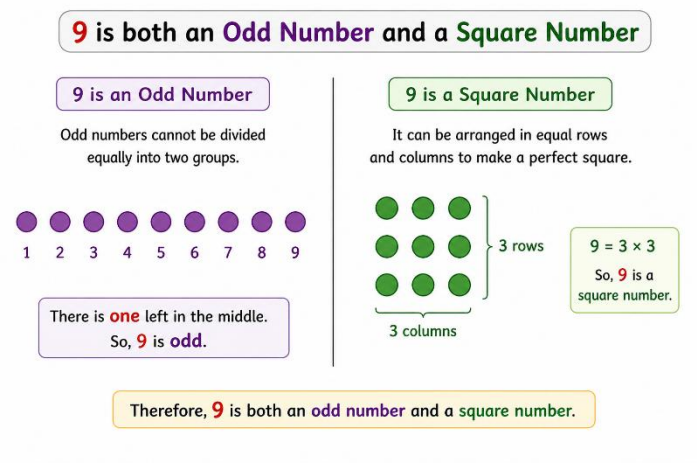
**3. Pictorial (logic)**

3 → ●●●
6 → triangle
9 → square
12 → rectangle



**4.**

Both square + odd




**Q5.**

Sequence: 2, 2, 2, 2, …

Step 1: Add terms
2 = 2
2 + 2 = 4
2 + 2 + 2 = 6
2 + 2 + 2 + 2 = 8

Pattern → **even numbers (2, 4, 6, 8, …)**

**Q6.**

Take examples:

2 + 4 − 1 = 5
4 + 6 − 1 = 9
6 + 8 − 1 = 13

Sequence = **5, 9, 13, … (odd numbers increasing by 4)**

**Q7.**

Shapes increase sides:

Triangle → 3 sides
Square → 4 sides

Pentagon → 5 sides
Hexagon → 6 sides

4th shape = **Hexagon**

**Q8.**

Triangle = 3
Square = 4
Pentagon = 5
Hexagon = 6
Heptagon = 7

5th shape has **7 sides**

**Q9.**

| **Sides** | **Name** |
|---|---|
| 3 | Triangle |
| 6 | Hexagon |
| 9 | Nonagon |
| 10 | Decagon |

**Q10.**

Step 1: Squares
$1^2$, $2^2$, $3^2$, $4^2$

Next:
$5^2 = 25$
$6^2 = 36$

Answer: **25, 36**

**Q11.**

Step 1: Pattern = +5

Terms:
1st = 5
2nd = 10

3rd = 15
4th = 20
5th = 25
6th = 30
7th = **35**

**Q12.**

2 → 7 → 12 → 17 → 22 → 27 …

**Q13.**

Step 1: nth term = 2n − 1

Step 2:
10th = 2×10 − 1 = 20 − 1 = **19**

**Q14.**

Step 1: Pattern = −10

Rule: **Subtract 10 each time**

**Q15.**

Step 1: Pattern = 1, 2, 3, 4, 5, 6

Step 2: Total blocks =
1 + 2 + 3 + 4 + 5 + 6

= 21

Answer: **21 blocks**

**G. Long Answer**

**Q1.**

Step 1: Pattern = +2

Step 2: 8th term = 2 × 8 = **16**

**Q2.**

Step 1: Squares

Step 2: 7th = $7^2$ = **49**

**Q3.**

Start = 2

Add 3 each time:

2 → 5 → 8 → 11 → 14

After 5 rounds = **14 marbles**

**Q4.**

Sequence: 7, 14, 21…

Step 1: 8th term = 7 × 8 = **56**

**Q5.**

1
1 + 3 = 4
1 + 3 + 9 = 13
1 + 3 + 9 + 27 = 40

Pattern:
Sum = $(3^n - 1) / 2$

**Competency-Based Questions**

**Assertion Reason**

**Q1**

A: Triangular numbers → True
R: Squares → True

But not explanation

Answer: **(b)**

**Q2**

A: Next term = 11 → True
R: Prime definition → True

Answer: **(a)**

**Case Study**

**(i) 2, 4, 6…**

7th term = 2×7 = **14**

**(ii) Total till 5th row**

2 + 4 + 6 + 8 + 10 = **30**

**(iii) Pattern decreases after 5th**

10 → 9 → 8 → 7 → 6

10th row = **6**

**Maths Booster**

**Across**

1. Regular
2. Counting
3. Even
4. Triangular

**Down**

1. Squares
2. Cubes
3. Square numbers
4. Counting numbers

## Chapter 2 – Lines And Angles

**Figure it out**

**Question 1.**

**Answer:**
Infinite number of lines can be drawn to pass through a point in a plane.
One and only one line can be drawn to pass through two points.

**Question 2.**

**Answer:**
Line segments: LM, MP, PQ and QR
Points L and R are on one line segment only.
Points M, P and Q are on two line segments.

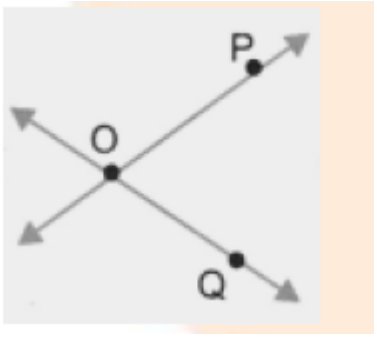
**Question 3.**

**Answer:**
Ray TA and ray TB (can also be called ray TN).
Yes, T is the starting point of each of the 2 rays, TA and TB.

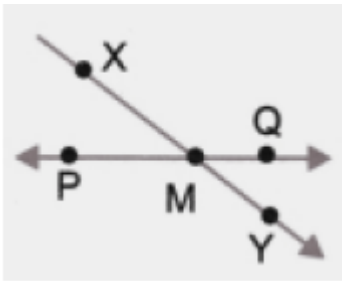
**Question 4.**

**Answer:**

(a)

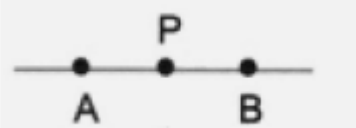



(b)




(c)


(d)




**Question 5.**

**Answer:**
(a) Points B, C, D, E and O
(b) Line: DB
(c) Rays: OB, OC, OD, OE
(d) Line segments: DE, EO, OB, DC, DO

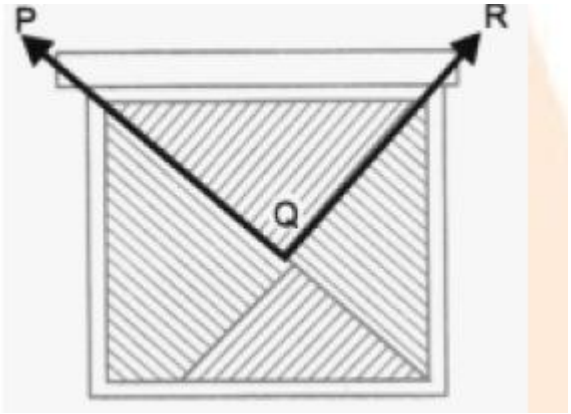
**Question 6.**

**Answer:**
(a) Yes, Ray OA can also be named as ray OB as initial point and direction remains same.
(b) Ray OA cannot be named as ray AO as the initial point of the ray is O, not A.

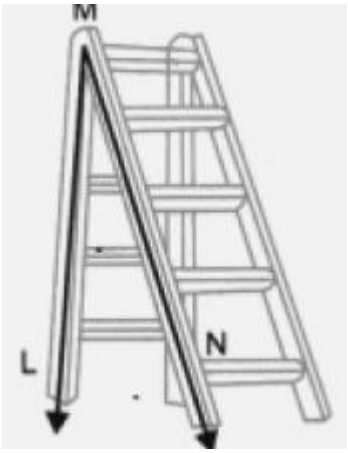
**Figure it Out**

**Question 1.**

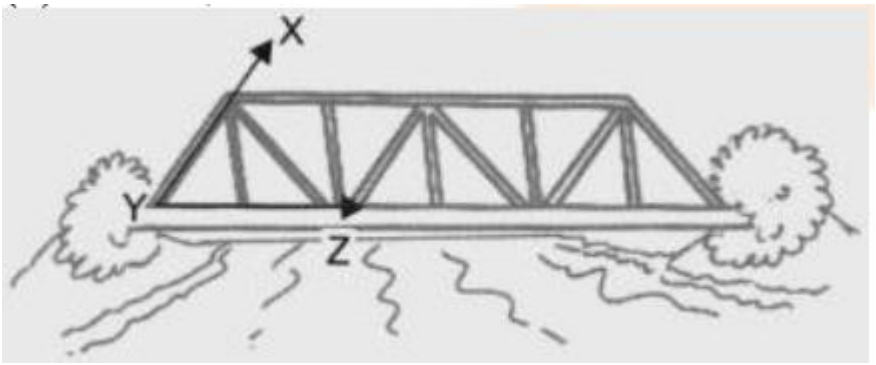
**Answer:**
(a) ∠ADB, ∠BDC, vertex: D
(b) ∠PQR, vertex: Q




(c) ∠LMN, vertex: M

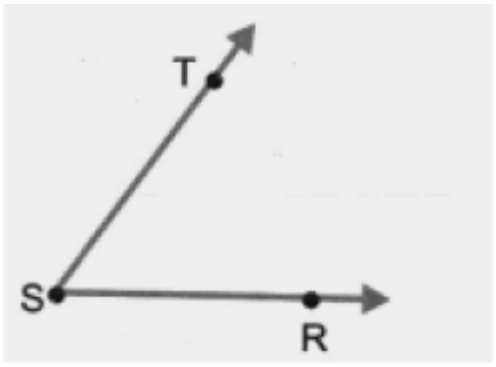



(d) ∠XYZ, vertex: Y




**Question 2.**

**Answer:**




**Question 3.**

**Answer:**

At P there are three angles.

∠P could mean ∠APB or ∠BPC or ∠APC.

To get the correct angle, it has to be named as ∠APC or ∠APB or ∠BPC.

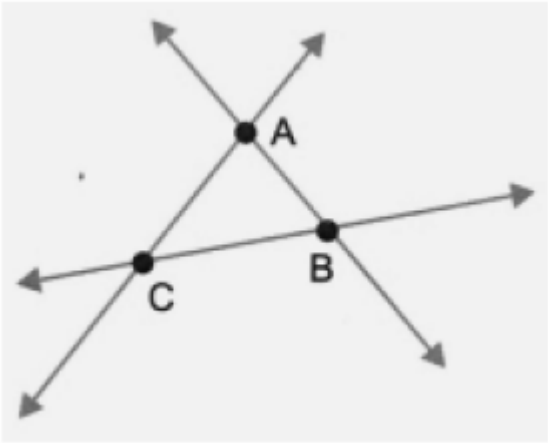
Also note that a single point cannot form an angle.

**Question 4.**

**Answer:**
Angle 1 is ∠RTP
Angle 2 is ∠RTQ

**Question 5.**

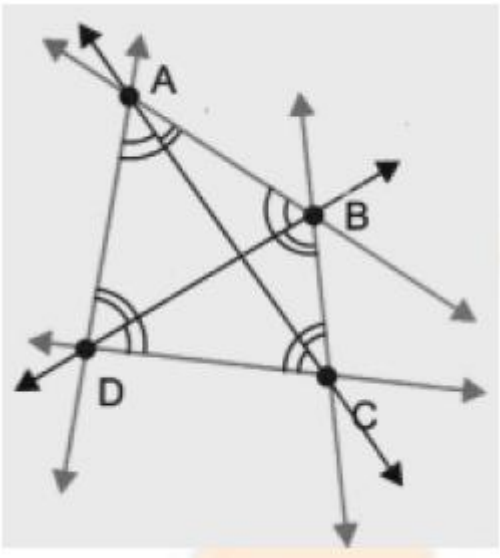
**Answer:**




We get three lines: AB, BC, CA
Angles: ∠ABC, ∠BCA, ∠CAB

**Question 6.**

**Answer:**



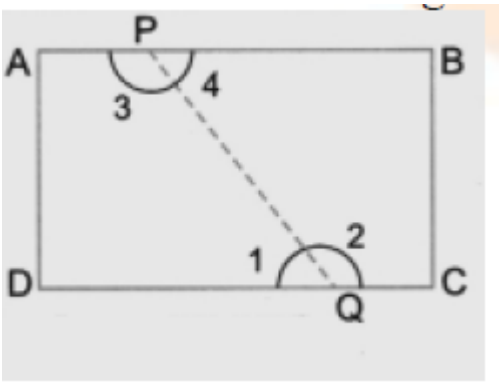

We get six lines.
These are line AB, line BC, line CD, line DA, line AC and line BD.

Also, we get twelve angles.
These are ∠BAC, ∠CAD, ∠BAD, ∠ABD, ∠DBC, ∠ABC, ∠BCA, ∠ACD, ∠BCD, ∠CDB, ∠CDA, ∠BDA.

**Figure it out**

**Question 1.**

**Answer:**
Let's mark the rectangle and vertex of the fold as shown in figure below.




We get ∠1, ∠2, ∠3 and ∠4.

Comparing: ∠1 < ∠2, ∠4 < ∠3,
∠1 = ∠4, ∠2 = ∠3.

∠2 and ∠3 are the largest angles.
∠1 and ∠4 are the smallest angles.

**Question 2.**

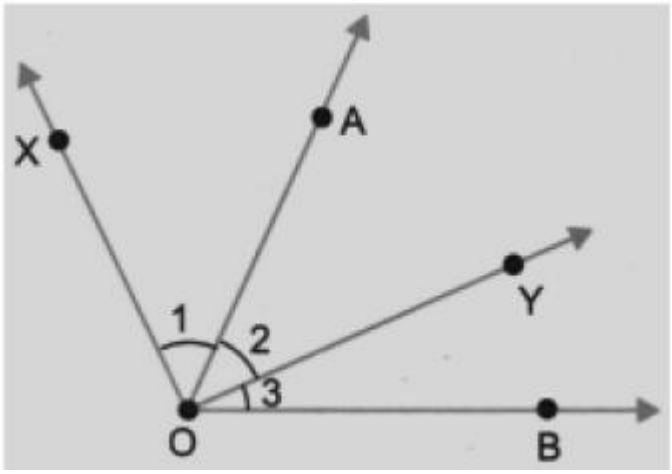
**Answer:**
(a) ∠AOB > ∠XOY
(∠AOB has more spread than ∠XOY)

(b) ∠AOB > ∠XOB
(∠AOB has more spread than ∠XOB)

(c) ∠XOB = ∠XOC
(B and C are points on same ray; both angles have same arms and vertex, hence same spread)

**Question 3.**

**Answer:**




∠1 > ∠3
(∠1 has more spread than ∠3)

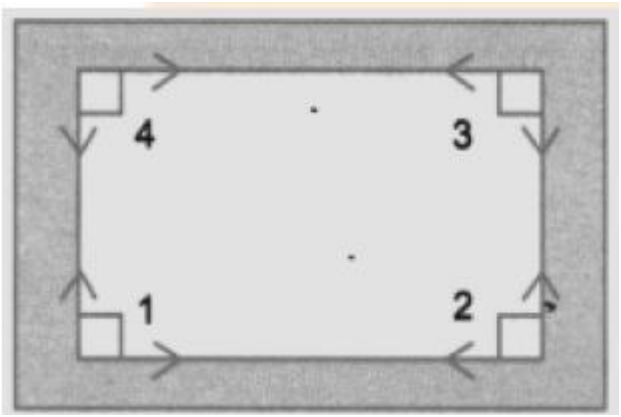
∠1 + ∠2 > ∠3 + ∠2
(adding ∠2 to both sides)

Hence, ∠XOY > ∠AOB

**Figure it Out**

**Question 1.**

**Answer:**

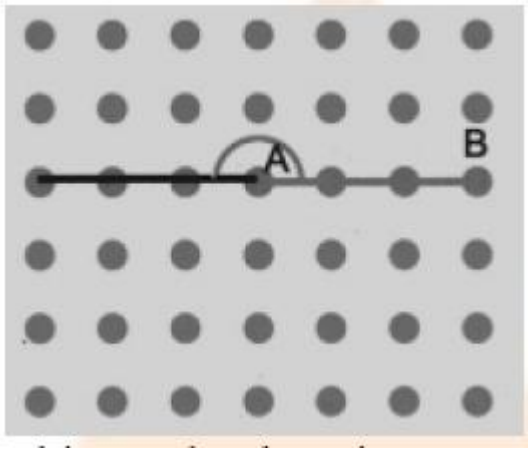



A window has 4 right angles.
∠1, ∠2, ∠3 and ∠4.

Yes. At corners of door. At corners of blackboard etc.

**Question 2.**

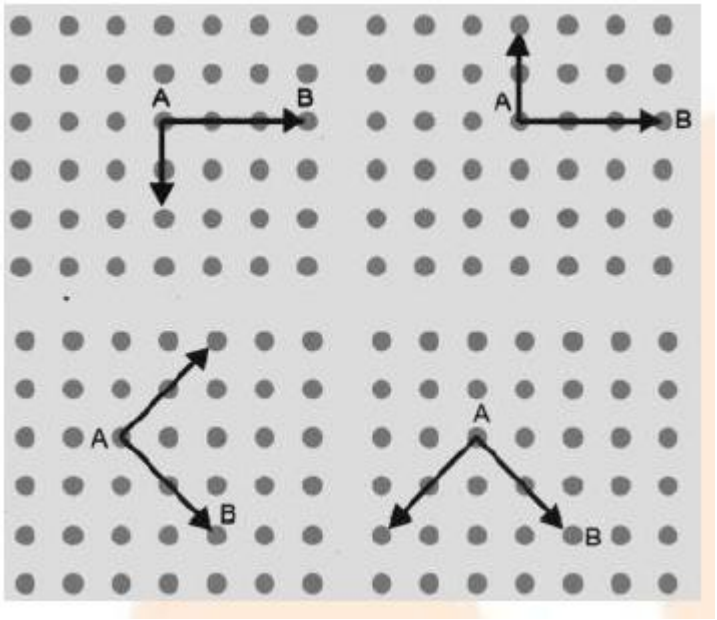
**Answer:**




This can be done in one way.

**Question 3.**

**Answer:**

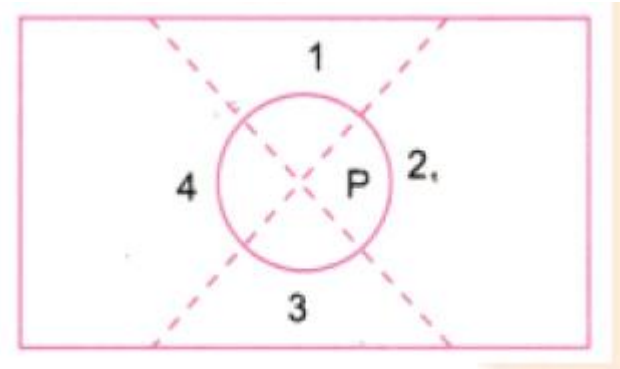



**Question 4.**

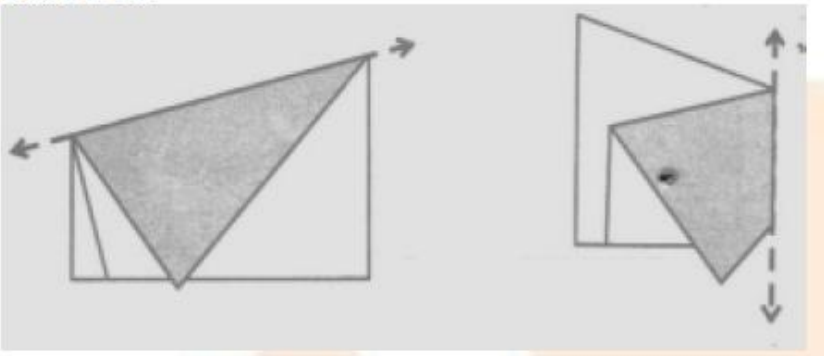
**Answer:**
(a) We get four right angles.

Let P be the point of intersection of the two creases.
The two creases are perpendicular lines meeting at P.

Hence, all four angles are right angles.




(b) **Answer:**



Step 1. Take a sheet of paper and fold it.
Step 2. Crease the fold.
Step 3. Now again fold the paper so that the two parts of the crease coincide.
Step 4. Crease the fold.
Step 5. Unfold both the creases.

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

## Figure it Out

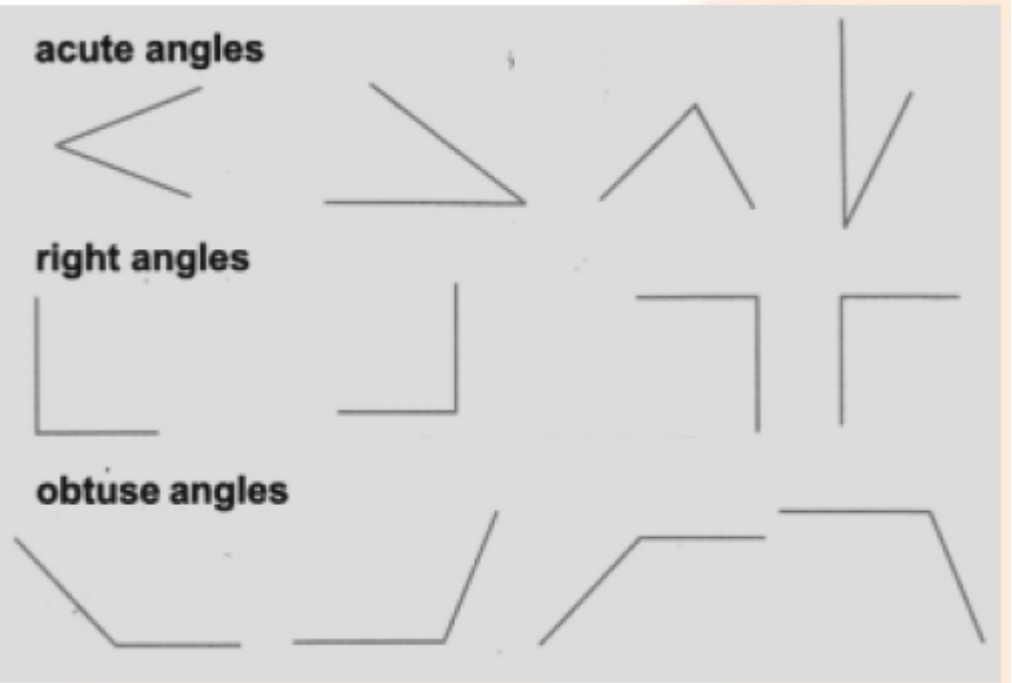
**Question 1.**

**Answer:**

Angle are classified in the three groups as shown in the picture. Right angles are shown in the second group. In the first group, all angle are less than a right angle or in the order words, less than a quarter turn. Such angles are called acute angles. In the third group, all angles are greater than a right angle but less than a straight angle. Turning is more than a quarter turn and less than a half turn. Such angles are called obtuse angles.

**Question 2.**

**Answer:**

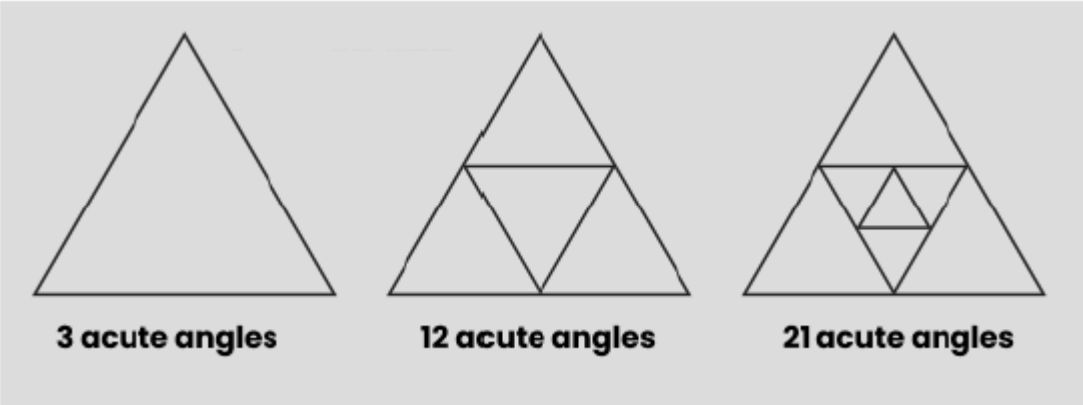



**Question 3.**

**Answer:**
Word ‘acute’ means ‘sharp’. The vertex of the angle appears as a sharp tip.
Word ‘obtuse’ means ‘blunt’. The vertex of the angle appears as a blunt tip.

**Question 4.**

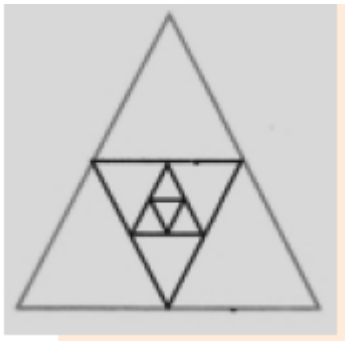
**Answer:**




3 + 9 = 12
12 + 9 = 21

In every step, the numbers of angles increases by 9.

Next figure will be as follows:



Number of acute angles = 21 + 9 = 30

**Figure it out**

1. (a) ∠KAL = **30°**

(b) ∠WAL = **50°**

(c) ∠TAK = **120°**

**Figure it out**

**Question 1.**

**Answer:**
(a) ∠IHJ = 47°
(b) ∠IHJ = 24°
(c) ∠IHJ = 110°

**Question 2.**

**Answer:**
Angle at corner of blackboard = 90°
Angle at corner of desk = 90°

**Question 3.**

**Answer:**
(a) ∠IHJ = 42°
(b) ∠IHJ = 116°
Paper protractor cannot be used here.

**Question 4.**

**Answer:**
We require measure of reflex ∠AOB.
Step 1. We find measure of ∠AOB.

Step 2. We find 360° − ∠AOB.
This is the required measure.

**Question 5.**

**Answer:**
(a) Measure of given angle is 80°
(b) Measure of given angle is 120°
(c) Measure of given angle is 60°
(d) Measure of given angle is 130°
(e) Measure of given angle is 130°
(f) Measure of given angle is 60°

**Question 6.**

**Answer:**
(a) ∠BXE = 115°
(b) ∠CXE = 85°
(c) ∠AXB = 65°
(d) ∠BXC = 30°

**Question 7.**

**Answer:**
(a) ∠PQR = 45°
(b) ∠PQS = 105°
(c) ∠PQT = 150°

**Question 8.**

**Answer:**
Do it yourself.

**Question 9.**

**Answer:**
∠A + ∠B + ∠C = 180°

**Figure it Out**

**Question 1.**

**Answer:**
(a) Numbers 1 to 12 are written along the circumference of a clock at equal distances.

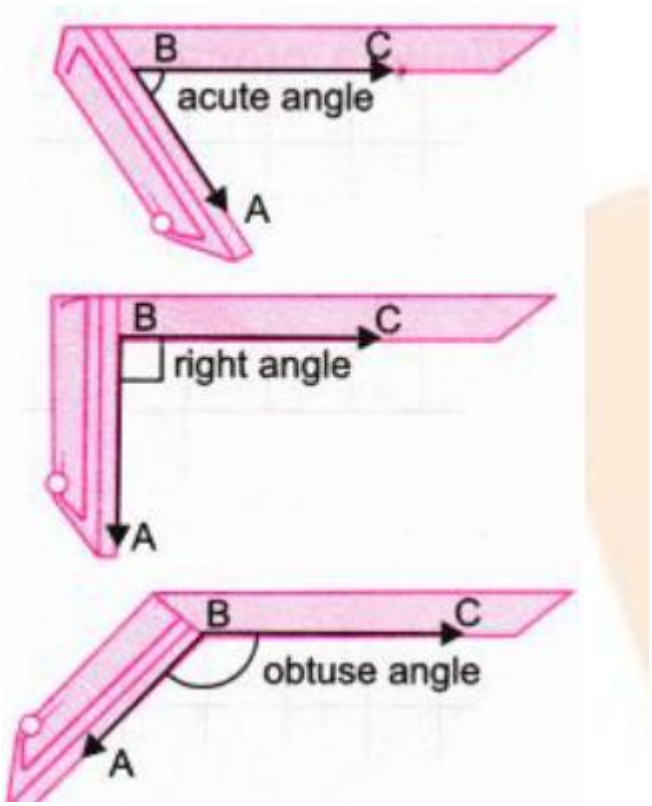
360 ÷ 12 = 30.
Hence, angle between two consecutive numbers is 30°.
At 1 o'clock hands are at 0 and 1 (consecutive numbers).
Hence angle between them is 30°.

(b) Angle between hands at 2 o'clock = 2 × 30° = 60°
Angle between hands at 4 o'clock = 4 × 30° = 120°
Angle between hands at 6 o'clock = 6 × 30° = 180°

(c) Angle between hands at 5 o'clock = 5 × 30° = 150°
Angle between hands at 7 o'clock = 7 × 30° = 210°
Angle between hands at 8 o'clock = 8 × 30° = 240°

**Question 2.**

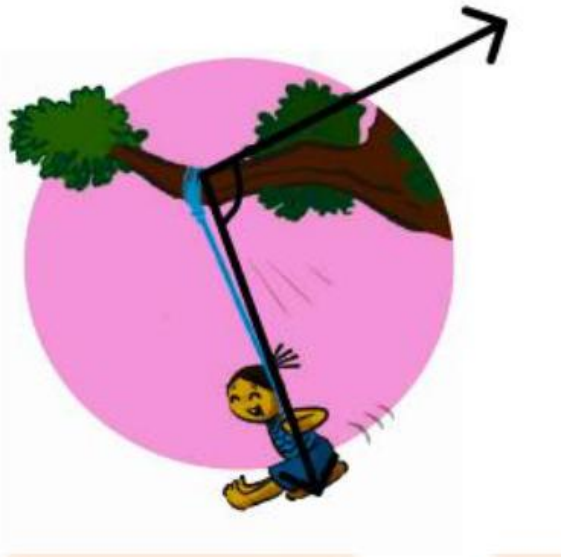
**Answer:**
Yes, it is possible.




Here, vertex is B, and arms are AB and BC.

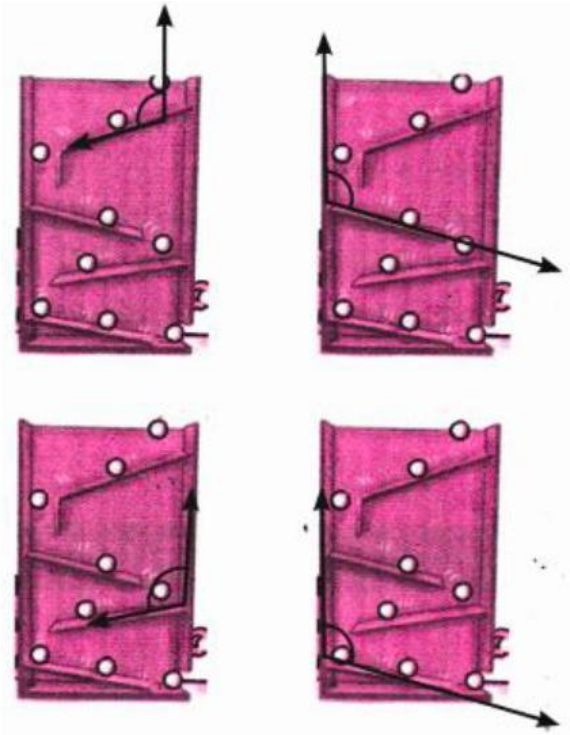
**Question 3.**

**Answer:**
Yes, an angle can be seen.



**Question 4.**

**Answer:**
Greater the angle, greater the slope.
For each angle one arm is a side and one arm is the slope.



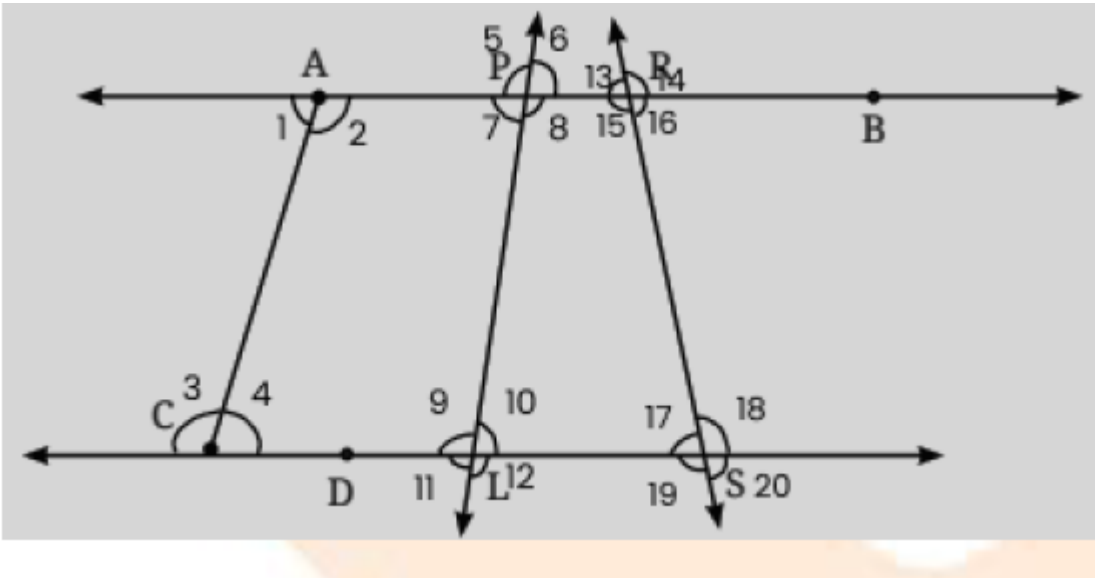
**Question 5.**

**Answer:**
Both insects are rotated 90° clockwise.

**Figure it Out**

**Question 1.**

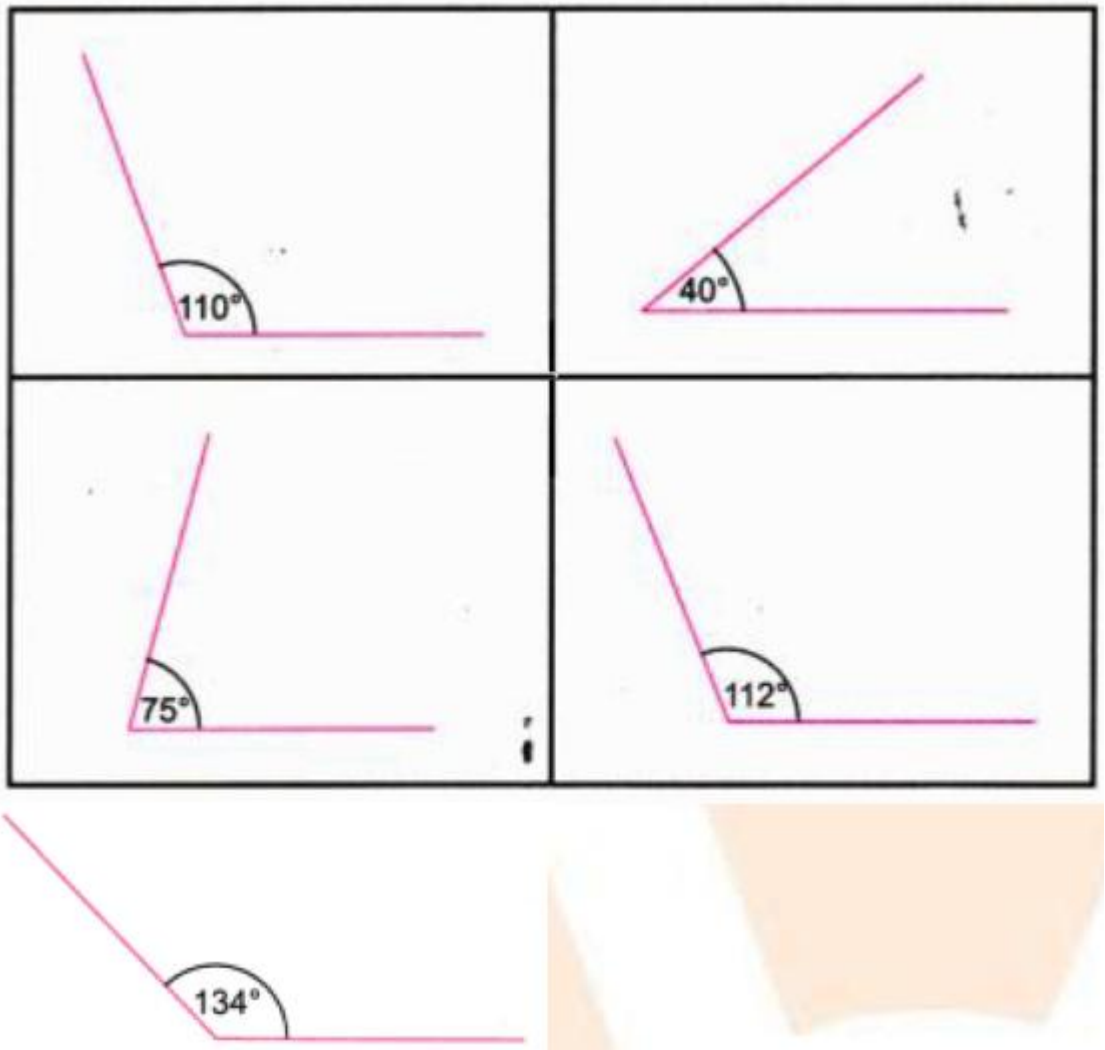
**Answer:**
The given figure has 20 angles.
Guess: ∠1 = ∠4 = 60°; ∠2 = ∠3 = 120°
By actual measure: ∠1 = ∠4 = 70°; ∠2 = ∠3 = 110°.



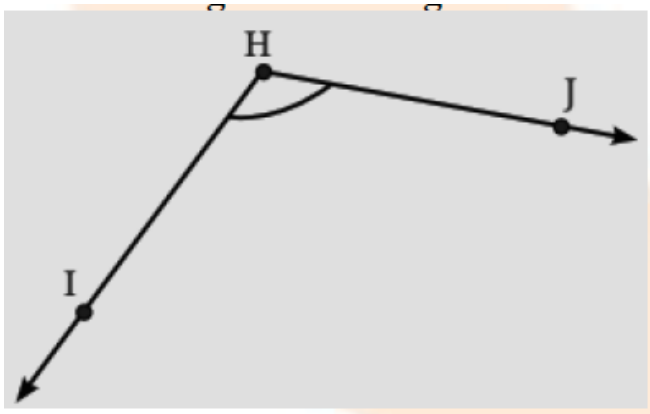

**Question 2.**

(a) 110°
(b) 40°
(c) 75°
(d) 120°
(e) 134°

**Answer:**




**Question 3.**
**Answer:**



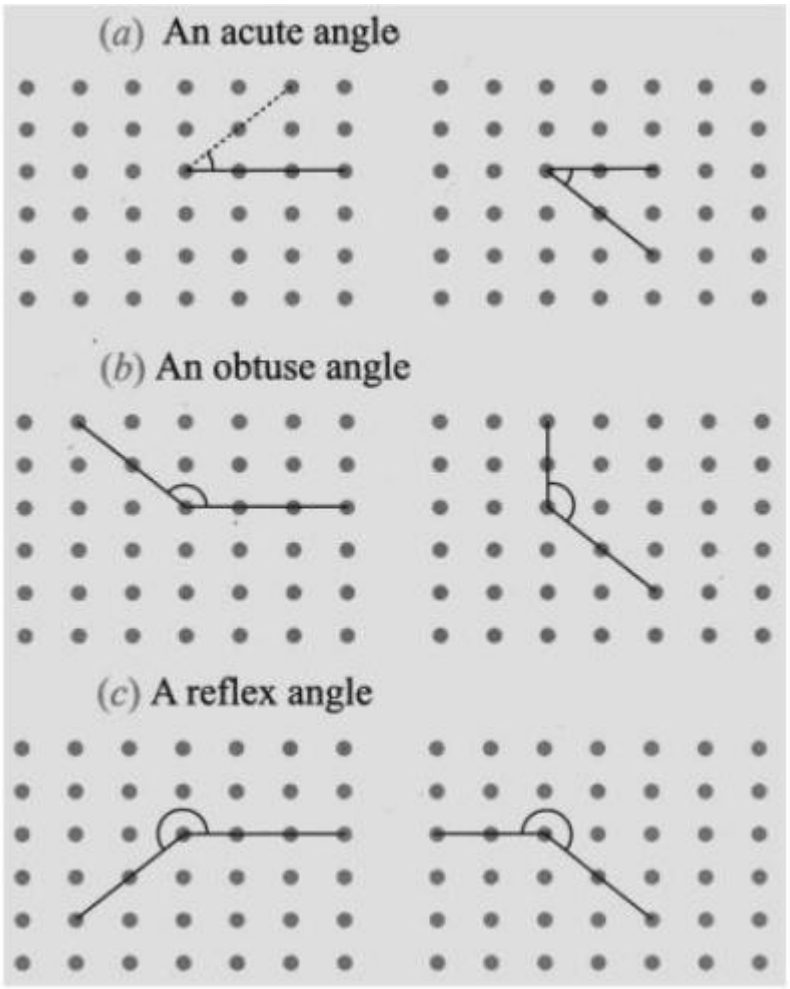

Step 1. Measure the given angle (∠IHJ = 120°)
Step 2. Using a protractor draw ∠ABC = 120°

**Figure it Out**

**Question 1.**

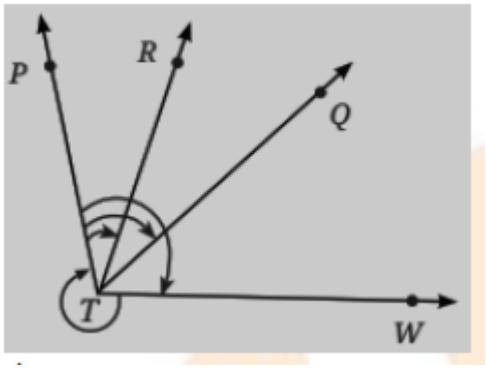
(a) An acute Angle
(b) An obtuse Angle
(c) A reflex Angle

**Answer:**




**Question 2.**

**Answer:**




(a) ∠PTR = 30° acute
(b) ∠PTQ = 60° acute
(c) ∠PTW = 105° obtuse
(d) ∠WTP = 225° reflex

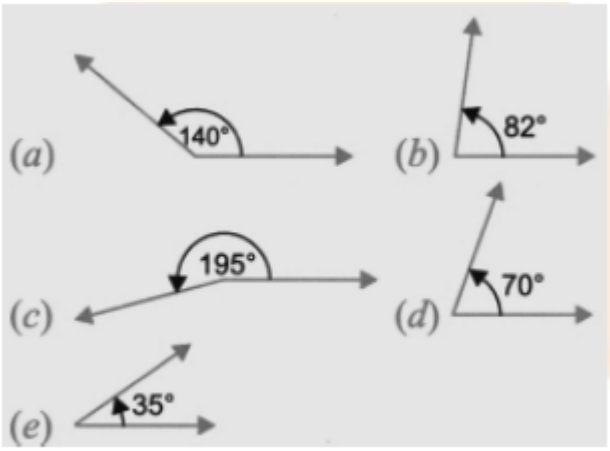
**Figure it Out**

**Question 1.**

Draw angles with the following degree measures:

(a) 140°
(b) 82°
(c) 195°
(d) 70°
(e) 35°

**Answer:**




**Question 2.**

**Answer:**
(a) 45° acute
(b) 150° obtuse

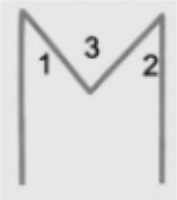
(c) 120° obtuse
(d) 30° acute
(e) 95° obtuse
(f) 350° reflex

**Question 3.**

**Answer:**
Angles 1, 2 and 3 are acute angles, angle 4 is right angle, angles 5 and 6 are obtuse angles.

**Question 4.**

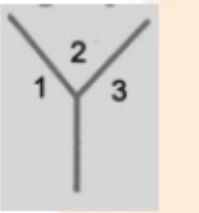
**Answer:**




∠1 = 30°, ∠2 = 30°, ∠3 = 60°

**Question 5.**

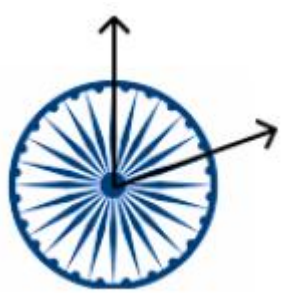
**Answer:**




∠1 = 150°, ∠2 = 60°, ∠3 = 150°

**Question 6.**

**Answer:**
Angle between two consecutive spokes = 360 ÷ 24 = 15°
Largest acute angle = 5 × 15° = 75°



**Question 7.**

**Answer:**
Let the measure of the angle be m

Then $5 \times m > 90$ but $4 \times m < 90$

or $m > 90/5$ and $m < 90/4$

Hence $m > 18$ but $m < 22½$

Hence measure of the angle is 19° or 20° or 21°

**Practice Time 2.1**

**1. Mark five points**

Activity question — Do it yourself.

Example:
Points: A, P, Q, Y, Z

Different ways to name:

- Point A
- Point P
- Point Q
- Point Y
- Point Z

**2. Name any four line segments**

From the figure:

Possible line segments are:

$$\bar{AB},\ \bar{BC},\ \bar{AE},\ \bar{CG}$$

**3. Name the line segments. Is A the endpoint of each?**

Line segments:

$$\bar{AB},\ \bar{AC}$$

Yes, A is the endpoint of both line segments.

**4. Name the line in all possible ways**

Points on line: M, N, O, P

Possible names:

$$\bar{MN},\ \bar{MO},\ \bar{MP},\ \bar{NO},\ \bar{NP},\ \bar{OP}$$

**5. Identify the rays**

Rays are:

$$\overrightarrow{PQ},\ \overrightarrow{PR},\ \overrightarrow{QR}$$

**6. Name the rays**

**(i)**

Rays are:

$$\overrightarrow{PA},\ \overrightarrow{PB}$$

**(ii)**

Yes, P is the starting point of both rays.

**Practice Time 2.2**

**1. Alternate name of ∠DCB**

$$\angle BCD$$

**2. How many angles are there?**

There are 10 angles:

$$\angle EOD,\ \angle DOC,\ \angle COB,\ \angle BOA,$$
$$\angle EOC,\ \angle DOB,\ \angle COA,\ \angle EOB,$$
$$\angle DOA,\ \angle EOA$$

**3. Name each angle**

**(i) ∠1**

$\angle QPS$ or $\angle SPQ$

**(ii) ∠2**

$\angle QSR$ or $\angle RSQ$

**(iii) ∠3**

$\angle PSU$ or $\angle USP$

**(iv) ∠4**

$\angle STU$ or $\angle UTS$

**4. Points lying in interior of ∠CAD**

Interior points:

$$P,\ Q$$

**5. Name the points**

**(i) Interior of ∠AOB**

$$R$$

**(ii) Exterior of ∠BOP**

$$A,\ R,\ Z$$

**6. Compare the angles**

**(i)**

$$\angle EOC = \angle AOD$$

**(ii)**

$$\angle DOC > \angle AOD$$

**(iii)**

$$\angle COA = \angle BOC$$

**7. Smaller angle**

$$\angle AOP$$

is smaller.

**8. Join A to make angles**

Activity question — Do it yourself.

**9. Number of acute angles**

Acute angles are:

$$\angle BCD,\ \angle DEF,\ \angle EFG$$

Number of acute angles:

$$3$$

**Practice Time 2.3**

**1. Measure the angles**

**(i)**

$$35^\circ$$

**(ii)**

$$45^\circ$$

**(iii)**

$$120^\circ$$

**2. Find ∠COB**

Given:

$$\angle AOB = 110^\circ$$

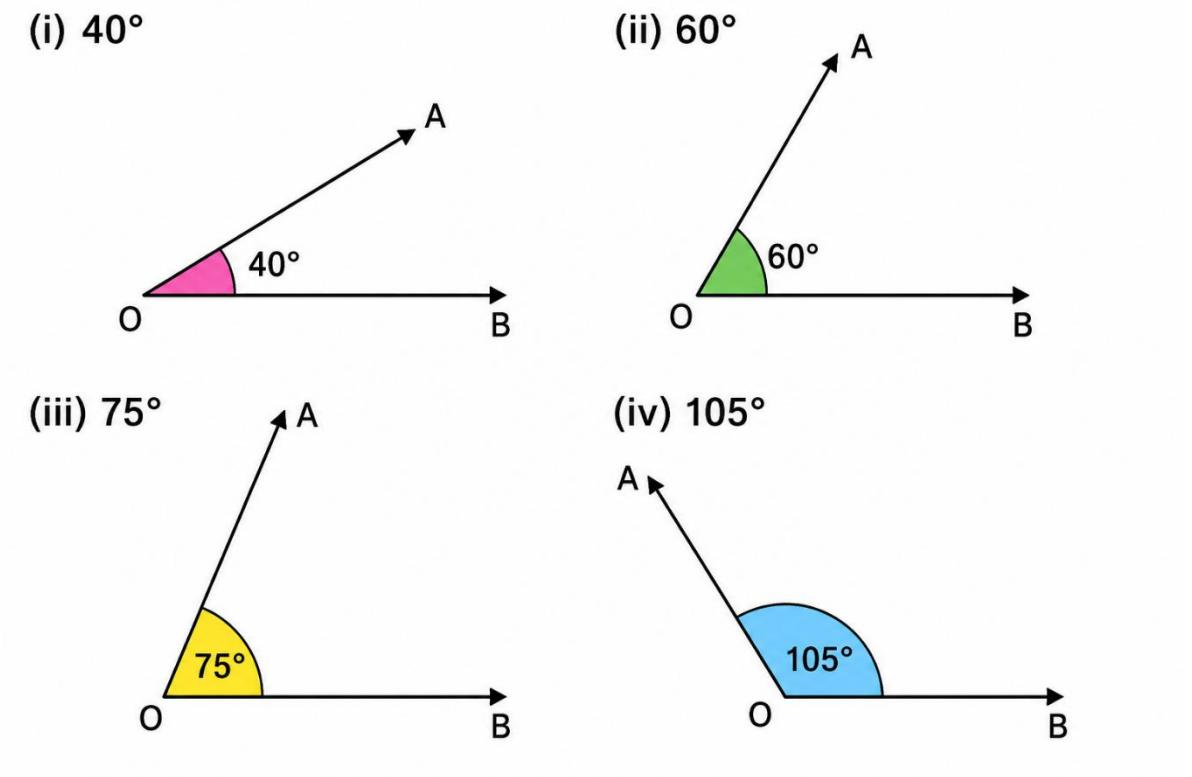
OC bisects ∠AOB.

So:

$$110^\circ \div 2 = 55^\circ$$

$$\angle COB = 55^\circ$$

**3. Draw the following angles**




**4. Classify the angles**

**(i)**

$45^\circ \rightarrow$ Acute angle

**(ii)**

$35^\circ \rightarrow$ Acute angle

**(iii)**

$90^\circ \rightarrow$ Right angle

**(iv)**

$108^\circ \rightarrow$ Obtuse angle

**(v)**

$215^\circ \rightarrow$ Reflex angle

**5. Measure and classify**

Angle shown is approximately:

$135^\circ$

Type:
Obtuse angle

**Multiple Choice Questions**

**1.**

Number of marked points:

4

Answer:

$(d)$

**2.**

Number of line segments:
For 5 points:

$$\frac{5 \times 4}{2} = 10$$

Answer:

$$(b)\ 10$$

**3.**

Has two end points:
Line segment

Answer:

$$(c)$$

**4.**

A line has:

$$0$$

end points.

Answer:

$$(c)$$

**5.**

Number of lines through one point:
Infinite

Answer:

$$(c)$$

**6.**

∠XYZ cannot be written as:

$$\angle XYP$$

Answer:

$$(d)$$

**7.**

Number of angles:

$$4$$

Answer:

$$(b)$$

**8.**

Angles between clock hands at 9 o'clock:

$$90°,\ 270°$$

Answer:

$$(b)$$

**9.**

Angle between consecutive spokes

Full angle:

$$360°$$

Spokes:

$$48$$

$$360° \div 48 = 7.5°$$

Answer:

$$7\frac{1}{2}^{\circ}$$

Option:

$(b)$

**10.**

Shifting point on same ray does not change angle.

Answer:

$45^\circ$

Option:

$(b)$

**Fill in the Blanks**

1. Acute
2. Obtuse
3. Reflex
4. Obtuse
5. One-fourth

**True / False**

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

**Match the Columns**

| **Column A** | **Column B** |
|---|---|
| (i) | (b) |
| (ii) | (a) |

| Column A | Column B |
|---|---|
| (iii) | (d) |
| (iv) | (c) |

**Very Short Answer Questions**

**1.**

**(i) All points**

$$A,\ B,\ C,\ O$$

**(ii) Two rays**

$$\overrightarrow{OA},\ \overrightarrow{OC}$$

**2. Line segments**

$$\bar{PQ},\ \bar{QR},\ \bar{RS}$$

**3. Line segments in figure**

$$\bar{AB},\ \bar{BC},\ \bar{CD},\ \bar{DE},\ \bar{EA}$$

**4.**

**(i) Ray containing A**

$$\overrightarrow{PA}$$

**(ii) Ray containing B**

$$\overrightarrow{QB}$$

**5. Interior and exterior points**

Interior:

$$B,\ E$$

Exterior:

$$H,\ M$$

**6. Vertices**

$$A,\ B,\ C,\ D$$

**7. Opposite vertex of AB and BC**

$$A$$

**8. All vertices**

$$A,\ B,\ C,\ D,\ E$$

**Short Answer Type Questions**

**1. Greater angle**

**(i)**

Right-side angle is greater.

**(ii)**

Straight angle is greater.

**(iii)**

Left-side angle is greater.

**(iv)**

Complete angle is greater.

**2. Points in interior/exterior/on ∠AOB**

**(i) Interior**

$$S$$

**(ii) Exterior**

$$P,\ O,\ R$$

**(iii) On ∠AOB**

$$A,\ N,\ T,\ B$$

**3.**

**(i) Vertex of ∠3**

$$C$$

**(ii) Common arm of ∠1 and ∠2**

$$AC$$

**(iii) Vertex of ∠4**

$$C$$

**4. Six angles**

$$\angle ABC,\ \angle BCD,\ \angle CDA,\ \angle DAB,\ \angle ACB,\ \angle BAD$$

**5. Classify angles**

(i) Acute
(ii) Obtuse
(iii) Reflex
(iv) Obtuse
(v) Acute
(vi) Reflex

**Long Answer Type Questions**

**1. Name points and line segments**

**(i)**

Points:

$$A,\ B,\ C$$

Line segments:

$$\bar{AB},\ \bar{BC},\ \bar{AC}$$

**(ii)**

Points:

$$A,\ B,\ C,\ D$$

Line segments:

$$\bar{AB},\ \bar{BC},\ \bar{CD},\ \bar{DA}$$

**(iii)**

Points:

$$A,\ B,\ C,\ D,\ E$$

Line segments:

$$\bar{AB},\ \bar{BC},\ \bar{CD},\ \bar{DE},\ \bar{EA}$$

**(iv)**

Points:

$$A,\ B,\ C,\ D,\ E,\ F$$

Line segments:

$$\bar{AB},\ \bar{CD},\ \bar{EF}$$

**2. Name the angles**

**(i)**

$$\angle 1 = \angle CBD$$

**(ii)**

$$\angle 2 = \angle DBE$$

**(iii)**

$$\angle 3 = \angle ABE$$

**(iv)**

$$\angle 1 + \angle 2 = \angle CBE$$

**(v)**

$$\angle 2 + \angle 3 = \angle DBA$$

**(vi)**

$$\angle 1 + \angle 2 + \angle 3 = \angle CBA$$

**(vii)**

$$\angle CBA - \angle 1 = \angle DBA$$

**3. Using the given information, name the right angles**

**(i) $\boldsymbol{AC \perp BD}$**

Since AC and BD are perpendicular and intersect at E, the right angles are:

$$\angle AEB,\ \angle BEC,\ \angle CED,\ \angle DEA$$

**(ii) $\boldsymbol{AE \perp CE}$**

AE is perpendicular to CE at B.

Right angles are:

$$\angle ABE,\ \angle EBC,\ \angle CBD,\ \angle DBA$$

**(iii) $\boldsymbol{AC \perp CD}$**

Perpendicular lines AC and CD meet at C.

Right angle:

$$\angle ACD$$

**(iv) $\boldsymbol{OP \perp AB}$**

OP is perpendicular to AB at P.

Right angles are:

$$\angle APO,\ \angle OPB$$

**4. What conclusion can be drawn in each figure?**

**(i)**

Given:
DB is the bisector of $\angle ADC$

A bisector divides an angle into two equal parts.

Therefore:

$$\angle ADB = \angle BDC$$

**(ii)**

Given:
BD bisects $\angle ABC$

Therefore:

$$\angle ABD = \angle DBC$$

**(iii)**

Given:

- DC bisects $\angle ADB$
- $CA \perp DA$
- $CB \perp DB$

Therefore:

$$\angle ADC = \angle CDB$$

and

$$\angle CAD = 90^\circ$$
$$\angle CBD = 90^\circ$$

**Competency-Based Questions**

**Assertion–Reason**

**1.**

Both A and R are true, but R is not correct explanation of A.

Answer:

$(b)$

**2.**

Both A and R are true and R explains A.

Answer:

$(a)$

**3.**

Both A and R are true and R explains A.

Answer:

$(a)$

**Case Study Questions**

**(i)**

Example of line segment:

$(b)$

**(ii)**

Example of acute angle:

$(b)$

**(iii)**

Because it is not exactly:

$90^\circ$

**(iv)**

Two names:

Acute angle and 45° angle

**Maths Booster Crossword**

**Across**

1. Right angle
2. Obtuse
3. Rays
4. Measure

**Down**

5. Point
6. Line segment
7. 90°
8. One

## Chapter 3 – Number Play

**NCERT CORNER**

**Figure it out**

**Question 1.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6828 | 670 | 9435 | 3780 | 3708 | 7308 | 8000 | 5583 | 52 |

Question 2.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5346 | 8345 | 1173 | 1258 | 1232 | 1054 | 7543 | 9635 | 9754 |

Question 3.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 999 | 573 | 650 | 633 | 654 | 582 | 743 | 709 | 834 |

Question 4.
Solution:
Out of 9 numbers, there are 5 supercells.

Question 5.

Solution:
If there are n odd cells then number of supercells = (n+1)/2
If there are n even cells then number of supercells = n/2

Yes, there is a pattern. Alternate cells can be supercells.

Method to fill a given table to get the maximum number of supercells.
• Make first cell as supercell. After that each alternate cell is to be made supercell.
• No consecutive cells can be supercell except in case of 4 cells because then first and fourth cell can be supercell.

Question 6.

Solution:
No, it is not possible to fill a supercell table without repeating numbers such that there are no supercells.

As there are two cases:

Case I: If we fill the cells in descending order then the first cell be supercell.
Case II: If we fill the cells in ascending order then the last cell will be supercell.

If we don't follow any order, then there will atleast one supercell.

Question 7.
Solution:
Yes, the cell having the largest number in a table always be a supercell because if it is corner cell, then the number adjacent to it (i.e. either second cell or second last cell) will be smaller than it. If it is in between then both its adjacent number would be smaller than it.

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

Question 8

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 999 | 980 | 943 | 850 | 785 | 473 | 927 | 846 | 298 |

Here 980 is the second largest number but it is not a supercell as 999 is the supercell.

**Question 9.**

Solution:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1895 | 1870 | 1743 | 1652 | 956 | 659 | 567 | 475 | 489 |

Here 1870 is the second largest number but the cell having 1870 is not a supercell because number 1895 (adjacent to it) is greater than it.
489 is the second smallest number but the cell having 489 is a supercell because adjacent number 475 is smaller to it.

**Question 10.**

Solution:

| | | | |
|---|---|---|---|
| 96,310 | 96,301 | 36,109 | 63,109 |
| 10,369 | 13,609 | 60,319 | 19,306 |
| 10,936 | 36,910 | 60,193 | 39,106 |
| 10,369 | 10,963 | 10,639 | 39,610 |

The biggest number in the table is 96,310.
The smallest even number in the table is 10,936.
The smallest number greater than 50,000 in the table is 60,193.

**Figure it Out**

**Question 1.**
**Solution:**

(a) Some numbers whose digits add up to 14 are:
59, 68, 77, 86, 95, 149, 158, 167, 176, 185, 194, 239, 248, 257, 266, 275, 281, 293

(b) The smallest number whose digit sum is 14 = 59

(c) The largest 5 digit number containing 0 whose digit sum is 14 = 95,000.
The largest 5 digit number not containing 0 whose digit sum is 14 = 92,111.

(d) A very big number having the digit sum 14 can be made. e.g. 95000000000000.
Yes, we can make even bigger number e.g. 9500000000000000000000.

**Question 2.**

**Solution:**

| **Number** | **Digit Sum** |
|---|---|
| 40 | 4 |
| 41 | 5 |
| 42 | 6 |
| 43 | 7 |
| 44 | 8 |
| 45 | 9 |
| 46 | 10 |
| 47 | 11 |
| 48 | 12 |
| 49 | 13 |
| 50 | 5 |
| 51 | 6 |
| 52 | 7 |

| Number | Digit Sum |
|---|---|
| 53 | 8 |
| 54 | 9 |
| 55 | 10 |
| 56 | 11 |
| 57 | 12 |
| 58 | 13 |
| 59 | 14 |
| 60 | 06 |
| 61 | 1 |
| 62 | 8 |
| 63 | 9 |
| 64 | 10 |
| 65 | 11 |
| 66 | 12 |
| 67 | 13 |
| 68 | 14 |
| 69 | 15 |
| 70 | 7 |

**Question 3.**

**Solution:**
If we take numbers in reverse order, sum of digits will remain same.
Yes, we observe a pattern.

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

i.e. (first number + 1) × 3 = digit sum.

**Intext Question**

**Question 1.**
Among the numbers 1-100, how many times will the digit '7' occur?

**Solution:**
The total count of 7 that we get is 20.

**Question 2.**
Among the numbers 1-1000, how many times will the digit '7' occur?

**Solution:**
The number of times 7 will be written when listing the numbers from 1 to 1000 is 300.

**Figure it Out**

**Question 1.**

**Solution:**

(a) Digits – 8, 7, 3 and 2
Largest Number – 8732
Smallest Number – 2378
Difference = 6354
6354 > 5085

(b) Digits – 1, 2, 3 and 4
Largest Number – 4321
Smallest Number – 1234
Difference = 3087
3087 < 5085

(c) Digits – 9, 8, 7 and 6
Largest Number – 9876
Smallest Number – 6789
Sum = 16665
16665 > 9779

(d) Digits – 1, 2, 3 and 8
Largest Number – 8321
Smallest Number – 1238
Sum = 9559
9559 < 9779

**Question 2.**

**Solution:**

Case-I. Smallest 5 digit palindrome number (different digits) – 12321
Largest 5 digit palindrome number (different digits) – 98789

Sum = 12321 + 98789 = 111110
Difference = 98789 – 12321 = 86468

Case-II: Largest 5 digit palindrome (same digit) – 99999
Smallest 5 digit palindrome (same digit) – 11111

Sum = 99999 + 11111 = 111110
Difference = 99999 – 11111 = 88888

**Question 3.**

**Solution:**
Time now – 10 : 01
Now next palindrome time is 11 : 11

Hence, 11:11 – 10:01 = 70 minutes.

**Question 4.**

| Round 1 | Round 2 | Round 3 |
|---|---|---|
| 8653 | 8550 | 9972 |
| − 3568 → | − 0558 → | − 2799 |
| = 5085 | = 7992 | = 7173 |
| **Round 4** | **Round 5** | **Round 6** |
| 7731 | 6543 | 8730 |
| − 1377 → | − 3456 → | − 0378 |
| = 6354 | = 3087 | = 8352 |
| **Round 7** | **Round 8** | |
| 8532 | 7641 | |
| → − 2358 → | − 1467 | |
| = 6174 | = 6174 | |

**Figure it out**

**Question 1.**

(a) Let's divide 90,250 by 2
then 90,250 ÷ 2 = 45,125
Hence to get sum more than 90,250 both numbers should be more than 45,125.

(b) To get a 6 digit sum by adding 5 digit and 3 digit, the 5 digit number should be more than 99,001.

| | |
|---|---|
| 99001 | 99002 |
| + 999 | + 999 |
| 100000 | 100001 and so on. |

(c) Let's take minimum 4 digit number 1000
let's add them

$$\begin{array}{r} 1000 \\ +\,1000 \\ \hline 2000 \\ \hline \end{array}$$

which is a 4 digit number.
Hence 6 digit sum from 4 digit number is impossible.

(d) Let's take 5 digit numbers 67987 and 65783
let's add them

$$\begin{array}{r} 67987 \\ +\,65783 \\ \hline 133770 \\ \hline \end{array}$$

which is a 6 digit number.

(e) Let's take minimum 5 digit numbers 1000
let's add them

$$\begin{array}{r} 10000 \\ +\,10000 \\ \hline 20000 \\ \hline \end{array}$$

which is a 5 digit number.
Hence 6 digit sum from 5 digit numbers is impossible.

(f) 5-digit -5 digit to give a difference less than 56,503

$$\begin{array}{r} 67453 \\ -\,4\,8\,7\,9\,1 \\ \hline 18662 \\ \hline \end{array}$$

(g) 5-digit-3 digit = 1 008 6 (5 digit)
to give a 4 digit = + 875 (3 digit)
difference = 92 11 (4 digit)

$$\begin{array}{rl} 10086 & \text{(5 digit)} \\ +875 & \text{(3 digit)} \\ \hline 9211 & \text{(4 digit)} \end{array}$$

(h) 5-digit digit = 1 2 8 7 6 (5 digit)
to give a 4 digit = -7865 (4 digit)
difference = 5 0 11 (4 digit)

$$\begin{array}{rl} 2876 & \text{(5 digit)} \\ -7865 & \text{(4 digit)} \\ \hline 5011 & \text{(4 digit)} \end{array}$$

(i) 5-digit -5 digit 7 = 645 3 (5 digit)
to give a 3 digit = 76 145 (5 digit)
difference = 308 (3 digit)

$$\begin{array}{rl} 6453 & \text{(5 digit)} \\ 76145 & \text{(5 digit)} \\ \hline 308 & \text{(3 digit)} \end{array}$$

(j) 5-digit -5 digit Not possible to give 91,500

**Question 2.**

(a) Sometimes

```
  10000  (5 digit)
+ 20000  (5 digit)
  30000  (5 digit)
  52000  (5 digit)
+ 51000  (5 digit)
 103000  (6 digit)
```

(b) Sometimes

```
  4321  (4 digit)
+   15  (2 digit)
  4336  (4 digit)
  9992  (4 digit)
+   35  (2 digit)
 10027  (5 digit)
```

(c) Never true

```
  9999  (largest 4 digit no.)
+   99  (largest 2 digit no.)
 10098  (5 digit number)
```

(d) Sometimes true

```
  70000  (5 digit)
- 20000  (5 digit)
  50000  (5 digit)
```

But

```
  20000  (5 digit)
- 15000  (5 digit)
   5000  (4 digit)
```

(e) Never true

```
  10000  (smallest 5 digit)
-    99  (largest 2 digit)
   9901  (4 digit)
```

**Figure it out**

**1.** If we swap first and last digit of central number 62,871, we get desired result.

| | | |
|---|---|---|
| 16,200 | 39,344 | 29,765 |
| 23,609 | 21,876 | 45,306 |
| 19,381 | 50,319 | 38,408 |

**Question 2.**

**Solution:**
If your year of birth is 2000

Step 1: Now from digits of number 2000
Here largest number = 2000
and smallest number = 0002
Let's subtract them = 2000 – 0002 = 1998

Step 2: Now from digits of number 1998
Here largest number = 9981
and smallest number = 1899
Let's subtract them = 9981 – 1899 = 8082

Step 3: Now from digits of number 8082
Here largest number = 8820
and smallest number = 0288
Let's subtract them = 8820 – 0288 = 8532

Step 4: Now from digits of number 8532
Here largest number = 8532
and smallest number = 2358
Let's subtract them = 8532 – 2358 = 6174

which is a Kaprekar constant.

Hence it took 4 rounds to reach the Kaprekar constant from 2000.

**Question 3.**
**Solution:**
The largest number with all odd digits (different) = 73951
The largest number with all odd digits (repetitive) = 73999

The smallest number (non repetitive) = 35,179
The smallest number (repetitive) = 57111

Closest to 50,000 (in case of non-repetition) = 49751
Closest to 50,000 (in case of repetition) = 49999

**Question 4.**

**Solution:**
Will be done by students.

**Question 5.**

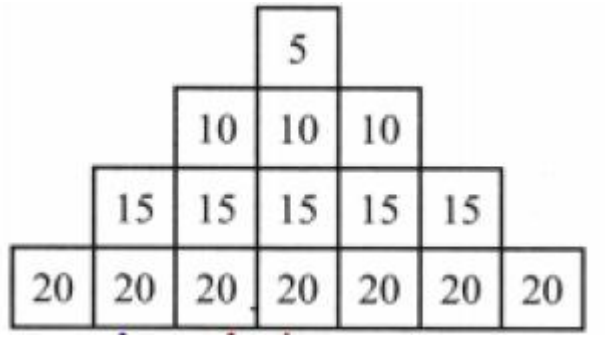
**Solution:**
Will be done by students.

**Question 6.**

**Solution:**
5 digit number = 1 8 0 0 0
3 digit number = 6 7 0

Sum = 18,000 + 670 = 18,670

**Question 7.**




**Solution:**
Sum of No. = 5 × 1 = 5

- 10 × 3 = 30
- 15 × 5 = 75
- 20 × 7 = 140 = 250

which lies between 210 and 390.

**Question 8.**

**Solution:**
The square of power of 2 is :
1,2,4, 8, 16, 32, 64

Let's take the number' 64 as per Collatz Conjecture

• 64 is even, divide by 2 = 32

• 32 is even, divide by 2 = 16

• 16 is even, divide by 2 = 8

• 8 is even, divide by 2 = 4

• 4 is even, divide by 2 = 2

• 2 is even, divide by 2 = 1

Hence Collatz conjecture is correct in all numbers in the power of 2 sequence. As it is power of 2, and in Collatz Conjecture even number is divided by 2 in each step.

**Question 9.**

**Solution:**

• 100 is even, divide by 2 = 50

• 50 is even, divide by 2 = 25

• 25 is odd, so multiply by 3 and add 1 → 76

• 76 is even, divide by 2 = 38

• 38 is even, divide by 2 = 19

• 19 is odd, so multiply by 3 and add 1 → 58

• 58 is even, divide by 2 = 29

• 29 is odd, so multiply by 3 and add 1 → 88

• 88 is even, divide by 2 = 44

• 44 is even, divide by 2 = 22

• 22 is even, divide by 2 = 11

• 11 is odd, so multiply by 3 and add 1 → 34

• 34 is even, divide by 2 = 17

• 17 is odd, so multiply by 3 and add 1 → 52

• 52 is even, divide by 2 = 26

• 26 is even, divide by 2 = 13

• 13 is odd, so multiply by 3 and add 1 → 40

• 40 is even, divide by 2 = 20

• 20 is even, divide by 2 = 10

• 10 is even, divide by 2 = 5

• 5 is odd, so multiply by 3 and add 1 → 16

• 16 is even, divide by 2 = 8

• 8 is even, divide by 2 = 4

• 4 is even, divide by 2 = 2

• 2 is even, divide by 2 = 1

Yes, the Collatz conjecture holds for the starting number 100.

**10.**

**Step 1: Find the Pattern**

Maximum number you can add = **3**

So we use this rule:
**3 + 1 = 4**

Now count backwards from **22** in steps of 4:

22 → 18 → 14 → 10 → 6 → 2

**Step 2: Important Numbers**

These are the **winning numbers**:

**2, 6, 10, 14, 18, 22**

**Step 3: Winning Strategy**

First player should say **2**

After that, always make sure:

**Your number + opponent's number = 4**

**Example Play**

- You say: **2**
- Opponent says: **3**
- You say: **6**
- Opponent says: **7**
- You say: **10**
- Opponent says: **11**
- You say: **14**
- Opponent says: **15**
- You say: **18**

- Opponent says: **19 / 20 / 21**
- You say: **22 (WIN )**

Start with **2**

Follow the pattern:
**2 → 6 → 10 → 14 → 18 → 22**

## Exam Time

### A. Multiple Choice Questions

**1.**

The supercell is the greatest number.

Numbers: 34, 94, 86, 56, 43, 20

Greatest number = **94**

Answer: **(c) 94**

**2.**

Smallest 2-digit number = 10
Largest 1-digit number = 9

$$10 + 9 = 19$$

Answer: **(a) 19**

**3.**

Multiple of 6 must be divisible by 2 and 3.

$24 \div 6 = 4$

Answer: **(a) 24**

**4.**

Smallest prime number = 2

$$15 - 2 = 13$$

Answer: **(b) 13**

**5.**

Largest single digit number = 9

$$9 \times 3 = 27$$

Answer: **(c) 27**

**6.**

Pattern doubles each time:

$$2, 4, 8, 16, 32$$

Answer: **(b) 32**

**7.**

Even multiple of 7 = 14

Answer: **(a) 14**

**8.**

Pattern increases by 10:

$$5 \rightarrow 15 \rightarrow 25 \rightarrow 35$$

Answer: **(b) 35**

**9.**

Palindrome reads same forward and backward.

848 is same both ways.

Answer: **(a) 848**

**10.**

Kaprekar constant is:

$$6174$$

Answer: **(c) 6174**

**B. Fill in the Blanks**

**1.**

In 4321, digit 3 is in the:

hundreds place

**2.**

Magic number of Kaprekar is:

$$6174$$

**3.**

Total two-digit numbers are:

$$99 - 10 + 1 = 90$$

$$90$$

**4.**

Digits of 950 add up to:

$$9 + 5 + 0 = 14$$

$$14$$

**5.**

323 is a:

palindrome number

**C. True / False**

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

**D. Match the Columns**

| **Column A** | **Column B** |
|---|---|
| (i) Palindrome number | (e) 4224 |
| (ii) Kaprekar constant | (d) 6174 |

| Column A | Column B |
|---|---|
| (iii) five digit even number | (a) 97982 |
| (iv) five digit odd number | (c) 99983 |
| (v) 25984 − 17452 | (b) 8532 |

**E. Very Short Answer Questions**

**1. Mark the supercells**

Numbers:
8286, 6600, 9545, 3670, 3607, 7406, 8000, 5484, 5600

Greatest number = **9545**

So, supercell = **9545**

**2.**

Fill boxes so circled cells are supercells.

One possible answer:

546, 120, 158, 900, 295, 950

(Circled numbers 900 and 950 are greatest nearby.)

**3.**

Supercell in the table = greatest number

Largest number = **8870**

**4. Greatest number**

(i)

$$48740 > 47645$$

Answer: **48740**

(ii)

$$26760 > 15896$$

Answer: **26760**

**5.**

Numbers:
29706, 28706, 39406, 87604

Greatest = **87604**

Smallest = **28706**

**6.**

Digits: 3, 5, 4, 6

Smallest 4-digit number:

$$3456$$

**7.**

Greatest 5-digit number using 1,2,7,9,4:

Arrange descending:

$$97421$$

**8.**

First step of Collatz conjecture for even number:

$$\text{Divide by } 2$$

**9.**

Smallest 4-digit palindrome number:

$$1001$$

**10.**

Kaprekar routine of 3524:

$$5432 - 2345 = 3087$$

**11.**

Sum of digits

(i) 909

$$9 + 0 + 9 = 18$$

(ii) 666

$$6 + 6 + 6 = 18$$

Answer: **18 and 18**

**12.**

78987 reads same forward and backward.

Yes, it is a palindrome number.

**13.**

Numbers between 10 and 20 increasing by 2:

$$10,\ 12,\ 14,\ 16,\ 18,\ 20$$

Total numbers = **6**

**F. Short Answer Questions**

**1. Number lines**

**(a)**

Difference between 1010 and 1030 = 20

So each step = 10

Numbers:
990, 1000, 1010, 1020, 1030, 1040 …

**(b)**

Numbers:
8885, 8886

Next numbers:
8887, 8888 …

**(c)**

Numbers increase by 1

12044, 12045, 12046 …

**(d)**

Difference:

$$8751 - 8651 = 100$$

Step = 50

**2.**

Circle smallest and box largest in sequences.

(Do on notebook)

**3.**

Next Collatz number after 8:

$$8 \div 2 = 4$$

**4.**

Collatz sequence starting with 7:

$$7 \rightarrow 22 \rightarrow 11 \rightarrow 34 \rightarrow 17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$$

Final result = **1**

**5.**

Form 49800 using numbers:

$$50000 - 800 + 500 + 300 - 200 = 49800$$

**6.**

Largest 5-digit palindrome:

$$99999$$

**7.**

Number 11 in Collatz sequence:

$$11 \to 34 \to 17 \to 52 \to 26 \to 13 \to 40 \to 20 \to 10 \to 5 \to 16 \to 8 \to 4 \to 2 \to 1$$

## G. Long Answer Questions

### 1. Kaprekar routine for 1225

Arrange digits descending and ascending.

$$5221 - 1225 = 3996$$
$$9963 - 3699 = 6264$$
$$6642 - 2466 = 4176$$
$$7641 - 1467 = 6174$$

Reached Kaprekar constant.

**2.**

Smallest 4-digit palindrome:

$$1001$$

Largest 4-digit palindrome:

$$9999$$

Sum:

$$1001 + 9999 = 11000$$

Difference:

$$9999 - 1001 = 8998$$

**3.**

Pattern:

$$2218, 2220, 2222, 2224$$

Increasing by 2.

Next three numbers:

$$2226, 2228, 2230$$

**4.**

(i) 5-digit − 5-digit = 61500

$$90000 - 28500 = 61500$$

(ii) 4-digit + 4-digit gives 5-digit sum

$$7000 + 4000 = 11000$$

**5. Collatz sequence for 12**

$$12 \to 6 \to 3 \to 10 \to 5 \to 16 \to 8 \to 4 \to 2 \to 1$$

**Competency-Based Questions**

**Assertion–Reason**

**1.**

Assertion: True
Reason: True

Reason correctly explains Assertion.

Answer: **(a)**

**2.**

12345 is not palindrome.

Assertion = False
Reason = True

Answer: **(d)**

**Case Study Questions**

Digits: 5, 5, 1, 2

**(i) Smallest number**

Arrange ascending:

**(ii) Largest number**

Arrange descending:

$$5521$$

**(iii) Sum**

$$1255 + 5521 = 6776$$

**(iv) Difference**

$$5521 - 1255 = 4266$$

## Chapter- 4 Data Handling and Presentation

**NCERT CORNER**

**Figure it Out**

**Question 1.**

| Sweets | Tally Marks | No. of Students |
|---|---|---|
| *Jalebi* | 𝍸 \| | 6 |
| *Gulab jamun* | 𝍸 \|\|\|\| | 9 |
| *Gujiya* | 𝍸 𝍸 \|\|\| | _____ |
| *Barfi* | \|\|\| | _____ |
| *Rasgulla* | 𝍸 \|\| | _____ |



(i) Complete the table to help Shri Nilesh to purchase the correct numbers of sweets:

(a) How many students chose jalebi?

(b) Barfi was chosen by students?

(c) How many students chose gujiya?

(d) Rasgulla was chosen by students?

(e) How many students chose gulabjamun?

**Solution:**

| Sweets | Tally Marks | Number of Students |
|---|---|---|
| Jalebi | 𝍸 | 6 |
| Gulab Jamun | 𝍸 \|\|\|\| | 9 |
| Gujiya | 𝍸 𝍸 \|\|\| | 13 |
| Barfi | \|\|\| | 3 |
| Rasgulla | 𝍸 \|\| | 7 |

(a) It is clear from the table, 6 students chose Jalebi.

(b) From the table, we can say that Barfi was chosen by 3 students;

(c) 13 students chose the gujiya.

(d) Rasgulla was chosen by 7 students.

(e) 9 students chose gulab jamun.

**(ii)**
**Solution:**
No, it is not sufficient.
Shri Nilesh should have also written children's names against each sweet item. Only then he could have given the right sweet to the right child.

**Figure it Out**

**Question 1.**
**Answer:**

- The largest shoe size in the class is 7.
- The smallest shoe size in the class is 3.
- There are 10 students who wear shoe size 5.
- There are 15 students who wear shoe sizes larger than 4.

**Question 2.**

**Solution:**
Arrangement of data in ascending order enables us to •find the smallest shoe size, the largest shoe size and the shoe sizes lying between them.

**Question 3.**
**Solution:**
Yes. The data can also be arranged in descending order.

**Question 4.**
**Solution:**

Sample Tree Observation Table

| **Tree Name** | **Number of Trees Seen** |
|---|---|
| Neem | 6 |
| Peepal | 3 |
| Mango | 5 |
| Banyan | 2 |
| Gulmohar | 5 |

**(a) Which tree was found in the greatest number?**
→ **Neem** (6 trees)

**(b) Which tree was found in the smallest number?**
→ **Banyan** (2 trees)

**(c) Were there any two trees found in the same numbers?**
→ **Yes**, **Mango** and **Gulmohar** were both seen 5 times.

**Question 5.**

**Solution:**

a. The letter found the most number of times is: e
b. The letter found the least number of times is: x
c. Letters in ascending order of frequency: x, c, t, i, r, e

**Figure It Out**

**1. Books borrowed from the library**

From the pictograph:

- Monday = 5 books
- Tuesday = 4 books

- Wednesday = 2 books
- Thursday = 0 books
- Friday = 5 books
- Saturday = 7 books

**(i) Minimum number of books borrowed**

Thursday

**(ii) Total number of books borrowed during the week**

$$5 + 4 + 2 + 0 + 5 + 7 = 23$$

**Answer:** 23 books

**(iii) Maximum number of books borrowed**

Saturday

**Possible reason:** Students may borrow more books before holidays or weekends.

**2. Pictograph of kites sold**

| Shopkeeper | Kites Sold |
|---|---|
| Chaman | 250 |
| Rani | 300 |
| Rukhsana | 100 |
| Jasmeet | 450 |
| Jetha Lal | 250 |
| Poonam Ben | 700 |

Key: ◆ = 100 kites

**(i) Symbols for Rani**

$$300 \div 100 = 3$$

**Answer:** 3 symbols

**(ii) Who purchased maximum kites?**

Poonam Ben

**(iii) Who purchased more kites, Jasmeet or Chaman?**

Jasmeet

**(iv) Is Rukhsana correct?**

Rani purchased 300 kites.

Double of 300:

$$300 \times 2 = 600$$

Poonam Ben purchased 700 kites, which is more than 600.

**Answer:** Yes, Rukhsana is correct.

**3. Bar graph of absent students**

Table:

| Class | Students Absent |
|---|---|
| 1 | 3 |
| 2 | 5 |
| 3 | 4 |
| 4 | 2 |
| 5 | 0 |
| 6 | 1 |
| 7 | 5 |
| 8 | 7 |

**(i) In Class 2, students absent**

5 students

**(ii) Maximum number absent**

Class 8

**(iii) Full attendance**

Class 5

**Figure It Out**

**1. Imran's family expenditure**

From the bar graph:

- Food = highest
- House rent = second highest

**(i) Most and second most expenditure**

Most: Food
Second most: House rent

**(ii) Is electricity about half of education?**

Education ≈ ₹800
Electricity ≈ ₹400

Half of 800 = 400

**Answer:** Yes

**(iii) Is education less than one-fourth of food?**

Food ≈ ₹3400

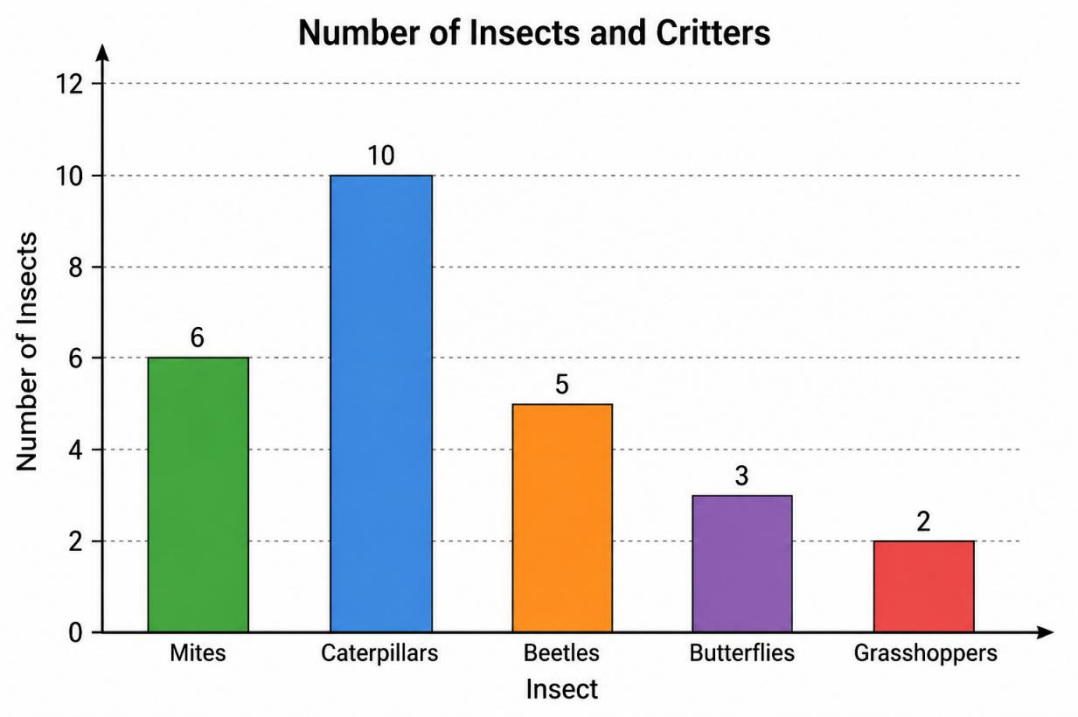
One-fourth:

$$3400 \div 4 = 850$$

Education ≈ ₹800, which is less than ₹850.

**Answer:** Yes

**2. Insects and critters data**




**3. Tickets sold**

| City | Tickets |
|---|---|
| Vidisha | 24 |
| Jabalpur | 20 |
| Seoni | 16 |
| Indore | 28 |
| Sagar | 16 |

**(i) Tickets sold for Vidisha**

24

**(ii) Tickets sold for Jabalpur**

20

**(iii) Scale of graph**

Vidisha bar = 6 units for 24 tickets

$$24 \div 6 = 4$$

Jabalpur bar = 5 units for 20 tickets

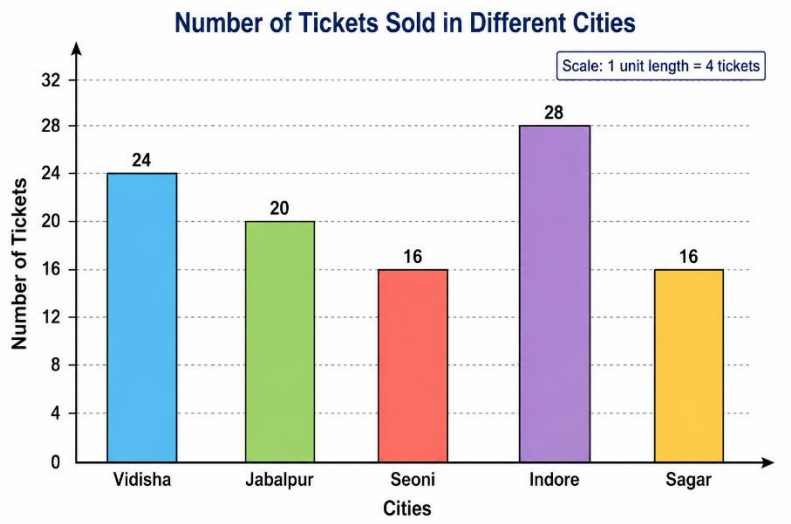
$$20 \div 5 = 4$$

**Scale:** 1 unit length = 4 tickets

**(iv) Correct bar for Sagar**

Sagar = 16 tickets
So bar height:

$$16 \div 4 = 4 \text{ units}$$




**(v) Vertical axis scale**

0, 4, 8, 12, 16, 20, 24, 28

**(vi) Are Seoni and Indore bars correct?**

Yes

**3. Means of transport**

Counting the entries:

| **Transport** | **Frequency** |
|---|---|
| Bike | 13 |
| Car | 6 |

| Transport | Frequency |
|---|---|
| Bicycle | 8 |
| Scooter | 7 |
| Auto | 7 |
| Bus | 4 |
| Bullock cart | 2 |

**(i) Frequency distribution table**

Shown above.

**(ii) Most used transport**

Bike

**(iii) How to collect data?**

1. Observe vehicles passing.
2. Record each vehicle type.
3. Use tally marks.
4. Count totals.
5. Prepare a table or graph.

**4. Roll a die 30 times**

This is an activity-based question. Results depend on experiment.

**5. Jaspreet Bumrah wickets table**

| Wickets | Matches |
|---|---|
| 0 | 2 |
| 1 | 4 |
| 2 | 6 |
| 3 | 8 |

| Wickets | Matches |
|---|---|
| 4 | 3 |
| 5 | 5 |
| 6 | 1 |
| 7 | 1 |

**(i) Information given**

Number of wickets Bumrah took in his last 30 matches.

**(ii) Suitable title**

“Frequency Distribution of Wickets Taken by Jaspreet Bumrah”

**(iii) What is noticeable?**

He took 3 wickets most often.

**(iv) Matches with 4 wickets**

3 matches

**(v) Is Mayank correct?**

No.

Because frequencies (number of matches) must also be considered.

**(vi) Total wickets**

$$0 \times 2 + 1 \times 4 + 2 \times 6 + 3 \times 8 + 4 \times 3 + 5 \times 5 + 6 \times 1 + 7 \times 1$$
$$= 0 + 4 + 12 + 24 + 12 + 25 + 6 + 7$$
$$= 90$$

**Answer:** 90 wickets

**6. Tractors pictograph**

**(i) Village with smallest tractors**

Village D

**(ii) Village with most tractors**

Village C

**(iii) Difference between Village C and Village B**

Village C = 8 tractors
Village B = 5 tractors

$$8 - 5 = 3$$

**Answer:** 3 tractors

**(iv) Is Komal right?**

Village D = 3 tractors
Village E = 6 tractors

Half of 6 = 3

**Answer:** Yes

**7. Girls students pictograph**

Key: 1 symbol = 4 girls

**(i) Least number of girls**

Class 8

**(ii) Difference between class 5 and 6**

Class 5 = 2 symbols = 8 girls
Class 6 = 4 symbols = 16 girls

$$16 - 8 = 8$$

**Answer:** 8 girls

**(iii) If 2 more girls admitted in class 2**

Half a symbol would be added.

**(iv) Girls in class 7**

3 symbols

$$3 \times 4 = 12$$

**Answer:** 12 girls

**8. Mudhol dogs pictograph**

| Village | Dogs |
|---|---|
| A | 18 |
| B | 36 |
| C | 12 |
| D | 48 |
| E | 18 |
| F | 24 |

**(i) Useful scale**

1 symbol = 6 dogs

**(ii) Symbols for Village B**

$$36 \div 6 = 6$$

**Answer:** 6 symbols

**(iii) Is Kamini right?**

Village B + D:

$$36 + 48 = 84$$

Other villages:

$$18 + 12 + 18 + 24 = 72$$

Since:

$$84 > 72$$

**Answer:** Yes

**9. Preferred activities survey**

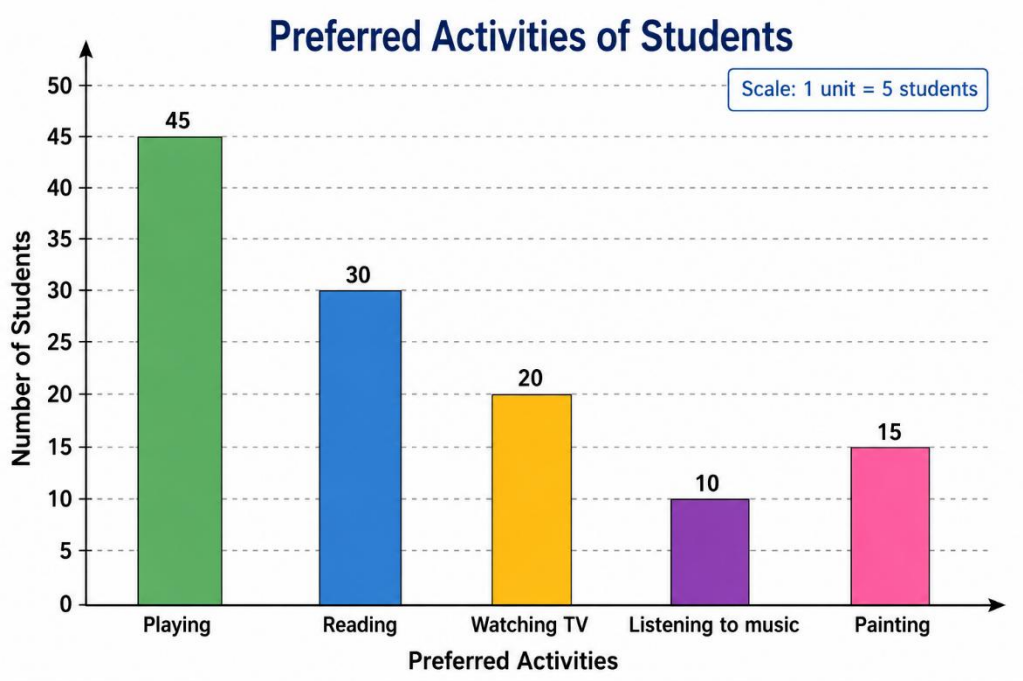
| Activity | Students |
|---|---|
| Playing | 45 |
| Reading | 30 |
| Watching TV | 20 |
| Listening to music | 10 |
| Painting | 15 |

Scale:

$$1 \text{ unit} = 5 \text{ students}$$

Bar heights:

- Playing = 9 units
- Reading = 6 units
- Watching TV = 4 units
- Listening = 2 units
- Painting = 3 units



**Most preferred activity other than playing**

Reading story books

**10. Saplings planted**

From the graph:

| **Day** | **Saplings** |
|---|---|
| Monday | 50 |
| Tuesday | 40 |
| Wednesday | 30 |
| Thursday | 40 |
| Friday | 50 |
| Saturday | 60 |
| Sunday | 40 |

**(i) Wednesday + Thursday**

$$30 + 40 = 70$$

**(ii) Whole week**

$$50 + 40 + 30 + 40 + 50 + 60 + 40 = 310$$

**(iii) Greatest and least**

Greatest: Saturday
Least: Wednesday

**11. Tigers in India**

Correct data:

| Year | Tigers |
|---|---|
| 2006 | 1400 |
| 2010 | 1700 |
| 2014 | 2200 |
| 2018 | 3000 |
| 2022 | 3700 |

**Mistakes in graph**

1. Bars are not drawn according to proper scale.
2. Some bars have incorrect lengths.
3. Uniform scale is missing.
4. Bars should increase gradually according to data.

## Practice Time 4.1

### 1. Favourite Sports

Sports list:

Hockey, Cricket, Football, Badminton, Basketball, Cricket, Football, Cricket, Football, Basketball, Cricket, Hockey, Cricket

**Count**

- Cricket = 5
- Football = 3
- Hockey = 2
- Basketball = 2
- Badminton = 1

**Answers**

(i) Most popular game = **Cricket**
(ii) Least popular game = **Badminton**

### 2. Favourite Sweets

**Count**

- Laddoo = 9
- Rasgulla = 8
- Jalebi = 7
- Barfi = 3
- Laddu = counted as Laddoo

**Answers**

(i) Most preferred sweet = **Laddoo**
(ii) Least preferred sweet = **Barfi**
(iii) Students liking Rasgulla = **8**

**3. Marks of 37 Students**

**(i) Marks equal to or more than 7**

Numbers ≥ 7 are:

8, 7, 7, 7, 8, 8, 7

Total = **7 students**

**(ii) Students who obtained 3 marks**

3 appears **3 times**

Answer = **3 students**

**4. Dice Throws**

From tally marks:

| Dice Number | Frequency |
|---|---|
| 1 | 7 |
| 2 | 6 |
| 3 | 5 |
| 4 | 3 |
| 5 | 11 |

| Dice Number | Frequency |
|---|---|
| 6 | 8 |

**Answers**

(i) Minimum times = **4**
(ii) Maximum times = **5**
(iii) Number 1 and number **none** appeared equal times.

## Practice Time 4.2

### 1. Government Employees in Villages

Each tractor = 1 government employee

**Count**

- Village A = 6
- Village B = 5
- Village C = 8
- Village D = 3
- Village E = 7

**Answers**

(i) Minimum employees = **Village D**
(ii) Employees in Village D = **3**
(iii) Total employees:

$$6 + 5 + 8 + 3 + 7 = 29$$

Total = **29**

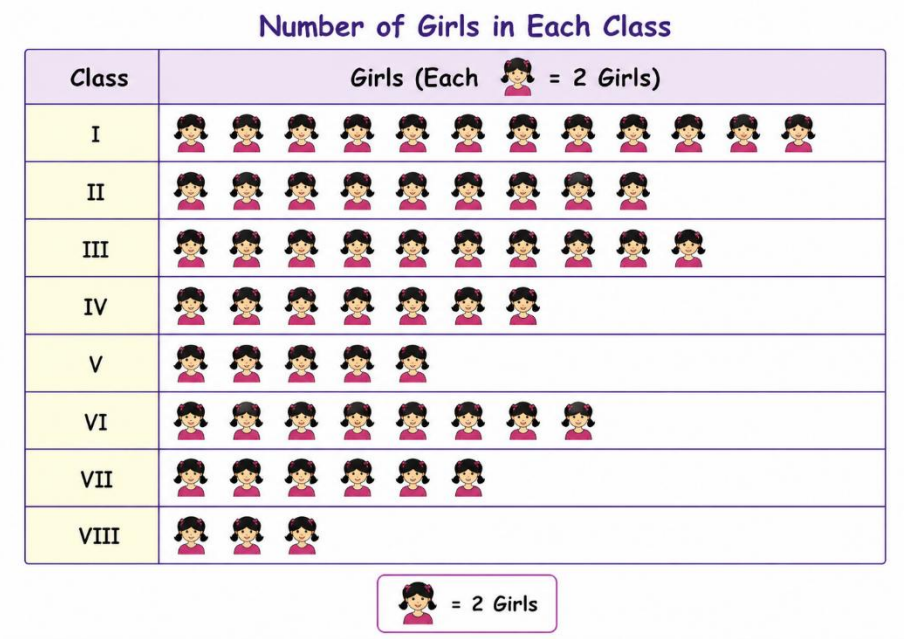
### 2. Girls in Different Classes

| Class | Girls |
|---|---|
| I | 24 |
| II | 18 |
| III | 20 |

| Class | Girls |
|---|---|
| IV | 14 |
| V | 10 |
| VI | 16 |
| VII | 12 |
| VIII | 6 |

**Answers**

**(i)**




(ii) Girls in Class VI = **16**
(iii) Minimum girls students = **Class VIII**

**3. Present Students in a Week**

Each symbol = 5 students

**Count**

- Monday = 6 × 5 = 30
- Tuesday = 7 × 5 = 35
- Wednesday = 4 × 5 = 20
- Thursday = 4 × 5 = 20
- Friday = 6 × 5 = 30

- Saturday = 4 × 5 = 20
- Sunday = 8 × 5 = 40

**Answers**

(i) Students on Friday = **30**
(ii) Same number on = **Wednesday, Thursday and Saturday**
(iii) Maximum students = **Sunday**

## Practice Time 4.3

### 1. Favourite Colours

**From bar graph**

- Red = 45
- Green = 30
- Blue = 50
- Yellow = 50
- Orange = 40

**Answers**

(i) Most preferred = **Blue and Yellow**
(ii) Least preferred = **Green**
(iii) Kids choosing Blue = **50**
(iv) Kids choosing Orange = **40**

### 2. Pets Owned

**From graph**

- Dogs = 8
- Cats = 10
- Rabbits = 2
- Hamsters = 5
- Others = 3

**Answers**

(i) Least popular pet = **Rabbit**
(ii) Students having dog = **8**
(iii) Students having rabbit = **2**

**3. Student Performance**

**Marks**

- English = 40
- Hindi = 65
- Maths = 90
- Science = 50
- S.Science = 20

**Answers**

(i) Best performance = **Maths**
(ii) Marks in Maths = **90**
(iii) Hindi and Science differ because student performs differently in subjects.

## Exam Time

**A. Multiple Choice Questions**

**1.**

Most repeated sweet = Kaju Katli

Answer: **(c) Kaju Katli**

**2.**

Marks ≥ 5:

Count = **16**

Answer: **(c) 16**

**3.**

Marks less than 4:

Count = **10**

Answer: **(d) 10**

**4.**

Tally for 8 = one group of 5 + 3

Answer: **(d)**

**5.**

Equal fruits liked = **M and B**

Answer: **(b)**

**6.**

Most liked fruit = **G**

Answer: **(b) G**

**7.**

Maximum bikes manufactured = 1232 in 2002

Answer: **(a) 2002**

**8.**

Difference:

$$995 - 685 = 310$$

Answer: **(c) 310**

**9.**

If 5 symbols = 40

One symbol:

$$40 \div 5 = 8$$

Answer: **(b) 8**

**10.**

Pictograph represents data using pictures.

Answer: **(c) pictures**

**B. Fill in the Blanks**

1. **Data**

2. **tally**
3. **12**
4. **pictograph**
5. $$20 \times 3 = 60$$

= **60 flowers**

**C. True / False**

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

**D. Match the Columns**

| **Column I** | **Column II** |
|---|---|
| (i) | 7 |
| (ii) | 12 |
| (iii) | 8 |
| (iv) | 17 |

**E. Very Short Answer Questions**

**1. Weights using tally marks**

| **Weight** | **Tally Marks** | **Frequency** |
|---|---|---|
| 9 | \| | 1 |
| 10 | \|\| | 2 |

| Weight | Tally Marks | Frequency |
|---|---|---|
| 15 | \|\|\|\| | 4 |
| 16 | \|\|\|\| | 4 |
| 17 | \|\| | 2 |
| 23 | \|\|\| | 3 |
| 25 | \| | 1 |

**2. Sports tally table**

| Sport | Tally Marks | Frequency |
|---|---|---|
| Cricket | \|\|\|\|\| | 5 |
| Football | \|\|\|\|\| \| | 6 |
| Tennis | \|\| | 2 |
| Badminton | \|\| | 2 |
| Basketball | \| | 1 |
| Golf | \| | 1 |
| Hockey | \|\|\| | 3 |

Note – Only 4 lines and one cross line count 5

**3.**

If 1 symbol = 5 persons

For 20 persons:

$$20 \div 5 = 4$$

Answer = **4 symbols**

**4. Perfume Brands**

Each symbol = 4 persons

R brand has 6 symbols.

$$6 \times 4 = 24$$

Answer = **24 persons**

**5. Classes and Children**

Maximum children = **Fifth class**
Minimum children = **Tenth class**

**F. Short Answer Questions**

**1. Private buses**

Each symbol = 10 buses

**Counts**

- Delhi = 50
- Mumbai = 40
- Jaipur = 70
- Agra = 30
- Pune = 60
- Noida = 20

**Answers**

(i) Least buses = **Noida**
(ii) Highest buses = **Jaipur**
(iii)

$$50 - 30 = 20$$

= **20 buses more**

(iv)

$$50 + 40 + 70 + 30 + 60 + 20 = 270$$

Total = **270 buses**

**2. Fans sold**

Each symbol = 4 fans

**Answers**

(i) Tuesday:

5 symbols

$$5 \times 4 = 20$$

= **20 fans**

(ii) Same fans sold on = **Monday and Friday**

(iii) Maximum sold = **Saturday**

(iv) Minimum sold = **Wednesday**

**3. Cycles manufactured**

Each symbol = 10 cycles

**Answers**

(i) Least manufactured = **Wednesday**
(ii) Maximum manufactured = **Thursday**

(iii)

Approximate total:

$$40 + 60 + 40 + 70 + 50 + 50 = 310$$

Total ≈ **310 cycles**

(iv) Same number manufactured = **Friday and Saturday**

**4. Blood groups tally**

| **Blood Group** | **Frequency** |
|---|---|
| A | 8 |

| Blood Group | Frequency |
|---|---|
| B | 7 |
| AB | 4 |
| O | 6 |

Like above, draw a tally (do it yourself)

**5. Dice outcomes tally**

| Number | Frequency |
|---|---|
| 1 | 5 |
| 2 | 5 |
| 3 | 5 |
| 4 | 5 |
| 5 | 10 |
| 6 | 10 |

**6. Ice-cream Flavours**

**Answers**

(i) Most popular = **Mint Choco**
(ii) Vanilla liked by = **15 consumers**
(iii) Minimum liked flavour = **Chocolate**

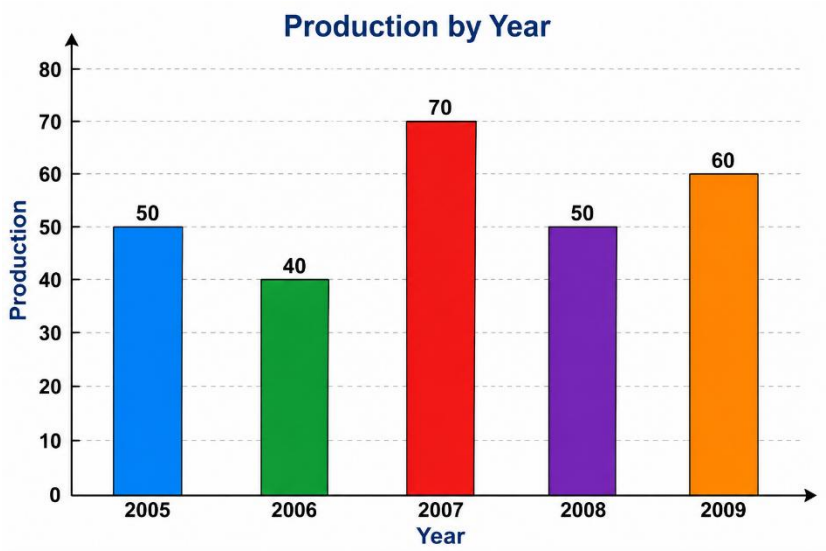
**7. Rice Production**

| Year | Production |
|---|---|
| 2005 | 50 |
| 2006 | 40 |
| 2007 | 70 |

| Year | Production |
|---|---|
| 2008 | 50 |
| 2009 | 60 |

**Answer**

**(i) Production**




(ii) Maximum production = **2007**

## G. Long Answer Questions

### 1. District Areas

Each symbol = 1000 sq km

**Answers**

(i) Area of Koria district = **7000 sq km**
(ii) Smallest area = **Mahasamund**
(iii) Largest area = **Rajnandgaon**
(iv) Same area = **Raigarh and Jashpur**
(v) Districts having area > 5000 sq km:

- Rajnandgaon
- Koria
- Raigarh
- Jashpur

Total = **4 districts**

**2. Shirt Size Table**

| Shirt Size | Number of Students |
|---|---|
| 30 | 3 |
| 32 | 5 |
| 34 | 8 |
| 36 | 7 |
| 38 | 10 |
| 40 | 7 |

Draw  tally marks according to the frequency

**3. Scouts Pictograph**

Each symbol = 10 scouts

**Answers**

(i) Minimum scouts = **Class X**
(ii) Maximum scouts = **Class VIII**
(iii) Scouts in VI = **40**
(iv) Class VI has four times scouts of = **Class X**

(v)

$$40 + 20 + 60 + 30 + 10 = 160$$

Total scouts = **160**

**4. Fruit Bar Graph**

**Answers**

(i) Most popular fruit = **Mango (B)**
(ii) Least popular fruit = **Grapes (C)**
(iii) Students liking orange = **8**

(iv)

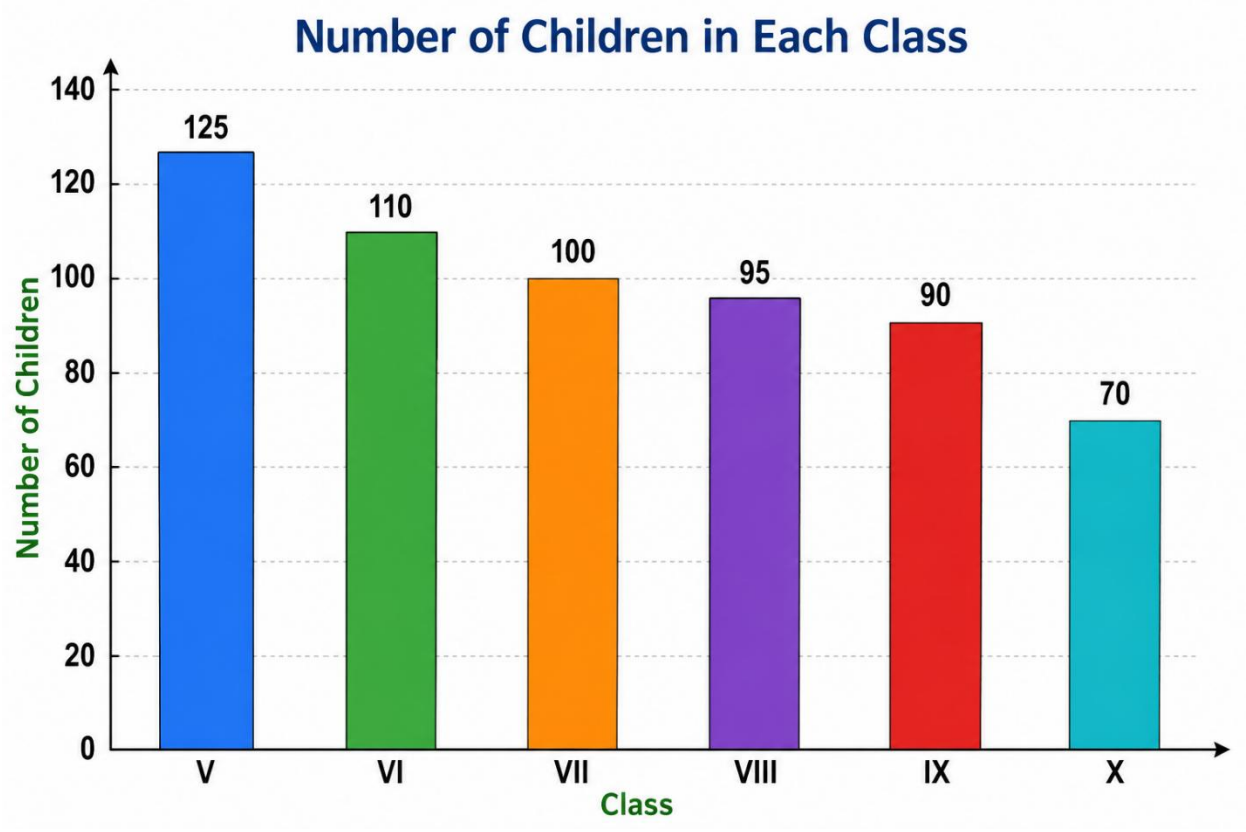
If 1 unit = 5 students:

$$8 \times 5 = 40$$

Students liking orange = **40**

**5. Number of Children**

**(i)**



**Answer**

(ii) Highest number of students = **Class V**

**Competency-Based Questions**

A.

1. b  2. A

B.

1. d 2. A 3. B

C. Do it yourself

## Chapter 5: Prime Time

**Ncert Corner**

**Figure it out**

**Question 1.**

Solution:
To determine the 10th occurrence of "idli-vada", we need to identify the numbers that are multiples of both 3 and 5.

The numbers for which "idli-vada" is said are the multiples of 15.

This sequence is:
15, 30, 45, 60, 75, 90, 105, 120, 135, 150, …

Thus, the 10th number for which players should say "idli-vada" is 150.

**Question 2.**
Solution:

(a) Idli is said for multiples of 3. Between 1 and 90 the multiples of 3 are 3, 6, 9, 12, 15, 18, …….. 90.

There are 30 such numbers.

Hence the children would say idli 30 times.

(b) Vada is said for multiples of 5. Between 1 and 90 the multiples of 5 are 5, 10, 15, 20, 25, …

There are 18 such numbers.

(c) Idli-Vada is said for multiples of both 3 and 5, which is multiple of 15.
Between 1 and 90, there are 15, 30, 45, 60, 75, 90.

There are 6 such numbers.

**Question 3.**

Solution:
There are 300 multiples of 3 between 1 and 900 and there are 180 multiples of 5 between 1 and 900. There are 60 multiples of 15 between 1 and 900.

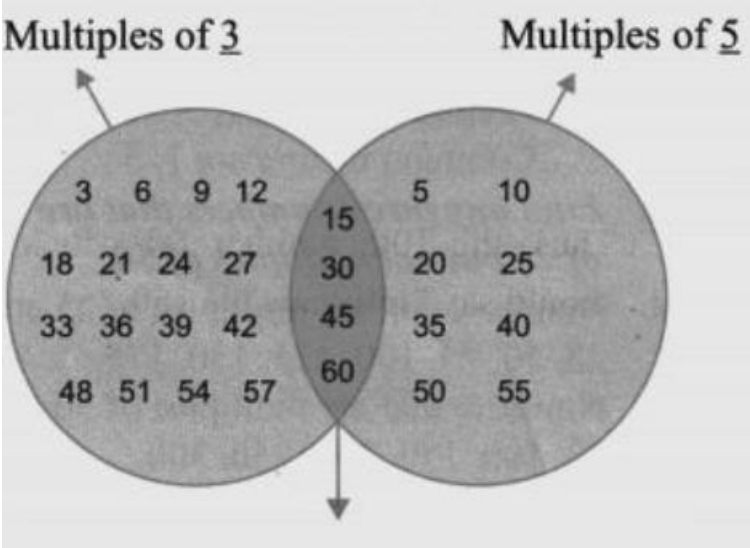
(a) "idli" is said: 300 times (including the times "idli-vada" is said).

(b) "vada" is said: 180 times (including the times "idli-vada" is said).

(c) "idli-vada" is said: 60 times.

**Question 4.**

Solution:




Yes, this figure is related to the 'idli-vada' game.

**Figure it Out**

**Question 1.**

Solution:
Multiples of 40 are:
40, 80, 120, 160, 200, 240, 280, 320, 360, 400, 440

Hence multiples of 40 that lie between 310 and 410 are:
320, 360 and 400.

**Question 2.**
Who am I?

(a) Solution:
7 is the common factor of 7, 14, 21, 28, 35, which are less than 40.

Only 35 has digit sum 8.

35 = 3 + 5 = 8

So, I am 35.

(b)

Solution:
Common multiples of 3 and 5 are:
15, 30, 45, 60, 75, 90

Only 45 has one digit 1 more than the other.

So, I am 45.

**Question 3.**

Find a perfect number between 1 and 10.

Solution:
The only perfect number between 1 and 10 is 6.

Factors:
1, 2, 3, 6

Sum = 1 + 2 + 3 + 6 = 12

12 is twice 6.

**Question 4.**
Find the common factors of:

(a) 20 and 28

Solution:
Factors of 20: 1, 2, 4, 5, 10, 20

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

Common factors: 1, 2, 4

(b) 35 and 50

Solution:
Factors of 35: 1, 5, 7, 35

Factors of 50: 1, 2, 5, 10, 25, 50

Common factors: 1, 5

(c) 4, 8 and 12

Solution:
Common factors are: 1, 2, 4

(d) 5, 15 and 25

Solution:
Common factors are: 1, 5

**Question 5.**

Solution:
Multiples of 25:
25, 50, 75, 100, 125, 150, 175, …

Multiples of 50:
50, 100, 150, 200, …

Hence, numbers that are multiples of 25 but not multiples of 50 are:
25, 75, 125, 175, …

**Question 6.**

Solution:
The LCM of 6 and 9 is 54, which is the first common multiple after 50.

Hence the two numbers could be 6 and 9.

**Question 7.**

Solution:

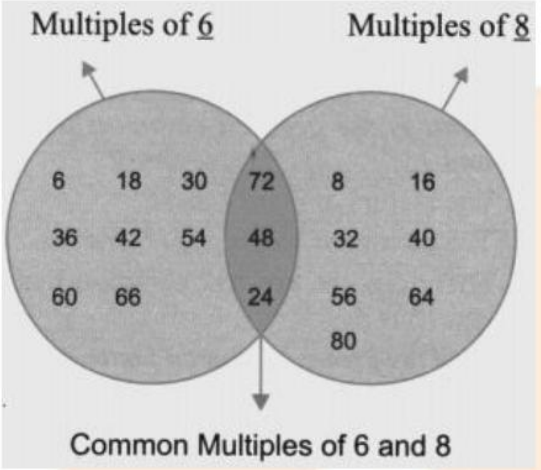
Factors of 28:
1, 2, 4, 7, 14, 28

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

Common factors:
1, 2, 7 and 14

**Question 8.**

Solution:




Here 6 could also be replaced by 3.

As 24, 48, 72 are also common multiples of 3 and 8.

**Question 9.**

Solution:

LCM = 2 × 2 × 2 × 3 × 3 × 5
= 360

Hence, the smallest number is 360.

**Question 10.**

Solution:

LCM = 2 × 2 × 2 × 3 × 3 × 5 × 7
= 2520

The smallest number is 2520.

5.2 Prime Numbers

**Figure it Out**

**Question 1.**

Solution:
No, 2 is the only even prime number.

**Question 2.**

Solution:
Smallest difference = 1 (between 2 and 3)

Largest difference = 8 (between 89 and 97)

**Question 3.**

Solution:
No.

The decade 90–99 has the least number of primes.

The decades 0–9 and 10–19 have the most number of primes.

**Question 4.**
Solution:
23 and 37 are prime numbers.

**Question 5.**

Solution:
(2, 3), (2, 13), (7, 13)

**Question 6.**

Solution:
(13, 31), (17, 71), (37, 73), (79, 97)

**Question 7.**

Solution:
90, 91, 92, 93, 94, 95, 96

**Question 8.**

Solution:
(5, 7), (11, 13), (29, 31), (41, 43), (59, 61), (71, 73)

**Question 9.**

(a) There is no prime number whose units digit is 4.
Ans: True

(b) A product of primes can also be prime.
Ans: False

(c) Prime numbers do not have any factors.
Ans: False

(d) All even numbers are composite numbers.
Ans: False

(e) For every prime after 3, the next number is composite.
Ans: True

**Question 10.**
Solution:
$105 = 3 \times 5 \times 7$

Hence, 105 is the answer.

**Question 11.**

Solution:
No prime number can be formed.

**Question 12.**

Solution:

$2 \rightarrow 5$
$3 \rightarrow 7$
$5 \rightarrow 11$
$11 \rightarrow 23$
$23 \rightarrow 47$

**Figure it Out**

**Question 1.**

Solution:

(a) $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

(b) $104 = 2 \times 2 \times 2 \times 13$

(c) $105 = 3 \times 5 \times 7$

(d) $243 = 3 \times 3 \times 3 \times 3 \times 3$

(e) $320 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5$

(f) $141 = 3 \times 47$

(g) $1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

(h) $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

(i) $1024 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

(j) $1331 = 11 \times 11 \times 11$

(k) $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

**Question 2.**

Solution:

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

Thus, the number is 198.

**Question 3.**

Solution:

$1955 = 5 \times 17 \times 23$

Hence, the three prime numbers are:
5, 17, and 23.

**Question 4.**

(a) $56 \times 25$

Solution:

Prime factors of $56 = 2 \times 2 \times 2 \times 7$

Prime factors of $25 = 5 \times 5$

Combined prime factorization:

$56 \times 25 = 2 \times 2 \times 2 \times 7 \times 5 \times 5$

(b) $108 \times 75$

Solution:

Prime factors of $108 = 2 \times 2 \times 2 \times 3 \times 3$

Prime factors of 75 = 3 × 5 × 5

Combined prime factorization:

108 × 75 = 2 × 2 × 3 × 3 × 3 × 3 × 5 × 5

(c) 1000 × 81

Solution:

Prime factors of 1000 = 2 × 2 × 2 × 5 × 5 × 5

Prime factors of 81 = 3 × 3 × 3 × 3

Combined prime factorization:

1000 × 81 = 2 × 2 × 2 × 5 × 5 × 5 × 3 × 3 × 3 × 3

**Question 5.**

(a) three different prime numbers?

Solution:

2 × 3 × 5 = 30

So, the smallest number is 30.

(b) four different prime numbers?

Solution:

2 × 3 × 5 × 7 = 210

Thus, the smallest number is 210.

**Figure it Out**

**Question 1.**

(a) 30 and 45

Solution:

30 = 2 × 3 × 5

45 = 3 × 3 × 5

Common factors = 3 × 5 = 15

Hence, they are not co-prime.

(b) 57 and 85

Solution:

$57 = 3 \times 19$

$85 = 5 \times 17$

No common factor other than 1.

Hence, they are co-prime.

(c) 121 and 1331

Solution:

$121 = 11 \times 11$

$1331 = 11 \times 11 \times 11$

Common factor = 121

Hence, they are not co-prime.

(d) 343 and 216

Solution:

$343 = 7 \times 7 \times 7$

$216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$

No common factor other than 1.

Hence, they are co-prime.

**Question 2.**

(a) 225 and 27

Solution:

$225 = 3 \times 3 \times 5 \times 5$

$27 = 3 \times 3 \times 3$

225 does not have enough factors of 3.

Therefore, 225 is not divisible by 27.

(b) 96 and 24

Solution:

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$

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

96 contains all required factors.

Hence, 96 is divisible by 24.

(c) 343 and 17

Solution:

$343 = 7 \times 7 \times 7$

$17 = 17$

343 does not contain factor 17.

Hence, 343 is not divisible by 17.

(d) 999 and 99

Solution:

$999 = 3 \times 3 \times 3 \times 37$

$99 = 3 \times 3 \times 11$

999 does not contain factor 11.

Hence, 999 is not divisible by 99.

**Question 3.**

Solution:

The numbers share common factors 3 and 7.

So, they are not co-prime.

Neither number contains all the factors of the other.

Hence, neither divides the other.

**Question 4**

Guna says, “Any two prime numbers are co-prime”. Is he right?

Solution:

Yes, Guna is right.

Any two prime numbers are co-prime because they do not have any common factor other than 1.

Example:
2 and 3, 5 and 7, 11 and 13.

**Figure it Out**

Question 1.

(a) From the year you were born till now, which years were leap years?

Solution:

From 2010 till 2024, the leap years are:

2012, 2016, 2020 and 2024.

(b) From the year 2024 till 2099, how many leap years are there?

Solution:

2024, 2028, 2032, 2036, 2040, 2044, 2048, 2052, 2056, 2060, 2064, 2068, 2072, 2076, 2080, 2084, 2088, 2092, 2096

Hence, there are 19 leap years.

**Question 2.**

Solution:

Largest = 8888

Smallest = 2112

**Question 3.**

(a) Sum of two even numbers gives a multiple of 4.

Solution:

Sometimes true.

Example:

6 + 4 = 10 (not divisible by 4)

2 + 2 = 4 (divisible by 4)

(b) Sum of two odd numbers gives a multiple of 4.

Solution:

Sometimes true.

Example:

1 + 5 = 6 (not divisible by 4)

1 + 3 = 4 (divisible by 4)

7 + 5 = 12 (divisible by 4)

**Question 4.**

(i) 10
(ii) 5
(iii) 2

78, 99, 173, 572, 980, 1111, 2345

Solution:

99 ÷ 10 → Remainder = 9
99 ÷ 5 → Remainder = 4
99 ÷ 2 → Remainder = 1

173 ÷ 10 → Remainder = 3
173 ÷ 5 → Remainder = 3
173 ÷ 2 → Remainder = 1

572 ÷ 10 → Remainder = 2
572 ÷ 5 → Remainder = 2
572 ÷ 2 → Remainder = 0

980 ÷ 10 → Remainder = 0
980 ÷ 5 → Remainder = 0
980 ÷ 2 → Remainder = 0

1111 ÷ 10 → Remainder = 1
1111 ÷ 5 → Remainder = 1
1111 ÷ 2 → Remainder = 1

2345 ÷ 10 → Remainder = 5
2345 ÷ 5 → Remainder = 0
2345 ÷ 2 → Remainder = 1

**Question 5.**

Solution:

If a number is divisible by 8, it is automatically divisible by 4.

If a number is divisible by 10, it is automatically divisible by 2 and 5.

Thus, checking divisibility by 8 and 10 is enough.

**Question 6.**
Solution:

5600, 6000, 77622160

**Question 7.**

Solution:

$10000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$

$2 \times 2 \times 2 \times 2 = 16$

$5 \times 5 \times 5 \times 5 = 625$

Hence, the two numbers are 16 and 625.

**Practice Time 5.1**

**1. Find the common factors**

**(i) 25 and 80**

**Solution By Steps**

*Step 1: Find factors of 25*
Factors of 25 = 1, 5, 25

*Step 2: Find factors of 80*
Factors of 80 = 1, 2, 4, 5, 8, 10, 16, 20, 40, 80

*Step 3: Find common factors*
Common factors = 1, 5

**Final Answer**
1 and 5

**(ii) 42 and 70**

*Step 1: Factors of 42*
1, 2, 3, 6, 7, 14, 21, 42

*Step 2: Factors of 70*
1, 2, 5, 7, 10, 14, 35, 70

*Step 3: Common factors*
1, 2, 7, 14

**Final Answer**
1, 2, 7 and 14

**(iii) 56 and 120**

*Step 1: Factors of 56*
1, 2, 4, 7, 8, 14, 28, 56

*Step 2: Factors of 120*
1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120

*Step 3: Common factors*
1, 2, 4, 8

**Final Answer**
1, 2, 4 and 8

**(iv) 9 and 12**

*Step 1: Factors of 9*
1, 3, 9

*Step 2: Factors of 12*
1, 2, 3, 4, 6, 12

*Step 3: Common factors*
1, 3

**Final Answer**
1 and 3

**(v) 7, 14 and 28**

*Step 1: Factors of 7*
1, 7

*Step 2: Factors of 14*
1, 2, 7, 14

*Step 3: Factors of 28*
1, 2, 4, 7, 14, 28

*Step 4: Common factors*
1, 7

**Final Answer**
1 and 7

**(vi) 12, 18 and 15**

*Step 1: Factors of 12*
1, 2, 3, 4, 6, 12

*Step 2: Factors of 18*
1, 2, 3, 6, 9, 18

*Step 3: Factors of 15*
1, 3, 5, 15

*Step 4: Common factors*
1, 3

**Final Answer**
1 and 3

**2.**

*Step 1: Factors of 8*
Factors of 8 = 1, 2, 4, 8

*Step 2: Use divisibility rule*
If a number is divisible by 8, it is also divisible by all factors of 8.

**Final Answer**
1, 2 and 4

**3.**

*Step 1: Relationship between 64 and 8*
$64 = 8 \times 8$

*Step 2: Apply divisibility*
If a number is divisible by 64, it must also be divisible by 8.

**Final Answer**
Yes, it is divisible by 8 also.

**4.**

*Step 1: Multiply the divisors*
$6 \times 5 \times 7 = 210$

*Step 2: Apply concept*
A number divisible by all these numbers is divisible by their common product.

**Final Answer**
210

**5.**

*Step 1: Multiply the divisors*
$3 \times 4 \times 5 \times 13 = 780$

*Step 2: Conclusion*
Therefore, the number is divisible by 780.

**Final Answer**
Yes

**6.**

**(i) 5 and 15**

Multiples of 5: 5, 10, 15, 20, 25, 30, 45 …

Multiples of 15: 15, 30, 45 …

**Final Answer**
15, 30, 45

**(ii) 8 and 12**

Multiples of 8: 8, 16, 24, 32, 40, 48 …

Multiples of 12: 12, 24, 36, 48, 60, 72 …

**Final Answer**
24, 48, 72

**(iii) 6 and 8**

Multiples of 6: 6, 12, 18, 24, 30, 36, 48 …

Multiples of 8: 8, 16, 24, 32, 40, 48 …

**Final Answer**
24, 48, 72

**(iv) 7 and 14**

Multiples of 7: 7, 14, 21, 28, 35, 42 …

Multiples of 14: 14, 28, 42 …

**Final Answer**
14, 28, 42

**7.** *Step 1: Find LCM of 7 and 8*
LCM = 56

*Step 2: Multiples of 56 less than 100*
56

**Final Answer**
56

**8. Write all perfect numbers from 1 to 20**

**Solution By Steps**

*Step 1: Recall perfect number*
A perfect number equals the sum of its proper factors.

*Step 2: Check numbers*
6 = 1 + 2 + 3

**Final Answer**
6

**9. Find all multiples of 20 between 250 and 350**

**Solution By Steps**

Multiples of 20 are obtained by 20 × n.

Between 250 and 350:

260, 280, 300, 320, 340

**Final Answer**
260, 280, 300, 320, 340

**10.** Multiples of 20: 20, 40, 60, 80, 100 …

Remove multiples of 40: 40, 80 …

Remaining examples: 20, 60, 100

**Final Answer**
20, 60, 100

## Practice Time 5.2

**1. Check whether the following numbers are prime or not**

**(i) 11**

**Solution By Steps**

*Step 1: Check factors of 11*
11 is divisible only by 1 and 11.

**Final Answer**
11 is a prime number.

**(ii) 16**

*Step 1: Check divisibility*
16 is divisible by 1, 2, 4, 8 and 16.

*Step 2: Conclusion*
It has more than two factors.

**Final Answer**
16 is not a prime number.

**(iii) 49**

*Step 1: Check divisibility*
$49 = 7 \times 7$

*Step 2: Conclusion*
49 has factors 1, 7 and 49.

**Final Answer**
49 is not a prime number.

**(iv) 43**

*Step 1: Check factors*
43 is divisible only by 1 and 43.

**Final Answer**
43 is a prime number.

**2.**

*Step 1: Least prime number*
Least prime number = 2

*Step 2: Highest prime number below 50*
Highest prime number below 50 = 47

*Step 3: Find difference*
$47 - 2 = 45$

**Final Answer**
45

**3.** Prime numbers differing by 2 are called twin primes.

Examples:

- 5 and 7
- 11 and 13
- 17 and 19
- 41 and 43

**Final Answer**
(5, 7), (11, 13), (17, 19), (41, 43)

**4.** Using the form:

$$5 \times n + 2$$

Examples:

- $5 \times 7 + 2 = 37$
- $5 \times 9 + 2 = 47$
- $5 \times 13 + 2 = 67$
- $5 \times 19 + 2 = 97$

All are prime numbers.

**Final Answer**
37, 47, 67, 97

**5.** Prime numbers between 20 and 50 are:

23, 29, 31, 37, 41, 43, 47

The greatest is 47.

**Final Answer**
47

**6. (i)**

$$2 + 5 = 7$$

**(ii)**

$$3 + 11 = 14$$

**(iii)**

$$11 + 17 = 28$$

**(iv)**

$$5 + 37 = 42$$

All sums are divisible by 7.

**Final Answer**
(2, 5), (3, 11), (11, 17), (5, 37)

**7.**

**(i) 26**

$$7 + 19 = 26$$

**Final Answer**
26 = 7 + 19

**(ii) 38**

$$7 + 31 = 38$$

**Final Answer**
38 = 7 + 31

**(iii) 48**

$$7 + 41 = 48$$

**Final Answer**
48 = 7 + 41

**(iv) 60**

$$7 + 53 = 60$$

**Final Answer**
60 = 7 + 53

**8.**

**(i) 21**

$$3 + 5 + 13 = 21$$

**Final Answer**
21 = 3 + 5 + 13

**(ii) 31**

$$5 + 7 + 19 = 31$$

**Final Answer**
31 = 5 + 7 + 19

**(iii) 23**

$$5 + 7 + 11 = 23$$

**Final Answer**
23 = 5 + 7 + 11

**(iv) 49**

$$13 + 17 + 19 = 49$$

**Final Answer**
49 = 13 + 17 + 19

**9.** *Step 1: List numbers from 11 to 24*

11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24

*Step 2: Separate primes and composites*

Prime numbers:
11, 13, 17, 19, 23

Composite numbers:
12, 14, 15, 16, 18, 20, 21, 22, 24

**Final Answer**

Prime numbers:
11, 13, 17, 19, 23

Composite numbers:
12, 14, 15, 16, 18, 20, 21, 22, 24

**10.** Check consecutive numbers:

24, 25, 26, 27, 28

All are composite numbers.

**Final Answer**
24, 25, 26, 27, 28

## Practice Time 5.3

**1.** Two numbers are coprime if their only common factor is 1.

**(i) 15 and 37**

**Solution By Steps**

Factors of 15 = 1, 3, 5, 15

Factors of 37 = 1, 37

Common factor = 1 only

**Final Answer**
15 and 37 are coprime numbers.

**(ii) 40 and 46**

Factors of 40 = 1, 2, 4, 5, 8, 10, 20, 40

Factors of 46 = 1, 2, 23, 46

Common factors = 1 and 2

**Final Answer**
40 and 46 are not coprime.

**(iii) 23 and 17**

Factors of 23 = 1, 23

Factors of 17 = 1, 17

Common factor = 1 only

**Final Answer**
23 and 17 are coprime numbers.

**(iv) 22 and 33**

Factors of 22 = 1, 2, 11, 22

Factors of 33 = 1, 3, 11, 33

Common factors = 1 and 11

**Final Answer**
22 and 33 are not coprime.

**2. Find the prime factorisation**

**(i) 20570**

**Solution By Steps**

$$20570 = 2 \times 10285$$
$$10285 = 5 \times 2057$$
$$2057 = 11 \times 187$$
$$187 = 11 \times 17$$

Therefore,

$$20570 = 2 \times 5 \times 11 \times 11 \times 17$$

**Final Answer**

$$20570 = 2 \times 5 \times 11 \times 11 \times 17$$

**(ii) 60775**

**Solution By Steps**

$$60775 = 5 \times 12155$$
$$12155 = 5 \times 2431$$
$$2431 = 11 \times 221$$
$$221 = 13 \times 17$$

Therefore,

$$60775 = 5 \times 5 \times 11 \times 13 \times 17$$

**Final Answer**

$$60775 = 5 \times 5 \times 11 \times 13 \times 17$$

**3. Fill in the blank**

Prime factorisation of 47957:

$$47957 = 7 \times 13 \times \_\_ \times 17$$

**Solution By Steps**

*Step 1: Multiply known factors*

$$7 \times 13 \times 17 = 1547$$

*Step 2: Divide*

$$47957 \div 1547 = 31$$

**Final Answer**

31

**4. Write the smallest 8-digit number and all its prime factors**

**Solution By Steps**

*Step 1: Smallest 8-digit number*

$$10000000$$

*Step 2: Prime factorisation*

$$10000000 = 10^7$$
$$= (2 \times 5)^7$$
$$= 2^7 \times 5^7$$

**Final Answer**

$$10000000 = 2^7 \times 5^7$$

Prime factors are:

2 and 5

**5.**

Greatest 3-digit number:

$$999$$

Prime factorisation:

$$999 = 3 \times 333$$
$$333 = 3 \times 111$$
$$111 = 3 \times 37$$

Therefore,

$$999 = 3 \times 3 \times 3 \times 37$$

**Final Answer**

$$999 = 3^3 \times 37$$

Prime factors are:

3 and 37

**6.**

**(i)**

$$2 \times 3 \times 3 \times 3 \times 4 = 216$$

4 is not prime.

Not correct.

**(ii)**

$$2 \times 3 \times 7 \times 7 \times 7 \times 11 = 22638$$

All factors are prime.

Correct.

**(iii)**

$$3 \times 3 \times 7 \times 7 \times 6 = 2646$$

6 is not prime.

Not correct.

**(iv)**

$$3 \times 5 \times 7 \times 7 = 735$$

All factors are prime.

Correct.

**Final Answer**
(ii) and (iv)

**7.** Take the smallest five prime numbers:

$$2,3,5,7,11$$

Multiply:

$$2 \times 3 \times 5 \times 7 \times 11$$
$$= 2310$$

**Final Answer**
2310

**8.** Prime factorisation:

$$231 = 3 \times 7 \times 11$$

Ascending order:

3, 7, 11

Differences:

$$7 - 3 = 4$$
$$11 - 7 = 4$$

**Final Answer**

Prime factors: 3, 7, 11

Yes, the difference between consecutive prime factors is 4.

**9.** Prime factorisation of 195:

$$195 = 3 \times 5 \times 13$$

Prime factorisation of 15:

$$15 = 3 \times 5$$

Since 195 contains both 3 and 5,

195 is divisible by 15.

**Final Answer**
Yes

**10. Find the prime factorisation without multiplying first**

**(i) $75 \times 35$**

$$75 = 3 \times 5 \times 5$$

$$35 = 5 \times 7$$

Therefore,

$$75 \times 35 = 3 \times 5 \times 5 \times 5 \times 7$$

**Final Answer**

$$3 \times 5^3 \times 7$$

**(ii) $105 \times 15$**

$$105 = 3 \times 5 \times 7$$
$$15 = 3 \times 5$$

Therefore,

$$105 \times 15 = 3 \times 3 \times 5 \times 5 \times 7$$

**Final Answer**

$$3^2 \times 5^2 \times 7$$

**(iii) $100 \times 27$**

$$100 = 2 \times 2 \times 5 \times 5$$
$$27 = 3 \times 3 \times 3$$

Therefore,

$$100 \times 27 = 2^2 \times 3^3 \times 5^2$$

**Final Answer**

$$2^2 \times 3^3 \times 5^2$$

## Practice Time 5.4

**1.**

A number is divisible by 2 if its last digit is even.

(i) 315623 → last digit 3 → **No**
(ii) 34678 → last digit 8 → **Yes**
(iii) 789 → last digit 9 → **No**
(iv) 2651 → last digit 1 → **No**

**2.**

A number is divisible by 4 if the last two digits are divisible by 4.

Last two digits = 16
16 ÷ 4 = 4

**Answer:** Yes

**3.** Last two digits = 52
52 ÷ 4 = 13

**Answer:** Yes

**4.** A number divisible by 8 is automatically divisible by 4.

(i) 1312
Last three digits = 312
312 ÷ 8 = 39 → **Yes**

(ii) 1626
626 ÷ 8 = not exact → **No**

(iii) 1612
612 ÷ 8 = not exact → **No**

(iv) 2304
304 ÷ 8 = 38 → **Yes**

**Answer:** 1312 and 2304

**5.**

| **Number** | **By 2** | **By 4** | **By 5** | **By 8** | **By 10** |
|---|---|---|---|---|---|
| (i) 780 | Yes | Yes | Yes | No | Yes |
| (ii) 3500 | Yes | Yes | Yes | No | Yes |

| Number | By 2 | By 4 | By 5 | By 8 | By 10 |
|---|---|---|---|---|---|
| (iii) 4820 | Yes | Yes | Yes | No | Yes |
| (iv) 48630 | Yes | No | Yes | No | Yes |
| (v) 54475 | No | No | Yes | No | No |

## EXAM TIME

### A. Multiple Choice Questions

1. Product of exactly three distinct prime numbers
$$165 = 3 \times 5 \times 11$$
**Answer:** (b) 165

2. Largest number dividing sum of consecutive odd numbers
Odd + Odd = Even, always divisible by 2
**Answer:** (a) 2

3. Sum of number of primes between 16–80 and 90–100
16–80 → 16 primes
90–100 → 1 prime (97)
Total = 17
**Answer:** (c) 17

4. Which pair is not coprime?
84 and 94 have common factor 2
**Answer:** (c) 84, 94

5. A number is divisible by 5 if it has
0 or 5 in ones place
**Answer:** (c)

6. First number divisible by second number
75 ÷ 15 = 5
**Answer:** (d) 75 and 15

7. Three prime numbers less than 20 whose product is 231
$$231 = 3 \times 7 \times 11$$
**Answer:** (a)

8. Common prime factors of 75, 60, 105
Common prime factor = 5 only

Number of common prime factors = 1
(Question seems misprinted; nearest option is 2.)
**Expected Answer:** 1

9. Distinct prime factors of largest 4-digit number
   $9999 = 3^2 \times 11 \times 101$
   Distinct prime factors = 3
   **Answer:** (b)
10. Distinct prime factors of smallest 5-digit number
    $10000 = 2^4 \times 5^4$
    Distinct prime factors = 2
    **Answer:** (a)

## B. Fill in the Blanks

1. 15 is a multiple of **3 and 5**
2. Such a number is called a **perfect**
3. Smallest prime between 80 and 90 = **83**
4. Numbers having more than two factors are called **composite**
5. Such numbers are **coprime**

## C. True / False

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

## D. Match the Columns

| Column A | Column B |
|---|---|
| (i) Smallest odd composite number | 9 |

| **Column A** | **Column B** |
|---|---|
| (ii) Number of common factors of 3 and 5 | 1 |
| (iii) Smallest composite number | 4 |
| (iv) Smallest even prime number | 2 |
| (v) Smallest odd prime number | 3 |

So:

(i) → (d)
(ii) → (a)
(iii) → (b)
(iv) → (e)
(v) → (c)

**E. Very Short Answer Questions**

1. First three multiples

(i) 11 → 11, 22, 33
(ii) 12 → 12, 24, 36

2. Greatest and smallest prime between 10 and 20
   Greatest = 19
   Smallest = 11

3. Prime numbers

(i) Between 10 and 15 → 11, 13
(ii) Between 20 and 35 → 23, 29, 31

4. Composite numbers from 7, 13, 16
   **16**

5. Common factors of 6 and 10
   **1, 2**

6. HCF of 6 and 15
   **3**

7. First two common multiples of 5 and 15
   **15, 30**

8. Prime factorisation of 40

$$40 = 2 \times 2 \times 2 \times 5$$

**F. Short Answer Questions**

1. Factorisation

(i) $136 = 2 \times 2 \times 2 \times 17$

(ii) $252 = 2 \times 2 \times 3 \times 3 \times 7$

2. Are 12 and 25 coprime?
   Yes
3. Common factors of 12 and 18
   1, 2, 3, 6
4. Is 51 composite?
   Yes, $51 = 3 \times 17$
5. Prime factorisation of 1600

$$1600 = 2^6 \times 5^2$$

6. Divisibility test of 2
   A number ending in 0, 2, 4, 6, 8 is divisible by 2.
7. Is 72 divisible by 4?
   Yes
8. Check if 2520 and 3003 are coprime

$$2520 = 2^3 \times 3^2 \times 5 \times 7$$
$$3003 = 3 \times 7 \times 11 \times 13$$

Common factors = 3 and 7
Therefore, they are **not coprime**.

**G. Long Answer Questions**

**1. Form a 4-digit odd number**

Possible number: **2145**

Interchanging first and last digits gives 5142.
Last two digits = 42, divisible by 2 but not by 4.

Take another:

**1245 → 5241** not divisible by 4.

Correct number: **2415**

After interchange → 5412
12 divisible by 4.

**Answer:** 2415

**2. Common prime factors of 120 and 84**

$$120 = 2^3 \times 3 \times 5$$
$$84 = 2^2 \times 3 \times 7$$

Common prime factors = **2 and 3**

Yes, they have common factors other than 1.

**3. Prime or Composite**

- 29 → Prime
- 56 → Composite
- 101 → Prime
- 77 → Composite

**4. Divisibility**

| Number | By 2 | By 4 | By 5 |
|---|---|---|---|
| 144 | Yes | Yes | No |
| 250 | Yes | No | Yes |
| 341 | No | No | No |

**Competency-Based Questions**

**A. Assertion Reason**

1.

Assertion: 9 and 25 are coprime → True
Reason: Definition of prime number → True but not explanation

**Answer:** (b)

2.

Assertion → True
Reason → True but not explanation

**Answer:** (b)

**B. Case Study Questions**

**(i) Possible arrangements for 35 people**

Factors of 35:

$$35 = 1 \times 35 = 5 \times 7$$

Rows must have 3 to 8 people.

Possible arrangement:

- 5 rows of 7 people

**(ii) 6 rows maximum students**

Maximum people per row = 8

$$6 \times 8 = 48$$

**Answer:** (c) 48

**(iii) Arrangement for 30 students + 2 teachers**

Total people = 32

Possible arrangement:

$$4 \times 8 = 32$$

**Answer:** (b) 4 rows with 8 students/teachers each

**C. Maths Booster (Crossword)**

**Across**

1. Itself
2. Composite
3. Prime

**Down**

2. Factor
3. Multiple
4. One
5. One

## Chapter- 6: Perimeter and Area

**NCERT SOLUTIONS**

**Figure it out**

**Question 1.**

Solution:
(a) Given, perimeter of rectangle =14 cm, breadth = 2 cm
Perimeter of rectangle = 2 (length + breadth)
⇒ 14 cm = 2 (length + 2 cm)
⇒ 7 cm = length + 2 cm
⇒ length = 5 cm

(b) Given, perimeter of a square = 20 cm
⇒ 4 × side = 20 cm
⇒ side = 5 cm
Therefore, length of a side = 5 cm

(c) Perimeter of a rectangle = 12 m
⇒ 2 (length + breadth) = 12 m
⇒ 3 m + breadth = 6 m
⇒ breadth = 3 m

**Question 2.**

Solution:
Given, length of rectangle = 5 cm and breadth = 3 cm
We know that
perimeter of rectangle = 2 × (length × breadth)
= 2 × (5 + 3) = 16 cm

Now, if we bend the wire to form a square, the total length of the wire (16 cm) will be divided equally among the four sides of the square.
So, each side of the square =
= 4 cm

**Question 3.**

Solution:
Let ABC be the given triangle such that AB = 20 cm, BC = 14 cm
So, perimeter = AB + BC + CA = 55 cm
⇒ 55 = 20 + 14 + CA
⇒ CA = 55 – (20 + 14)
⇒ CA = 21 cm
∴ the length of the third side of the triangle = 21 cm.

**Question 4.**

Solution:
The length of the fence is the perimeter of the rectangular park.
Given that the length of the rectangular park = 150 m and breadth = 120 m
∴ Perimeter = 2(l + b)
= 2(150 + 120)
= 2(270)
= 540 m
Now cost of fencing per meter = ₹ 40
Cost of fencing the rectangular park = ₹ 40 × 540 = ₹ 21600

**Question 5.**

Solution:
Length of piece of string = 36 cm
(a) Length of side of a square = cm = 9 cm
(b) Length of side of a triangle when all sides are equal =

**Question 6.**

Solution:
Perimeter of a rectangular field = 2 (length + breadth)
= 2 (230 m + 160 m)
= 780 m
The farmer wants 3 rounds of rope to fence.

Total length of rope needed = 780 m × 3
= 2340 m

**Figure it Out**
**Question 1.**

Solution:
Length of a rectangular garden = 25 m
Area of rectangular garden = length × width
300 sq m = 25 m × width
⇒ Width of the garden = = 12 m

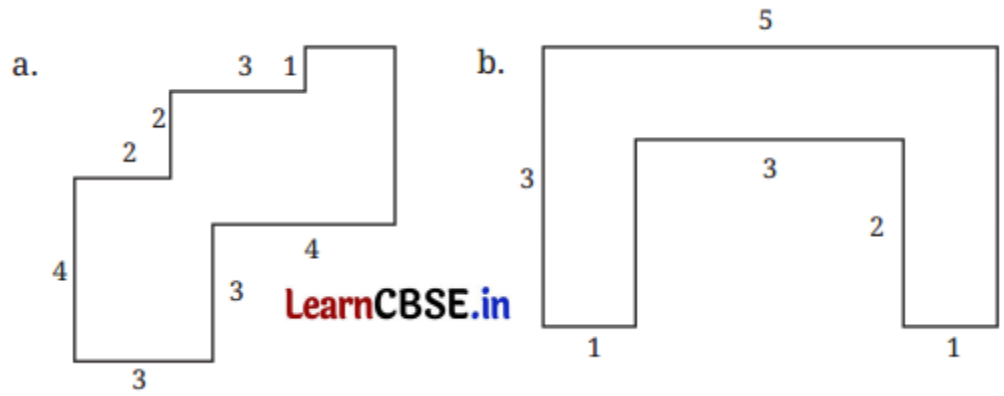
**Question 2.**

Solution:
Length of rectangular plot = 500 m
Breadth of rectangular plot = 200 m
Area of rectangular plot = 500 m × 200 m = 1,00,000 sq m
The cost of tiling the plot is given ₹ 8 per hundred sq m.
So, we will convert area into per hundred sq m
= 1,000 (in hundred sq m)
The cost of tiling per hundred sq m = ₹ 8
∴ The cost of tiling rectangular plot = 1,000 × ₹ 8 = ₹ 8,000

**Question 3.**

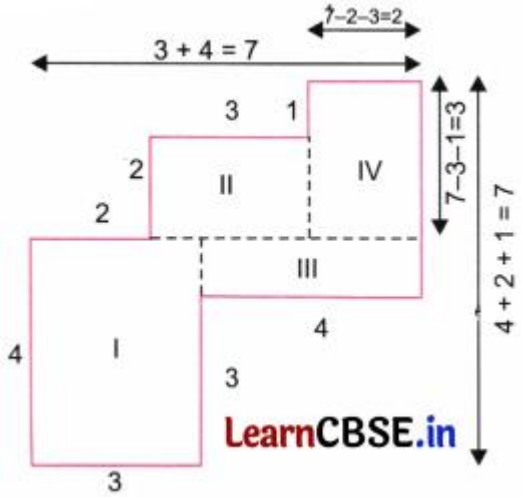
Solution:
Area of rectangular coconut grove = 100 × 50 = 5000 sq. m
Given each coconut tree requires 25 sq. m
then the maximum no. of trees that can be planted in this grove = = 200

**Question 4.**
By splitting the following figures into rectangles, find their areas (all measures are given in meters):




Solution:

(a) Splitting the given figure into I, II, III, and IV rectangles as shown in the figure below, we get




Here, the area of rectangle I = length × breadth

= 4 cm × 3 cm

= 12 sq. cm

Area of rectangle II = length × breadth

= 3 cm × 2 cm

= 6 sq. cm

Area of rectangle III = length × breadth

= 4 cm × 1 cm

= 4 sq. cm

Area of rectangle IV = length × breadth

= 3 cm × 2 cm

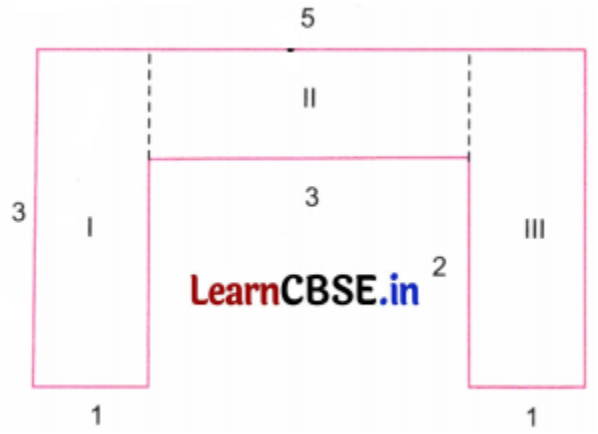
= 6 sq. cm

The total area of the whole figure = 12 sq. cm + 6 sq. cm + 4 sq. cm + 6 sq. cm

= 28 sq. cm.

Therefore, the total area of Figure (a) is 28 sq. cm.

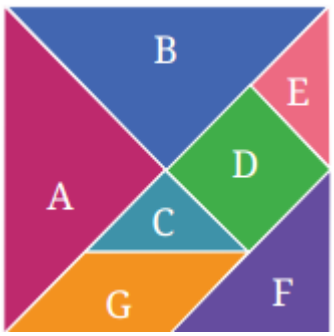
(b) Similarly, by splitting figure (b) into I, II, and III rectangles as shown in the figure below, we get




Area of the rectangle I = length × breadth
= 3 cm × 1 cm
= 3 sq. cm
Area of rectangle II = length × breadth
= 3 cm × 1 cm
= 3 sq. cm
Area of rectangle III = length × breadth
= 3 cm × 1 cm
= 3 sq. cm
The total area of the figure = 3 sq. cm + 3 sq. cm + 3 sq. cm = 9 sq. cm.
Therefore, the total area of Figure (b) is 9 sq. cm.

**Area Figure it Out**

**Question 1.**
Explore and figure out how many pieces have the same area.




**Solution:**
(i) Here, we can see that some shapes have identical areas.
Specifically
Shapes A and B These shapes are identical, meaning they cover the same amount of space, so they have the ^ same area.

Shapes C and E These shapes also have the same area because they are identical in size and shape.

**(ii).**

Solution:
Shape D is twice as big as shape C. This means that if you place two shape C pieces together. Then, they exactly cover shape D.
The relationship between these shapes
Shape D can be completely filled by combining shape C and shape E. So, area of shape D is equal to the sum of the area of shape C and E.
Each of shapes C and E has half the area of shape D.

**(iii)**

From the figure, we can see that two times Shape C forms Shape D. Similarly two times Shape C forms Shape F. Thus, both Shape D and F are equal.

**(iv)**

Since the medium triangle and the rhomboid are each made up of two small tangram triangles, they each have an area 2x that of the small triangle. Hence both have the same area.

**(v)**

[Hint: In the tangram pieces, by placing the shapes over each other, we can find out that Shapes A and B have the same area, and Shapes C and E have the same area. You would have also figured out that Shape D can be exactly covered using Shapes C and E, which means Shape D has twice the area of Shape C or Shape E, etc.]
Solution:
Shape A has twice the area of shape G.

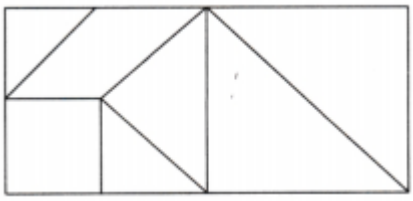
**(vi)**

Answer:
Let's say the area of C = x
Area of D = Area of 2C = 2x
Area of E = Area of C = x
Area of F = Area of 2C = 2x
Area of G = Area of 2C = 2x

Area of A = Area of 2F = 2 × 2x = 4x
Area of B = Area of A = 4x
Hence total area of big shape = Area of A + B + C + D + E + F + G
= 4x + 4x + x + 2x + x + 2x + 2x
= 16x
= 16C
That means the area of a big square is 16 times the area of shape C.

**(vii)**

Solution:
When arranging the 7 pieces to form a rectangle, the area of the rectangle will be the same as that of area of square.



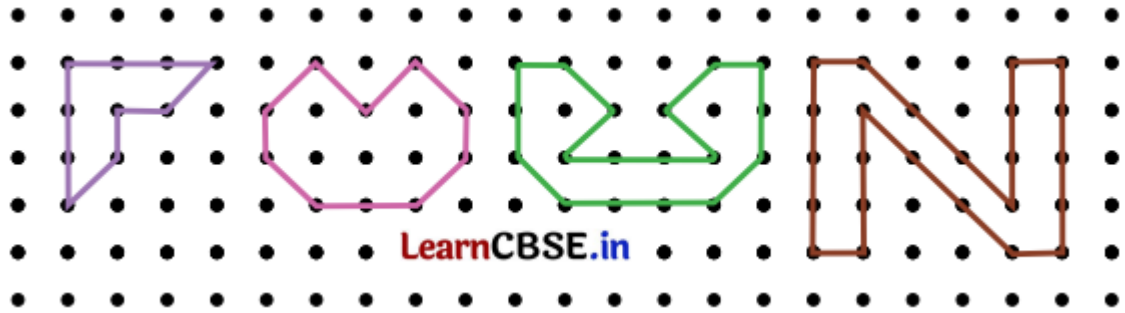
Area of rectangle = 16 × area of shape C.

**(viii)**

Solution:
For the same area, a square always has the smallest perimeter.
So the perimeter of the square is less than that of the rectangle.

**Figure it Out**

**Find the area of the following figures.**




Solution:
(i)

| Covered Area | Number | Area Estimated (sq. units) |
|---|---|---|
| Fully-filled squares | 3 | 3 × 1 = 3 |
| Half-filled squares | 2 | 2 × ½ =1 |



∴ Total area of the figure = 3 + 1 = 4 sq. units

(ii)

| Covered Area | Number | Area Estimated (sq. units) |
|---|---|---|
| Fully-filled squares | 6 | 6 × 1 = 6 |
| Half-filled squares | 6 | 6 × ½ =3 |



∴ Total area of the figure = 6 + 3 = 9 sq. units

(iii)

| Covered Area | Number | Area Estimated (sq. units) |
|---|---|---|
| Fully-filled squares | 7 | 7 × 1 = 7 |
| Half-filled squares | 6 | 6 × ½ =3 |



∴ Total area of the figure = 7 + 3 = 10 sq. units

(iv)

| Covered Area | Number | Area Estimated (sq. units) |
|---|---|---|
| Fully-filled squares | 8 | 8 × 1 = 8 |
| Half-filled squares | 6 | 6 × ½ =3 |
| More than half of a square | 0 | |



∴ Total area of the figure = 8 + 3 = 11 sq. unit

**Figure it Out**

**Question 1.**

Solution:

(a) Figure have 20 full rectangles + 4 more than half rectangles + 4 less than half rectangles
= 20 × 1 + 4 × 1 + 4 × 0
= 20 + 4
= 24 sq. units

(b) Figure have 24 full rectangles, 2 half rectangles, 3 more than half and 3 less than half
∴ Area of figure = 24 + 1 + 2 × + 3 × 1 + 3 × 0
= 24 + 1 + 3 + 0
= 28 sq. units

(c) Figure have 36 full rectangles, 2 half rectangles, 9 more than half, and 10 less than half rectangles
∴ Area of figure = 36 × 1 + 2 × + 9 × 1 + 10 × 0
= 36 + 1 + 9 + 0
= 46 sq. units.

(d) Figure have 13 full rectangles, 1 half, 2 more than half and 2 less than half.
∴ Area of figure = 13 × 1 + 1 × + 2 × 1 + 2 × 0
= 13 + 0.5 + 2
= 15.5 sq. units

(e) Figure have 5 full rectangles, 5 half, 3 more than half and 4 less than half.
∴ Area of figure = 5 × 1 + 5 × + 3 × 1 + 4 × 0
= 5 + 2.5 + 3
= 10.5 sq. units

**Figure it Out**

**(i) Find the Missing Measurements**

**1. Small Bedroom Dimensions**

Given:

$$15 \text{ ft} \times \_\_\_$$

Area $= 180$ sq ft

Using:

$$\text{Area} = \text{Length} \times \text{Breadth}$$
$$180 = 15 \times b$$

$$b = \frac{180}{15} = 12 \text{ ft}$$

**Small Bedroom** = $15$ ft $\times$ $12$ ft

**2. Utility Dimensions**

The total height of the rectangular plot is $30$ft.

On the right side:

- Kitchen height $= 12$ft
- Hall height equals Small Bedroom height $= 12$ft

So utility height:

$$30 - (12 + 12) = 6 \text{ ft}$$

The utility lies directly above the kitchen, so its width is same as kitchen width:

$$15 \text{ ft}$$

**Utility** = $15$ ft $\times$ $6$ ft

**3. Garden Dimensions**

Garden is below the Small Bedroom.

Width of Small Bedroom $= 15$ft

Remaining height:

$$30 - (15 + 12) = 3 \text{ ft}$$

(15 ft from Master Bedroom and 12 ft from Small Bedroom)

So:

**Garden** = $15$ ft $\times$ $3$ ft

**4. Parking Dimensions**

Parking is below the Hall.

Hall width equals Kitchen width:

$$15 \text{ ft}$$

Parking height:

$$30 - (6 + 12 + 9) = 3 \text{ ft}$$

(Utility 6ft + Kitchen 12ft + Hall 9ft)

So:

**Parking** = $15 \text{ ft} \times 3 \text{ ft}$

**(ii) Find the Areas**

**1. Utility Area**

$$15 \times 6 = 90 \text{ sq ft}$$

**Utility Area** = 90 sq ft

**2. Garden Area**

$$15 \times 3 = 45 \text{ sq ft}$$

**Garden Area** = 45 sq ft

**3. Parking Area**

$$15 \times 3 = 45 \text{ sq ft}$$

**Parking Area** = 45 sq ft

**4. Hall Area**

Hall dimensions:

- Width = 15ft
- Height = 9ft

$$15 \times 9 = 135 \text{ sq ft}$$

**Hall Area** = 135 sq ft

**Final Answers**

| Part | Answer |
|---|---|
| Small Bedroom | 15 ft × 12 ft |
| Utility | 15 ft × 6 ft |
| Garden | 15 ft × 3 ft |
| Parking | 15 ft × 3 ft |
| Utility Area | 90 sq ft |
| Garden Area | 45 sq ft |
| Parking Area | 45 sq ft |
| Hall Area | 135 sq ft |

**Figure it Out**

**Question 1.**

Solution:
Dimensions of rectangle 1: 5 m × 10m
Dimensions of rectangle 2:2m × 7m
Area of rectangle 1 = 50 sq m
Area of rectangle 2 = 14 sq m
Now, area of rectangle = sum of areas of rectangle 1 and 2 = 50 sq m + 14 sq m = 64 sq m

So possible dimensions of a rectangle with area 64 sq m are 1 m × 64 m; 2 m × 32 m; 4 m × 16 m; 8 m × 8 m, etc.

**Question 2.**

Solution:
Width of rectangular garden =
.

Width of rectangular garden = area / length of garden

= 1000/50

= 20 m.

**Question 3.**

Solution:
We have, length of the garden = 15 m
and width of the garden = 12 m
∴ The area of the garden = Length × Width
= 15 × 12
= 180 sq. m

Now, also given that length of a flower bed = 2 m
and width of a flower bed = 1 m
The area of a flower bed = Length × Width
= 2 × 1
= 2 sq. m

Total area of 4 flower beds = 4 × 2
= 8 sq. m

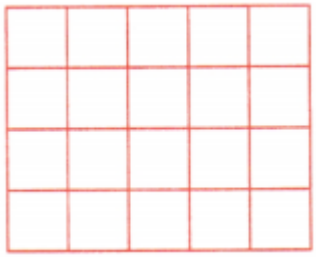
The area available for laying down a lawn
= Area of the garden – Area of 4 flower beds
= 180 – 8
= 172 sq. m

**Question 4.**

Solution:
For shape A, can be arrange it as 9 units by 2 units, giving a perimeter of 22

units.

For shape B, can be arrange it as 5 units by 4 units, giving a perimeter of 18 units.

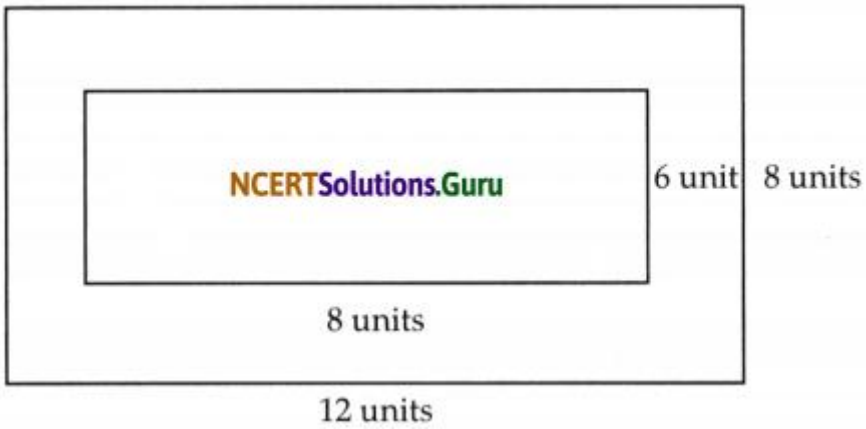


**Question 5.**

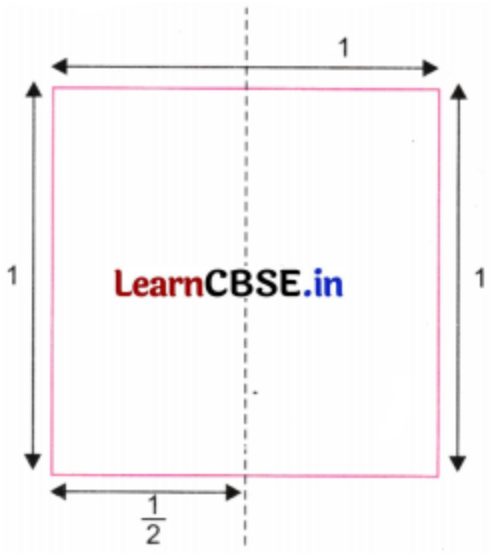
Solution:
Perimeter of the border = $2(1 + 1.5) = 5\ cm^2$

**Question 6.**

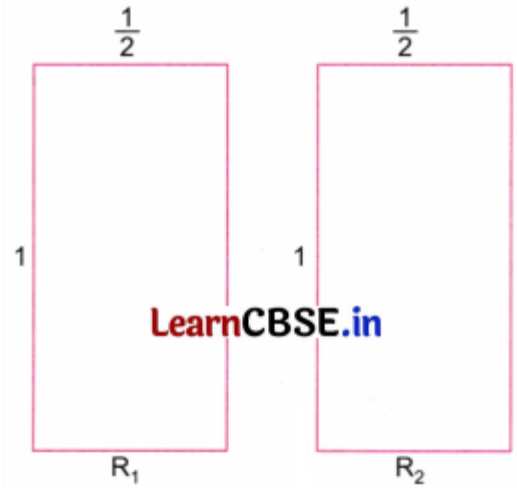
Solution:
As given, the Area **of** the rectangle of size 12 units × 8 units = 96 sq units
And the area of an inner rectangle that occupies exactly half the area = 48 sq units




**Question 7.**
Solution:




Now in the above square piece
side of square = 1 unit
area of square = 1 × 1 = 1 sq. unit.
and perimeter of square = 1 + 1 + 1 + 1 = 4 units.
Now after folding the above square piece in half becomes 2 rectangles




Perimeter of rectangle $R_1$ = 1 + + 1 + = 3 units.
Area of rectangle $R_1$ = × 1 = sq. unit.
Perimeter of rectangle $R_2$ = 1 + + 1 + = 3 units.
Area of rectangle $R_2$ = × 1 = sq. unit.
(a) Now, area of rectangle $R_1$ = area of rectangle $R_2$ = < 1.
Hence, option (a) is not true.

(b) Here perimeter of square = 4 units
and perimeters of both the rectangles = 3 + 3 = 6 units.
which is greater than 4 units.
Hence option (b) is not true.

(c) Here perimeters of both the rectangles = 6 units
and perimeter of square = 4 units × 1= 4 × = 6 units.
The perimeters of both the rectangles added together are 1times the perimeter of the square.
Hence, option (c) is true.

(d) Here, the area of the square = 4 units
and areas of both the rectangles = + = 1 unit.
The area of the square is four times the area of both rectangles.
Hence, option (d) is not true.

**Practice Time 6.1**

**1.**

Perimeter of rectangle

$$P = 2(l + b)$$

$$= 2(300 + 150) = 2 \times 450 = 900 \text{ m}$$

Two rows of wires:

$$2 \times 900 = 1800 \text{ m}$$

**Answer:** 1800 m

**2.**

Perimeter of regular pentagon:

$$5 \times 6 = 30 \text{ m}$$

**Answer:** 30 m

**3.**

Regular hexagon has 6 equal sides.

$$\text{Side} = \frac{120}{6} = 20 \text{ cm}$$

**Answer:** 20 cm

**4.**

Square perimeter:

$$4 \times \text{side} = 32$$
$$\text{side} = \frac{32}{4} = 8 \text{ m}$$

**Answer:** 8 m

**5(i)**

Regular hexagon has 6 equal sides.

$$\text{Each side} = \frac{12}{6} = 2 \text{ cm}$$

**Answer:** 2 cm

**5(ii)**

Equilateral triangle has 3 equal sides.

$$\text{Each side} = \frac{12}{3} = 4 \text{ cm}$$

**Answer:** 4 cm

**6.**

Anuj distance:

$$4 \times (4 \times 40) = 4 \times 160 = 640 \text{ m}$$

Suraj distance:

$$6 \times (3 \times 60) = 6 \times 180 = 1080 \text{ m}$$

Difference:

$$1080 - 640 = 440 \text{ m}$$

**Answer:** Suraj covers 440 m more.

**7.**

Radhika:

$$2(100 + 75) = 350 \text{ m}$$

Monika:

$$4 \times 80 = 320 \text{ m}$$

Difference:

$$350 - 320 = 30 \text{ m}$$

**Answer:** Radhika covers 30 m more.

**8.**

Third side:

$$30 - (8 + 10) = 12 \text{ cm}$$

**Answer:** 12 cm

**9.**

Perimeter of one equilateral triangle:

$$3 \times 2 = 6 \text{ cm}$$

Number of triangles:

$$\frac{60}{6} = 10$$

**Answer:** 10 triangles

**Practice Time 6.2**

**1. Area of rectangles**

$$A = l \times b$$

(i)

$$7 \times 9 = 63 \text{ cm}^2$$

(ii)

$$16 \times 19 = 304 \text{ m}^2$$

(iii)

$$11 \times 15 = 165 \text{ m}^2$$

(iv)

$$4 \text{ m} \times 2.8 \text{ m} = 11.2 \text{ m}^2$$

**2. Largest and smallest area**

(i)

$$5 \times 7 = 35 \text{ m}^2$$

(ii)

$$11 \times 13 = 143 \text{ m}^2$$

(iii)

$$13 \times 5 = 65 \text{ m}^2$$

(iv)

$$6 \times 16 = 96 \text{ m}^2$$

**Largest:** 143 m²
**Smallest:** 35 m²

**3.**

$$\text{Width} = \frac{600}{30} = 20 \text{ m}$$

**Answer:** 20 m

**4.**

$$\text{Width} = \frac{180}{20} = 9 \text{ m}$$

**Answer:** 9 m

**5.**

$$7 \text{ m } 50 \text{ cm} = 7.5 \text{ m}$$

Area:

$$5 \times 7.5 = 37.5 \text{ m}^2$$

**Answer:** 37.5 m²

**6.**

Floor area:

$$6 \times 5 = 30 \text{ m}^2$$

Tile area:

$$10 \text{ cm} \times 6 \text{ cm} = 60 \text{ cm}^2$$

Convert:

$$30 \text{ m}^2 = 300000 \text{ cm}^2$$

Tiles needed:

$$\frac{300000}{60} = 5000$$

**Answer:** 5000 tiles

**7.**

$$6 \times 4 = 24 \text{ m}^2$$

**Answer:** 24 m² carpet

**8.**

Rectangle area:

$$7 \times 6 = 42 \text{ m}^2$$

Square carpet area:

$$5 \times 5 = 25 \text{ m}^2$$

Uncovered area:

$$42 - 25 = 17 \text{ m}^2$$

**Answer:** 17 m²

**9.**

Plot area:

$$15 \times 10 = 150 \text{ m}^2$$

5 flower beds:

$$5 \times 5 \times 5 = 125 \text{ m}^2$$

Remaining:

$$150 - 125 = 25 \text{ m}^2$$

**Answer:** 25 m²

**10.**

Area of square:

$$A = s^2$$

(i)

$$5^2 = 25 \text{ cm}^2$$

(ii)

$$14^2 = 196 \text{ m}^2$$

(iii)

$$9^2 = 81 \text{ m}^2$$

(iv)

$$11^2 = 121 \text{ cm}^2$$

**11.**

Perimeter of square:

$$4s = 40$$
$$s = 10 \text{ m}$$

Area:

$$10^2 = 100 \text{ m}^2$$

**Answer:** 100 m²

**12.**

If length and width are doubled:

$$(2l)(2b) = 4lb$$

**Answer:** Area becomes 4 times.

**13.**

Diagonal divides rectangle into two equal triangles.

$$\frac{1080}{2} = 540 \text{ m}^2$$

**Answer:** 540 m²

## Exam Time

### MCQ Answers

1. (b) 4 m
2. (b) 5.40 m
3. (a) ₹17500
4. (a) 6.3 cm
5. (d) 15 cm
6. (c) 30 cm
7. (a) ₹243
8. (a) 2 times
9. (a) 5.4 m
10. (a) 48 cm

### Fill in the blanks

1. $AB + BC + CD + DE + EF + FG + GH + HA$
2. equal
3. half
4. area
5. 34 m

### True/False

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

**Match the Columns**

(a) → (iii) 20
(b) → (iv) 16
(c) → (ii) 18
(d) → (i) 10

**Very Short Answer Questions**

**1.**

*Step 1: Let breadth be $b$*
Then length $= 3b$

*Step 2: Use perimeter formula*

$$2(l + b) = 40$$

Substitute $l = 3b$:

$$2(3b + b) = 40$$
$$2(4b) = 40$$
$$8b = 40$$
$$b = 5 \text{ cm}$$

*Step 3: Find length*

$$l = 3b = 3 \times 5 = 15 \text{ cm}$$

**Final Answer**
Length $= 15$cm
Breadth $= 5$cm

**2.** *Step 1: Use perimeter formula of regular pentagon*

$$\text{Perimeter} = 5 \times \text{side}$$

*Step 2: Find side*

$$\text{side} = \frac{1240}{5} = 248 \text{ cm}$$

**Final Answer**
Each side $= 248$cm

**3.**

*Step 1: Use perimeter formula*

$$\text{Perimeter} = 3 \times \text{side}$$

*Step 2: Find side*

$$\text{side} = \frac{30}{3} = 10 \text{ cm}$$

**Final Answer**
Side $= 10$cm

**4.**

*Step 1: Add all sides*

$$5 + 6 + 7 = 18$$

**Final Answer**
Perimeter $= 18$cm

**5.** *Step 1: Use perimeter formula*

$$P = 3 \times \text{side}$$
$$P = 3 \times 5 = 15$$

**Final Answer**
Perimeter $= 15$cm

**6.** *Step 1: Use formula*

$$P = 3 \times \text{side}$$

*Step 2: Find side*

$$\text{side} = \frac{27}{3} = 9 \text{ cm}$$

**Final Answer**
Side $= 9$cm

**7.** *Step 1: Use area formula*

$$\text{Area} = l \times b$$
$$= 10 \times 6 = 60$$

**Final Answer**
Area $= 60$ cm$^2$

**8.** *Step 1: Find side*

$$\text{side} = \sqrt{36} = 6 \text{ cm}$$

*Step 2: Find perimeter*

$$P = 4 \times 6 = 24 \text{ cm}$$

**Final Answer**
Perimeter $= 24$cm

**Short Answer Type Questions**

**1.**

Length $= 2 \times$breadth

Let breadth $= b$

Length $= 2b$

Perimeter:

$$2(l + b) = 2(2b + b) = 6b$$

Distance in one round:

$$\frac{6000}{4} = 1500 \text{ m}$$

So,

$$6b = 1500$$
$$b = 250 \text{ m}$$

Length:

$$2 \times 250 = 500 \text{ m}$$

**Answer:** 500 m

**2.**

Room area:

$$9.5 \times 7.4 = 70.3 \text{ m}^2$$

Tile area:

$$20 \text{ cm} \times 10 \text{ cm} = 200 \text{ cm}^2$$

Convert room area:

$$70.3 \text{ m}^2 = 703000 \text{ cm}^2$$

Tiles needed:

$$\frac{703000}{200} = 3515$$

**Answer:** 3515 tiles

**3.**

Square side $= 70$ cm

Perimeter:

$$4 \times 70 = 280 \text{ cm}$$

Rectangle length $= 100$ cm

$$2(l + b) = 280$$
$$2(100 + b) = 280$$
$$100 + b = 140$$
$$b = 40 \text{ cm}$$

Areas:

Square:

$$70^2 = 4900 \text{ cm}^2$$

Rectangle:

$$100 \times 40 = 4000 \text{ cm}^2$$

Difference:

$$4900 - 4000 = 900 \text{ cm}^2$$

**Answer:** Square has greater area by $900 \text{ cm}^2$

**4.**

Perimeter of combined figure:

$$4 + 6 + 10 + 10 + 3 + 3 + 10 + 4 + 4 + 6$$
$$= 60 \text{ cm}$$

**Answer:** 60 cm

**5.**

Perimeter of square field:

$$200 \times 140 = 28000 \text{ cm}$$

Side:

$$\frac{28000}{4} = 7000 \text{ cm}$$
$$7000 \text{ cm} = 70 \text{ m}$$

**Answer:** 70 m

**6.**

Rectangle perimeter:

$$2(8 + 6) = 28 \text{ m}$$

Square side:

$$\frac{28}{4} = 7 \text{ m}$$

Area:

$$7^2 = 49 \text{ m}^2$$

**Answer:** $49 \text{ m}^2$

**7.**

Square floor side $= 5$ m

Area:

$$5^2 = 25 \text{ m}^2$$

**Answer:** $25 \text{ m}^2$

**Long Answer Type Questions**

**1.**

Field perimeter:

$$2(250 + 150) = 800 \text{ m}$$

Distance in 3 rounds:

$$3 \times 800 = 2400 \text{ m}$$

To cover 4 km:

$$4000 \div 800 = 5$$

**Answer:**
Distance run = 2400 m
Rounds needed = 5

**2.**

Molly's lawn:

$$2(12 + 8) = 40 \text{ m}$$

Dolly's lawn:

$$2(15 + 5) = 40 \text{ m}$$

Total fencing:

$$40 + 40 = 80 \text{ m}$$

**Answer:** 80 m

**3.**

Room area:

$$9.68 \times 6.2 = 60.016 \text{ m}^2$$

Tile area:

$$22 \text{ cm} \times 10 \text{ cm} = 220 \text{ cm}^2$$

Convert room area:

$$60.016 \text{ m}^2 = 600160 \text{ cm}^2$$

Tiles:

$$\frac{600160}{220} = 2728$$

Cost:

$$2728 \times 25 = ₹68200$$

**Answer:** ₹68,200

**4.**

Fence needed on:

- two smaller sides:

$$2 \times 4 = 8 \text{ m}$$

- one longer side:

$$10 \text{ m}$$

Total:

$$8 + 10 = 18 \text{ m}$$

Gap for entrance:

$$18 - 1 = 17 \text{ m}$$

**Answer:** 17 m

**5.**

Given:

$$AB = 8$$

Each new equilateral triangle uses midpoint, so side becomes half.

Perimeter of full figure:

$$8 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 40$$

**Answer:** 40 units

**Competency-Based Questions**

**Assertion–Reason**

**1.**

Rectangle:

$$2(20 + 10) = 60 \text{ m}$$

Assertion is true.

Reason says area is boundary length — false.

**Answer:** (c) A is true but R is false.

**2.**

Perimeter of square side 1 m:

$$4 \times 1 = 4 \text{ m}$$

Assertion false.

Reason true.

**Answer:** (d)

**Case Study Questions**

Football field dimensions:

$$76 \text{ m} \times 88 \text{ m}$$

**(i) Perimeter of WURQ**

$$2(76 + 88) = 328 \text{ m}$$

**Answer:** 328 m

**(ii)**

Areas enclosed by QRUW and WUST are equal because the line divides rectangle into two equal parts.

**Answer:** Yes

**(iii)**

Penalty area dimensions from grid:

$$16 \text{ m} \times 30 \text{ m}$$

Area:

$$16 \times 30 = 480 \text{ m}^2$$

**Answer:** $480 \text{ m}^2$

## Chapter 7 – Fractions

**NCERT CORNER**

**Figure it Out**

1. Ans: Each guava will roughly weigh ⅓ kg.

2.

Ans: The weight of each packet is ¼ kg.

3.

Ans: Each one drank ¾ glass of sugarcane juice.

4.

Ans: Together they weigh ¾ kg.

5.

Ans:

To complete this task, you'll need to ask people around you (grandparents, parents, teachers, classmates) how they refer to different fractions in your local language or dialect. Here are some examples in Hindi for common fractions:

• Quarter (¼): Paauna or Chauthai
• Half (½): Aadhaa
• Three-quarters (¾): Teen Paav
• One and a quarter (1¼): Sawa ek
• One and a half (1½): Dedh
• Two and a half (2½): Dhaai

To arrange the fractions in order from smallest to largest, we first convert them to numerical fractions:

• Quarter = 1/4
• Half = 1/2
• Three quarters = 3/4
• One and a quarter = 5/4
• One and a half = 3/2
• Two and a half = 5/2

Arranged in order from smallest to biggest:

1. Quarter = 1/4
2. Half = 1/2
3. Three quarters = 3/4
4. One and a quarter = 5/4
5. One and a half = 3/2
6. Two and a half = 5/2

**Figure it out**

1.

Ans:

Even though the pieces of chikki are divided into different shapes, they are still of the same size. Each piece represents 1/6 of the whole chikki, meaning that all the pieces have the same area, even if their shapes are different. This illustrates that fractions represent a part of a whole, regardless of the shape of the part, as long as the total area is equally divided.

Ans:

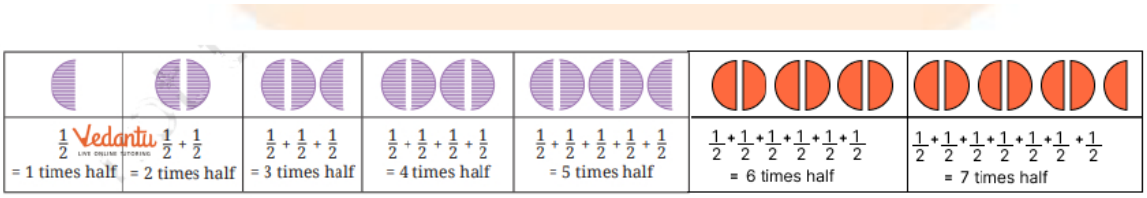
a. 1/6
b. 1/3
c. 1/3

d. 1/6
e. 1/6
f. 1/3
g. 1/6
h. 1/6

**Figure it out**

1.

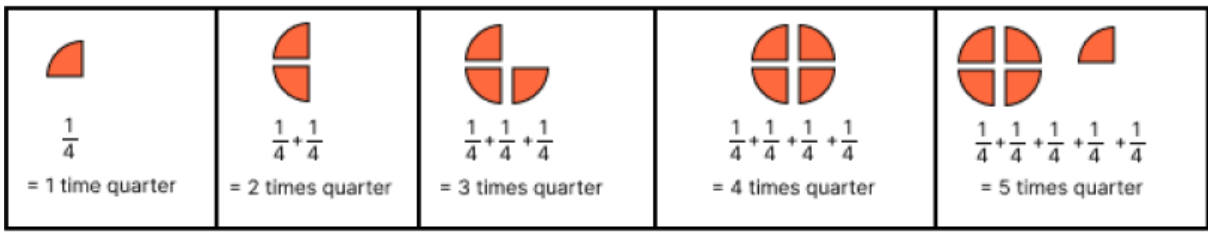
Ans:




6 times half = 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 = 6/2

7 times half = 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 = 7/2

2. Ans:

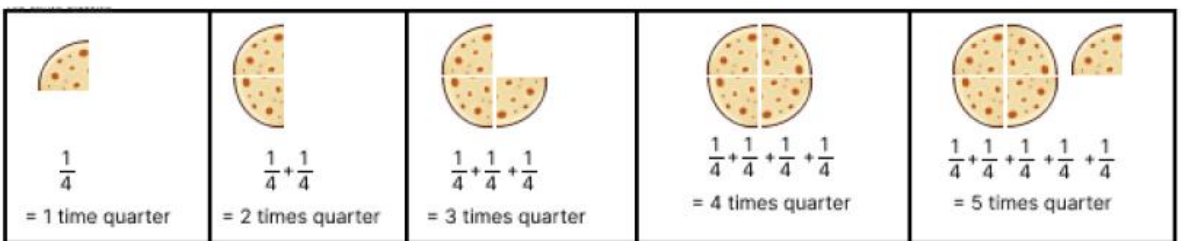



3.

Ans: Yes, by folding the strip with ⅓ marked, you can divide it further to create ⅙.

**4.**

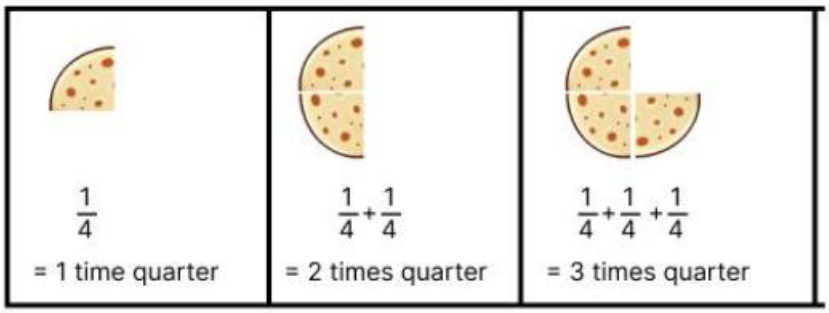
a. 5 times ¼ of a roti

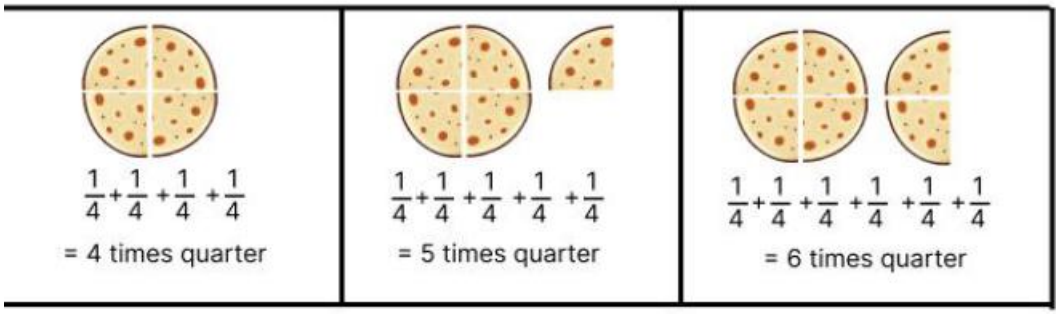


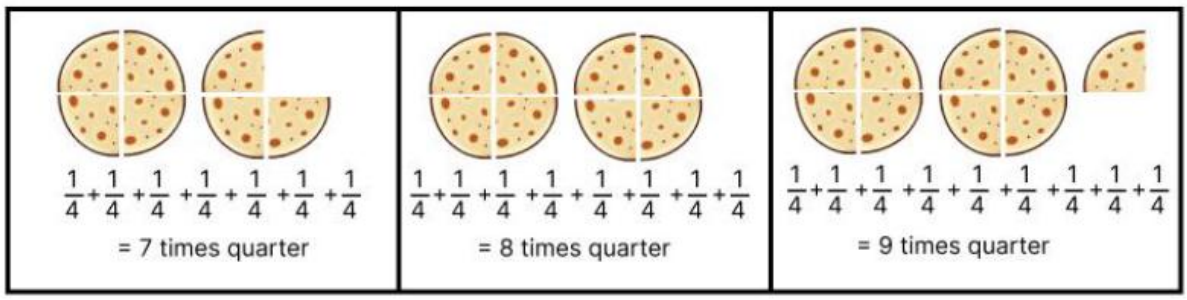
Ans:

¼ + ¼ + ¼ + ¼ + ¼ = 5/4 or 1¼

b. 9 times ¼ of a roti




Ans:

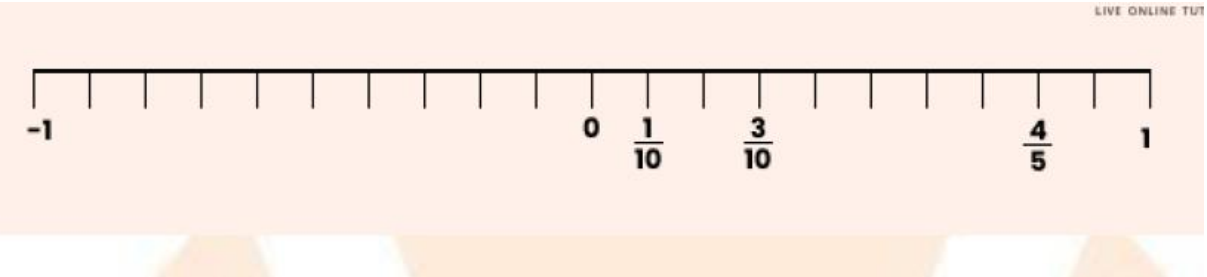
¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ = 9/4 or 2¼

**5. Ans:**

⅓: Matches with the third picture (the one with three equal parts, one shaded).
⅕: Matches with the second picture (the one with five equal parts, one shaded).
⅛: Matches with the first picture (the one with eight equal parts, one shaded).
⅙: Matches with the fourth picture (the one with six equal parts, one shaded).

**Figure it Out**

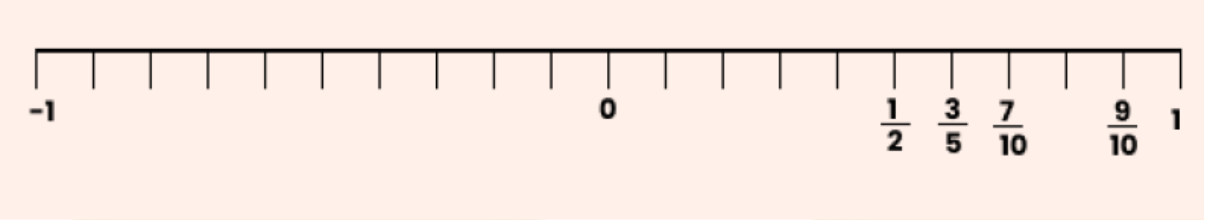
**1. Ans:**




On the number line, draw lines corresponding to the lengths 1/10, 3/10, and 4/5. These can be marked by dividing the number line into 10 equal parts and placing the fractions accordingly.

2.

Ans:




Five more fractions you can mark on the number line could be 1/2, 3/5, 7/10, 9/10, and 1.

3.

Ans:

Between 0 and 1, there are an infinite number of fractions, as you can always divide any segment of the number line into smaller parts.

Examples include 1/2, 1/3, 2/3, 4/5, and many more.

4.

Ans:


The blue line is 1/2 units long.

The black line is 2 units long. The fraction for the length of the black line is 2/1.

**5.**

Ans:

6/5
7/5
8/5
9/5

**Figure it out**

1.

Ans:

7/2 has 3 whole units and a remaining fraction of 1/2.

2.

Ans:

• 4/3 has 1 whole unit and 1/3 remaining.
• 7/3 has 2 whole units and 1/3 remaining.

**Figure it Out:**

**1. Ans:**

a. 8/3 has 2 whole units and 2/3 remaining.
b. 11/5 has 2 whole units and 1/5 remaining.
c. 9/4 has 2 whole units and 1/4 remaining.

**2.**

Ans:

Yes, all fractions greater than 1 can be written as mixed numbers, which include a whole number part and a fractional part.

**3.**

8/3 = 2 2/3
11/5 = 2 1/5
19/4 = 4 3/4
47/9 = 5 2/9
12/5 = 2 2/5
19/6 = 3 1/6

Figure it Out

**1. Ans:**

a. 3 1/4 = 13/4
b. 7 2/3 = 23/3
c. 9 4/9 = 85/9
d. 3 1/6 = 19/6
e. 2 3/11 = 25/11
f. 3 9/10 = 39/10

**Figure it Out**

1. **Are the lengths 1/2 and 3/6 equal?**

Ans:

The lengths 1/2 and 3/6 are equal because 3/6 simplifies to 1/2.

2. **Are 2/3 and 4/6 equivalent fractions? Why?**

Ans:

Yes, 2/3 and 4/6 are equivalent fractions because when you multiply both the numerator and denominator of 2/3 by 2, you get 4/6.

3. **How many pieces of length 1/6 will make a length of 1/2?**

Ans:

Three pieces of length 1/6 will make a length of 1/2, because:

3 × 1/6 = 1/2

4. **How many pieces of length 1/6 will make a length of 1/3?**

Ans:

Two pieces of length 1/6 will make a length of 1/3, because:

2 × 1/6 = 1/3

**Figure it out**

**1. Answer:**

Yes, 3/6, 4/8, and 5/10 are equivalent fractions because they all simplify to 1/2.

**2. Answer:**

Two equivalent fractions for 2/6 are:

• 1/3 (simplified by dividing the numerator and denominator by 2)
• 4/12 (multiplied both the numerator and denominator by 2)

3.

Answer:

Some equivalent fractions for 4/6 are:

• 2/3
• 8/12
• 12/18
• 16/24

**Figure it out:**

**1.**

• Fraction of roti each child gets is: 3/4

• Division fact:

3 ÷ 4 = 3/4

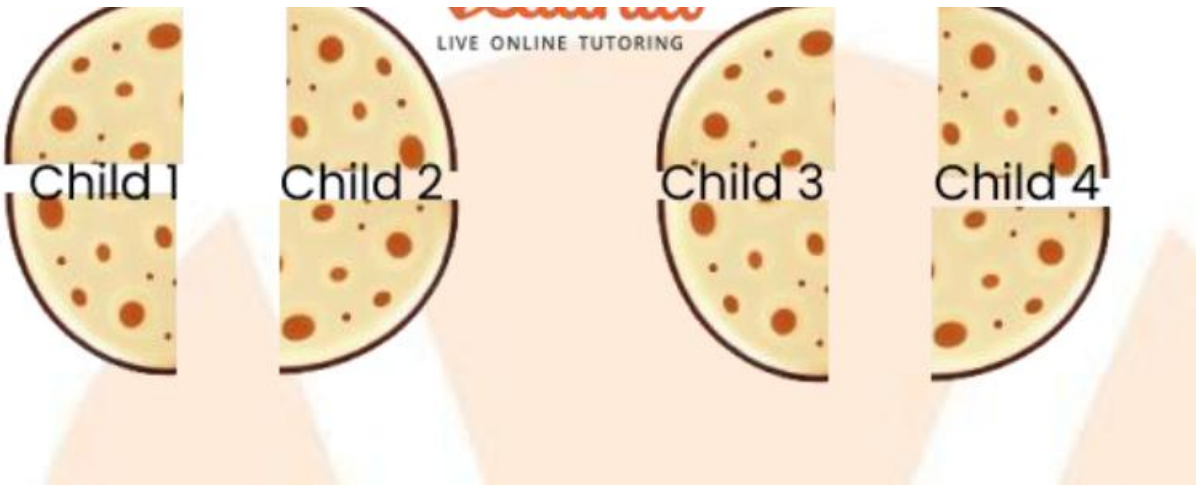
• Addition fact:

3/4 + 3/4 + 3/4 + 3/4 = 3

• Multiplication fact:

4 × 3/4 = 3

2.




Answer:

• Each child gets:

2/4 = 1/2

• Division fact:

2 ÷ 4 = 1/2

• Addition fact:

1/2 + 1/2 + 1/2 + 1/2 = 2

• Multiplication fact:

4 × 1/2 = 2

**3.**

Answer:

Anil would get 2/5 of a cake.

**Figure it out**

1. 5 glasses of juice shared equally among 4 friends is the same as 10 glasses of juice shared equally among 8 friends.

So,

5/4 = 10/8

2.

Answer:

4 kg of potatoes divided equally in 3 bags is the same as 12 kg of potatoes divided equally in 9 bags.

So,

4/3 = 12/9

3.

Answer:

7 rotis divided among 5 children is the same as 14 rotis divided among 10 children.

So,

7/5 = 14/10

**Figure it out**

a. 7/2 and 3/5

Answer:

a. Equivalent fractions: 35/10 and 6/10
b. Equivalent fractions: 16/6 and 5/6
c. Equivalent fractions: 15/20 and 12/20
d. Equivalent fractions: 30/35 and 56/35
e. Equivalent fractions: 18/8 and 20/8
f. Equivalent fractions: 9/90 and 20/90
g. Equivalent fractions: 32/12 and 33/12
h. Equivalent fractions: 39/18 and 2/18

**Figure it out:**

Express the following fractions in lowest terms:

a. 17/51

Find the GCD: The GCD of 17 and 51 is 17 (since 51 = 3 × 17).

Simplify:

17 ÷ 17 / 51 ÷ 17 = 1/3

Lowest term: 1/3

b. 64/144

Find the GCD: The GCD of 64 and 144 is 16.

Simplify:

64 ÷ 16 / 144 ÷ 16 = 4/9

Lowest term: 4/9

c. 126/147

Find the GCD: The GCD of 126 and 147 is 21.

Simplify:

126 ÷ 21 / 147 ÷ 21 = 6/7

Lowest term: 6/7

d. 527/112

Find the GCD: The GCD of 527 and 112 is 1 (no common factors).

Since the GCD is 1, it is already in the lowest terms.

527/112

Lowest term: 527/112

**Figure it out**

1.

a. 8/3 and 5/2

Answer:

8/3 > 5/2 because

8 × 2 = 16 and 5 × 3 = 15, and 16 > 15.

b. 4/9 and 3/7

Answer:

4/9 > 3/7 because

4 × 7 = 28 and 3 × 9 = 27, and 28 > 27.

c. 7/10 and 9/14

Answer:

7/10 > 9/14 because the equivalent fractions are 49/70 and 45/70, and 49 > 45.

d. 12/5 and 8/5

Answer:

12/5 > 8/5 because both fractions have the same denominator, and 12 > 8.

e. 9/4 and 5/2

Answer:

9/4 < 5/2 because

9/4 = 2.25 and 5/2 = 2.5, and 2.25 < 2.5.

2.

a. 7/10, 11/15, 2/5

Answer:

Ascending order:

2/5, 7/10, 11/15

b. 19/24, 5/6, 7/12

Answer:

Ascending order:

7/12, 19/24, 5/6

3. a. 25/16, 7/8, 13/4, 17/32

Answer:

Descending order:

13/4, 25/16, 7/8, 17/32

b. 3/4, 12/5, 7/12, 5/4

Answer:

Descending order:

12/5, 5/4, 3/4, 7/12

**Figure it out**

**1.**

a. 2/7 + 5/7 + 6/7

Answer:

Since the denominators are the same, add the numerators:

2 + 5 + 6 / 7 = 13/7

b. 3/4 + 1/3

Answer:

Find the least common denominator (LCD) of 4 and 3, which is 12:

3/4 = 9/12 and 1/3 = 4/12

9/12 + 4/12 = 13/12

c. 2/3 + 5/6

Answer:

The LCD of 3 and 6 is 6:

2/3 = 4/6

4/6 + 5/6 = 9/6 = 3/2

d. 2/7 + 2/7

Answer:

Since the denominators are the same:

2 + 2 / 7 = 4/7

e. 3/4 + 1/3 + 1/5

Answer:

The LCD of 4, 3, and 5 is 60:

3/4 = 45/60
1/3 = 20/60
1/5 = 12/60

45/60 + 20/60 + 12/60 = 77/60

f. 2/3 + 4/5

Answer:

The LCD of 3 and 5 is 15:

2/3 = 10/15
4/5 = 12/15

10/15 + 12/15 = 22/15

g. 4/5 + 3/4

Answer:

The LCD of 5 and 4 is 20:

4/5 = 16/20
3/4 = 15/20

16/20 + 15/20 = 31/20

h. 3/5 + 5/8

Answer:

The LCD of 5 and 8 is 40:

3/5 = 24/40
5/8 = 25/40

24/40 + 25/40 = 49/40

i. 9/2 + 5/4

Answer:

The LCD of 2 and 4 is 4:

9/2 = 18/4

18/4 + 5/4 = 23/4

j. 8/3 + 2/7

Answer:

The LCD of 3 and 7 is 21:

8/3 = 56/21
2/7 = 6/21

56/21 + 6/21 = 62/21

k. 3/4 + 1/3 + 1/5

Answer:

The LCD of 4, 3, and 5 is 60:

3/4 = 45/60
1/3 = 20/60
1/5 = 12/60

45/60 + 20/60 + 12/60 = 77/60

l. 2/3 + 4/5 + 7/7

Answer:

The LCD of 3, 5, and 7 is 105:

2/3 = 70/105
4/5 = 84/105
7/7 = 105/105

70/105 + 84/105 + 105/105 = 259/105

m. 9/2 + 5/4 + 7/6

Answer:

The LCD of 2, 4, and 6 is 12:

9/2 = 54/12
5/4 = 15/12
7/6 = 14/12

54/12 + 15/12 + 14/12 = 83/12

2.

Answer:

The LCD of 3 and 4 is 12:

2/3 = 8/12
3/4 = 9/12

8/12 + 9/12 = 17/12 = 1 5/12 liters of green paint.

3.

Answer:

The LCD of 5 and 4 is 20:

2/5 = 8/20
3/4 = 15/20

8/20 + 15/20 = 23/20 = 1 3/20 meters.

They have 1 meter and 3/20 meters of lace, which is more than enough to cover the 1-meter border.

**Figure it out:**

1. 5/8 − 3/8

Solution:

5/8 − 3/8 = 2/8 = 1/4

2. 7/9 − 5/9

Solution:

7/9 − 5/9 = 2/9

3. 10/27 − 1/27

Solution:

10/27 − 1/27 = 9/27 = 1/3

**Figure it out:**

1. Carry out the following subtractions using Brahmagupta's method:

a. 8/15 − 3/15

Solutions:

Since the denominators are the same:

8/15 − 3/15 = 5/15 = 1/3

b. 2/5 − 4/15

Solutions:

The least common denominator (LCD) of 5 and 15 is 15:

2/5 = 6/15

6/15 − 4/15 = 2/15

c. 5/6 − 4/9

The LCD of 6 and 9 is 18:

5/6 = 15/18
4/9 = 8/18

15/18 − 8/18 = 7/18

d. 2/3 − 1/2

The LCD of 3 and 2 is 6:

2/3 = 4/6
1/2 = 3/6

4/6 − 3/6 = 1/6

2.

a. 13/4 from 10/3

Solution:

The LCD of 4 and 3 is 12:

13/4 = 39/12
10/3 = 40/12

So,

$40/12 - 39/12 = 1/12$

b. 18/5 from 23/3

Solution:

The LCD of 5 and 3 is 15:

$18/5 = 54/15$
$23/3 = 115/15$

So,

$115/15 - 54/15 = 61/15$

c. 29/7 from 45/7

Solution:

Since the denominators are the same:

$45/7 - 29/7 = 16/7$

3.

a.

Solution:

The LCD of 10 and 2 is 10:

$7/10 - 1/2 = 7/10 - 5/10 = 2/10 = 1/5$ km

So, Jaya walks 1/5 km daily.

b.

Solution:

The LCD of 3 and 4 is 12:

$10/3 = 40/12$
$13/4 = 39/12$

Jeevika takes 40/12 minutes and Namit takes 39/12 minutes.

Namit takes less time by 1/12 minute.

## Practice Time 7.1

**1. What fraction of**

**(i) 10 min of 1 hour**

$$1 \text{ hour} = 60 \text{ min}$$
$$\frac{10}{60} = \frac{1}{6}$$

**Answer:** $\frac{1}{6}$

**(ii) 20 min of 1 hour**

$$\frac{20}{60} = \frac{1}{3}$$

**Answer:** $\frac{1}{3}$

---

**(iii) 16 h of a day**

$$1 \text{ day} = 24 \text{ h}$$
$$\frac{16}{24} = \frac{2}{3}$$

**Answer:** $\frac{2}{3}$

**2. Fraction representing shaded portion**

(i) $\frac{1}{2}$

(ii) $\frac{3}{4}$

(iii) $\frac{2}{6} = \frac{1}{3}$

(iv) $\frac{3}{7}$

**3. Fraction representing unshaded portion**

(i) $\frac{3}{4}$

(ii) $\frac{3}{4}$

(iii) $\frac{3}{5}$

(iv) $\frac{1}{3}$

(v) $\frac{3}{8}$

**5. Identify the error**

(i) Figure is divided into unequal parts, so it is **not** $\frac{1}{4}$.

(ii) Correct fraction is $\frac{2}{5}$.

**6.**

Total circles $= 6$

Without cross sign $= 4$

Fraction:

$$\frac{4}{6} = \frac{2}{3}$$

**Answer:** $\frac{2}{3}$

**7.**

Prime numbers from 1 to 11:

$$2,3,5,7,11$$

Total numbers $= 11$

Prime numbers $= 5$

Fraction:

$$\frac{5}{11}$$

**8.**

White balls:

$$15 - 11 = 4$$

Fraction white:

$$\frac{4}{15}$$

**9.**

Finished books:

$$\frac{10}{25} = \frac{2}{5}$$

**10.**

Money left:

$$10 - 7 = 3$$

Fraction left:

$$\frac{3}{10}$$

**11.**

Each bread divided into 5 equal parts.

Total pieces:

$$3 \times 5 = 15$$

Each friend gets:

$$\frac{15}{5} = 3 \text{ pieces}$$

Fraction of bread:

$$\frac{3}{5}$$

## Practice Time 7.2

**1.**

Next two steps:

$$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=2$$
$$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=\frac{5}{2}$$

**2.**

Point shown:

$$\frac{7}{11}$$

**3.**

Point A represents:

$$\frac{5}{10}=\frac{1}{2}$$

**4.**

Fractions between 1 and 2:

$$\frac{6}{5},\frac{7}{6},\frac{8}{7},\frac{9}{8},\frac{10}{9}$$

**5. Choose the proper fraction from the following: $\mathbf{7\frac{1}{2},\frac{7}{4},\frac{4}{9},8\frac{1}{3}}$**

A proper fraction has numerator smaller than denominator.

- $7\frac{1}{2}$is a mixed fraction
- $\frac{7}{4}$is improper
- $\frac{4}{9}$is proper
- $8\frac{1}{3}$is a mixed fraction

**Final Answer**

$$\frac{4}{9}$$

**6. Give a proper fraction**

**(i) Whose numerator is 7 and denominator is 15**

$$\frac{7}{15}$$

**(ii) Whose denominator is 11 and numerator is 2**

$$\frac{2}{11}$$

**(iii) Whose numerator and denominator add up to 6**

One example:

$$\frac{1}{5}$$

since $1 + 5 = 6$

**(iv) Whose denominator is 2 more than the numerator**

One example:

$$\frac{3}{5}$$

since $5 = 3 + 2$

**Final Answer**

(i) $\frac{7}{15}$

(ii) $\frac{2}{11}$

(iii) $\frac{1}{5}$

(iv) $\frac{3}{5}$

**7. Fill up using one of these: $>$, $<$, or $=$**

**(i) $\frac{1}{3} \square 1$**

$$\frac{1}{3} < 1$$

**(ii)** $\frac{3}{7} \square 1$

$$\frac{3}{7} < 1$$

**(iii)** $1 \square \frac{6}{11}$

$$1 > \frac{6}{11}$$

**(iv)** $\frac{9}{9} \square 1$

$$\frac{9}{9} = 1$$

**Final Answer**
(i) $<$
(ii) $<$
(iii) $>$
(iv) $=$

**8. Combine the following as mixed fraction**

**(i)** $7 \text{and } \frac{1}{9}$

$$7\frac{1}{9}$$

**(ii)** $6 \text{and } \frac{2}{3}$

$$6\frac{2}{3}$$

**9. Express the following as mixed fraction**

**(i)** $\frac{20}{7}$

Divide 20by 7:

$$20 \div 7 = 2 \text{ remainder } 6$$

So,

$$\frac{20}{7} = 2\frac{6}{7}$$

**(ii)** $\frac{35}{8}$

$$35 \div 8 = 4 \text{ remainder } 3$$
$$\frac{35}{8} = 4\frac{3}{8}$$

**(iii)** $\frac{113}{7}$

$$113 \div 7 = 16 \text{ remainder } 1$$
$$\frac{113}{7} = 16\frac{1}{7}$$

**10. Express the following as improper fraction**

**(i)** $2\frac{5}{9}$

$$\frac{(2 \times 9) + 5}{9} = \frac{18 + 5}{9} = \frac{23}{9}$$

**(ii)** $5\frac{3}{7}$

$$\frac{(5 \times 7) + 3}{7} = \frac{35 + 3}{7} = \frac{38}{7}$$

**(iii)** $16\frac{1}{7}$

$$\frac{(16 \times 7) + 1}{7} = \frac{112 + 1}{7} = \frac{113}{7}$$

## Practice Time 7.3

**1. Equivalent fractions**

**(i)** $\frac{3}{7}$

$$\frac{6}{7}, \frac{9}{21}, \frac{12}{28}, \frac{15}{35}$$

**(ii)** $\frac{5}{11}$

$$\frac{10}{22}, \frac{15}{33}, \frac{20}{44}, \frac{25}{55}$$

**2.**

Examples:

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$$

**3.**

$$\frac{12}{15} = \frac{4}{5}$$

Not equal to $\frac{2}{5}$

**Answer:** No

**4.**

Equivalent fractions are:

(i) and (iii)

**5.**

Equivalent fraction of $\frac{36}{63}$with numerator 4:

$$\frac{4}{7}$$

**6.**

Equivalent fraction of $\frac{5}{8}$ with denominator 56:

$$\frac{35}{56}$$

**7. Simplest form**

(i)

$$\frac{91}{26} = \frac{7}{2}$$

(ii)

$$\frac{7}{9}$$

(iii)

$$\frac{169}{196} = \frac{13}{14}$$

## Practice Time 7.4

**1.**

Like fractions:

$$\frac{4}{7}, \frac{5}{7}, \frac{2}{3} = \frac{14}{21}$$

Not like fractions.

**2.**

(i)

$$\frac{7}{5} > \frac{3}{5}$$

(ii)

$$\frac{13}{24} > \frac{6}{24}$$

**3.**

Sachin reads:

$$\frac{2}{7} \times 35 = 10$$

Apurva reads 15 pages.

So Apurva reads more.

**4. Ascending / Descending**

(i) Ascending:

$$\frac{3}{7} < \frac{4}{7} < \frac{6}{7}$$

Descending:

$$\frac{6}{7} > \frac{4}{7} > \frac{3}{7}$$

(ii) Ascending:

$$\frac{1}{11} < \frac{2}{11} < \frac{7}{11} < \frac{12}{11}$$

Descending:

$$\frac{12}{11} > \frac{7}{11} > \frac{2}{11} > \frac{1}{11}$$

**5.**

Ascending:

$$\frac{2}{19} < \frac{2}{17} < \frac{2}{13} < \frac{2}{9} < \frac{2}{7}$$

Descending:

$$\frac{2}{7} > \frac{2}{9} > \frac{2}{13} > \frac{2}{17} > \frac{2}{19}$$

**6.**

$$\frac{3}{6} = \frac{1}{2}$$
$$\frac{1}{3} < \frac{1}{2}$$

Mehak used more.

**7.**

LCM of 9 and 15 = 45

$$\frac{7}{9} = \frac{35}{45}$$
$$\frac{13}{15} = \frac{39}{45}$$
$$\frac{7}{9} < \frac{13}{15}$$

**8.**

(i)

$$\frac{7}{5} = 1\frac{2}{5} \neq \frac{9}{7} = 1\frac{2}{7}$$

(ii)

$$\frac{25}{17} \neq \frac{3}{7}$$

**9.**

Triangle:

$$\frac{3}{4}$$

Square:

$$\frac{7}{8}$$

$$\frac{7}{8} > \frac{3}{4}$$

Square has bigger shaded fraction.

**10.**

Ritesh:

$$\frac{7}{12}$$

Jitesh:

$$\frac{5}{8}$$

LCM $= 24$

$$\frac{7}{12} = \frac{14}{24}$$

$$\frac{5}{8} = \frac{15}{24}$$

Jitesh distributed more.

## Practice Time 7.5

**1.**

(i)

$$\frac{11}{15}+\frac{12}{15}=\frac{23}{15}=1\frac{8}{15}$$

(ii)

$$\frac{13}{19}+\frac{11}{19}=\frac{24}{19}=1\frac{5}{19}$$

**2.** 1

**3.**

(i)

$$\frac{19}{21}-\frac{15}{21}=\frac{4}{21}$$

(ii)

$$\frac{39}{51}-\frac{20}{51}=\frac{19}{51}$$

**4.**

Sunil:

$$\frac{700}{1000}=\frac{7}{10}$$

Neha:

$$\frac{300}{3000}=\frac{1}{10}$$

Sunil donated more.

**5.**

Distance walked:

$$2\frac{9}{10} - 1\frac{1}{4}$$
$$= \frac{29}{10} - \frac{5}{4}$$
$$= \frac{58 - 25}{20} = \frac{33}{20} = 1\frac{13}{20}$$

km

**6.**

$$5\frac{1}{2} - 3\frac{1}{2} = 2$$

**Answer:** 2 L

**7.**

(i)

$$\frac{8}{12} - \frac{5}{12} = \frac{3}{12}$$

(ii)

$$\frac{3}{16} - \frac{1}{16} = \frac{2}{16}$$

(iii)

$$\frac{8}{15} + \frac{4}{15} = \frac{12}{15}$$

(iv)

$$\frac{8}{27} - \frac{2}{27} = \frac{6}{27}$$

**8.**

$$\frac{7}{12}-\frac{5}{12}=\frac{2}{12}$$
$$\frac{10}{24}+\frac{2}{12}=\frac{10}{24}+\frac{4}{24}=\frac{14}{24}=\frac{7}{12}$$

## Practice Time 7.6

**1.**

(i)

$$\frac{8}{9}+\frac{5}{12}=\frac{32+15}{36}=\frac{47}{36}=1\frac{11}{36}$$

(ii)

$$8\frac{3}{4}+10\frac{2}{5}=19\frac{3}{20}$$

**2.**

(i)

$$\frac{7}{8}-\frac{5}{12}=\frac{21-10}{24}=\frac{11}{24}$$

(ii)

$$\frac{7}{11}-\frac{1}{3}=\frac{21-11}{33}=\frac{10}{33}$$

**3.**

$$\frac{7}{8}-\frac{1}{4}=\frac{5}{8}$$

**4.**

Spent:

$$\frac{1}{8}+\frac{3}{8}+\frac{1}{4}$$

$$= \frac{1}{8} + \frac{3}{8} + \frac{2}{8} = \frac{6}{8} = \frac{3}{4}$$

Savings:

$$1 - \frac{3}{4} = \frac{1}{4}$$

**5.**

$$\frac{5}{6} - \frac{2}{5} = \frac{25 - 12}{30} = \frac{13}{30}$$

Neharika's shelf is less by $\frac{13}{30}$.

**6.**

$$2\frac{5}{7} + 7\frac{1}{9} = 9\frac{52}{63}$$

**7.**

$$5\frac{1}{11} - 3\frac{7}{9} = \frac{56}{11} - \frac{34}{9} = \frac{504 - 374}{99} = \frac{130}{99} = 1\frac{31}{99}$$

**8**

$$2\frac{3}{20} - 1 = 1\frac{3}{20}$$

**9.**

$$4\frac{1}{4} + 7\frac{3}{4} - 3\frac{2}{4} = 8\frac{1}{2}$$

**10.**

$$5\frac{1}{3} + 6\frac{1}{5} = 11\frac{8}{15}$$

**11.**

$$\left(\frac{3}{7}+\frac{2}{3}\right)-\left(1\frac{2}{3}+\frac{5}{7}\right)$$
$$=\frac{9}{7}-\frac{16}{21}=\frac{27-16}{21}=\frac{11}{21}$$

## Exam Time

**MCQ Answers**

1. (c) $\frac{9}{23}$
2. (b) 32
3. (b) Unlike fractions
4. (d)
5. (d)
6. (a)
7. (a)
8. (a)
9. (b)
10. (a)

**Fill in the blanks**

1. whole
2. 10
3. improper
4. improper
5. mixed

**True / False**

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

**Match the Columns**

(i) → (d)
(ii) → (c)
(iii) → (a)
(iv) → (b)

**Very Short Answer Questions**

1. $$\frac{3}{1000}$$

2. $$\frac{2}{3} \times 60 = 40$$

3. $$\frac{3}{7}$$

4. $$\frac{1}{2}$$

5. Proper fractions

**Short Answer Type Questions**

**1.**

Numbers from 205 to 219 = 15 numbers

Odd numbers = 8

Fraction:

$$\frac{8}{15}$$

**2.**

$$\frac{650}{1000} = \frac{13}{20}$$

**3.**

Natural numbers:

$$1,2,3,4,5$$

Fraction:

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

Whole numbers:

$$0,1,2,3,4,5$$

Fraction:

$$\frac{5}{6}$$

**4.**

(i)

$$5\frac{1}{4} = \frac{21}{4}$$

(ii)

$$7\frac{2}{3} = \frac{23}{3}$$

**5.**

(i)

$$\frac{15}{4} = 3\frac{3}{4}$$

(ii)

$$\frac{25}{6} = 4\frac{1}{6}$$

**6.**

(i)

$$\frac{5}{7} \neq \frac{9}{12}$$

(ii)

$$\frac{7}{5} = \frac{21}{15}$$

Equivalent.

**7.**

$$\frac{2}{3} = \frac{12}{18}$$

**8.**

$$\frac{156}{60} = \frac{13}{5}$$

**9.**

$$4\frac{2}{3} < 5\frac{3}{7}$$

**10.**

(i)

$$\frac{6}{17} + \frac{3}{17} + \frac{11}{17} = \frac{20}{17} = 1\frac{3}{17}$$

(ii)

$$\frac{1}{2}+\frac{3}{4}+1\frac{1}{3}=2\frac{7}{12}$$

**11.**

$$1\frac{3}{4}+\frac{1}{2}=2\frac{1}{4}$$

**12.**

$$12\frac{1}{2}+14\frac{3}{4}=27\frac{1}{4}$$

**13.**

(i)

$$6-\frac{3}{4}=5\frac{1}{4}$$

(ii)

$$\frac{7}{12}-\frac{4}{15}=\frac{19}{60}$$

**14.**

Milk needed:

$$1-\frac{1}{3}=\frac{2}{3}$$

**15.**

$$3\frac{1}{2}-1\frac{3}{4}=1\frac{3}{4}$$

**16.**

$$5\frac{1}{2}-2\frac{3}{4}=2\frac{3}{4}$$

**Long Answer Type Questions**

**1.**

(i)

$$\frac{3300}{21000} = \frac{11}{70}$$

(ii)

$$\frac{3300}{33000} = \frac{1}{10}$$

**2.**

Cake divided into:

$$8 \times 3 = 24$$

Each small piece:

$$\frac{1}{24}$$

**3.**

Maximum energy: Rice $= 5.3J$

Least energy: Milk $= 3.0J$

Fraction:

$$\frac{3.0}{5.3} = \frac{30}{53}$$

**4.**

$$\frac{1}{4} = \frac{16}{64}$$

Rectangle divided into 64 parts.

**5.**

School X:

$$\frac{250}{750} = \frac{1}{3}$$

School Y:

$$\frac{300}{1200} = \frac{1}{4}$$

Since:

$$\frac{1}{3} > \frac{1}{4}$$

School X selected more students.

**6.**

$$3\frac{3}{4} - 2\frac{1}{2} = 1\frac{1}{4}$$

**7.**

Food available for next level:

$$1 - \frac{1}{10} = \frac{9}{10}$$

**8.**

Working years:

$$60 - 24 = 36$$

Fraction of age:

$$\frac{36}{60} = \frac{3}{5}$$

**9.**

$$150\frac{1}{4} - 40\frac{1}{5} = 110\frac{1}{20} \text{ cm}$$

## Chapter 8 – Playing With Constructions

### NCERT CORNER

### Figure it out

1. What radius should be taken in the compass to get this half circle? What should be the length of AX?

Ans:

We have AB = 8 cm.

Since the "Wavy Wave" has two equal half circles, we have AX = XB.

∴ X is the midpoint of AB.

∴ AX = 8/2 = 4 cm

Let M be the midpoint of AX.

∴ AM = MX = 4/2 = 2 cm

The centre of the half circle is M.

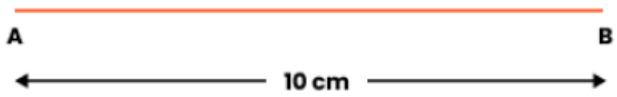
∴ Radius of half circle = AM = 2 cm

∴ The radius of the half circle is 2 cm.

2. Take a central line of a different length and try to draw the wave on it.

Ans:

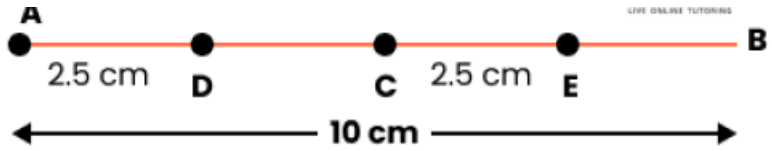
Step 1. We start with the central line of different lengths, say, 10 cm.



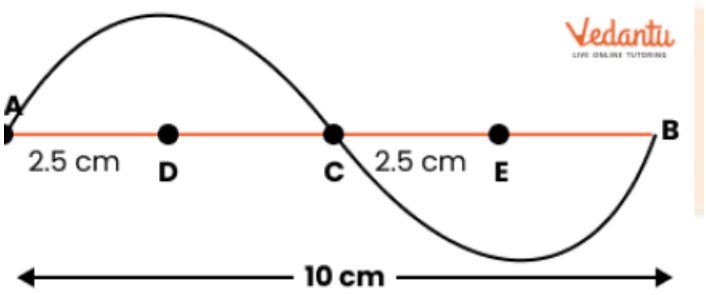

Step 2. Since 10 ÷ 2 = 5, using a ruler, take point C on AB such that AC = 5 cm. C is the midpoint of AB.

As 5 ÷ 2 = 2.5, using a ruler, take points D on AC and E on CB such that AD = 2.5 cm and CE = 2.5 cm.

D is the midpoint of AC and E is the midpoint of CB.

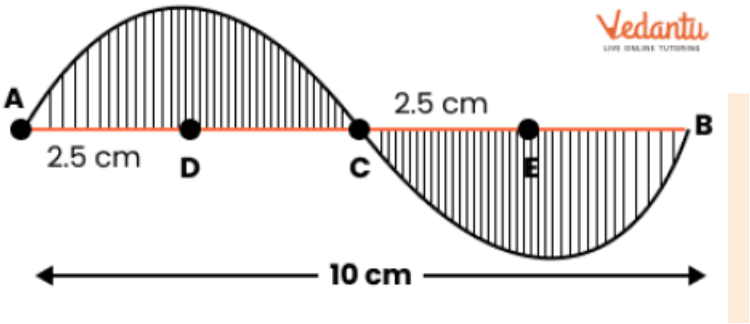



Step 3. With the centre at D, draw a half circle above the central line AB and of radius 2.5 cm. With the centre at E, draw a half circle below the central line AB and of radius 2.5 cm.




Step 4. Draw vertical lines in the half circles above and below the line AB.

Step 5. The figure represents the required depiction of the given “Wavy Wave” with the central line of length 10 cm.




3. Eyes

How do you draw these eyes with a compass?

Draw a figure in the given form to depict “Eyes”.

Ans:

Step 1. Take a line AB of length 8.5 cm (4 cm + 0.5 cm + 4 cm) as a base. Take points C and D on AB such that AC = 4 cm and AD = 4.5 cm (4 cm + 0.5 cm).

Step 2. Take points E and F on AB such that AE = 2 cm and FB = 2 cm. E is the midpoint of AC and F is the midpoint of DB.

Step 3. Using a protractor, draw perpendiculars at E and F.

Step 4. Using a ruler, take points G, H, I, and J such that EG, EH, FI, and FJ are all equal to 1.5 cm. Equal distances can also be slightly less than or greater than 1.5 cm.

Step 5. With the centre at G, draw an arc from A to C of a radius equal to AG. Similarly, with the centre at H, I, and J draw arcs of radius equal to AG. Erase the extra lines.

Step 6. At points E and F, draw two black dots of big size.

Step 7. The figure represents the required depiction of "Eyes".

**Figure It out**

1. Draw the rectangle and four squares configuration (shown in Fig. 8.3) on a dot paper. What did you do to recreate this figure so that the four squares are placed symmetrically around the rectangle? Discuss with your classmates.

Ans:

Step 1. Take a square dot paper and mark a dot on it at A. Start from A move 10 dots to the right and mark the tenth dot at B.

Step 2. Start from B and move 6 dots above B and mark the 6th dot as C. Start from A and move 6 dots above A and mark the 6th dot as D. Join AB, BC, CD, and DA.

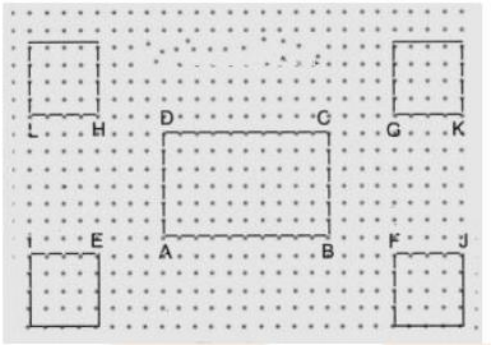
Step 3. Take points E, F, G, and H on the dot paper as shown in the figure.

Step 4. Take points I, J, K, and L at a distance of 4 dots from E, F, G, and H respectively. Join IE, FJ, GK, and LH.

Step 5. On LH and GK, construct squares above the rectangle.

Step 6. On IE and FJ, construct squares below the rectangle.

Step 7. The figure is the required configuration of one rectangle and four squares on a square dot paper.




2. Identify if there are any squares in this collection. Use measurements if needed.

Ans:

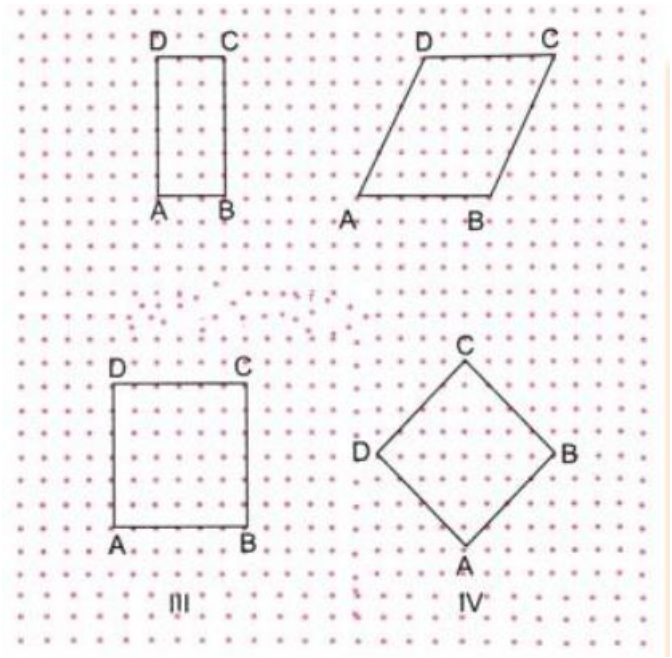



Fig. I: In this figure, AB and BC are not equal. So, ABCD cannot be a square.

Fig. II: In this figure, ∠BAD is not equal to 90°. So, ABCD cannot be a square.

Fig. III: In this figure, counting dots between sides, we find that AB, BC, CD, and DA are all equal sides. Also, the position of the dots on the sides shows that each angle of ABCD is 90°.

∴ ABCD is a square.

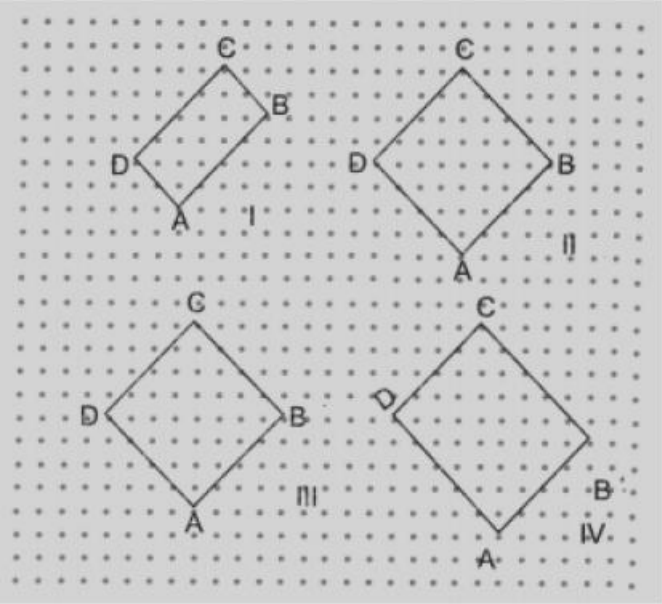
Fig. IV: In this figure, counting dots between sides, we find that AB, BC, CD, and DA are all equal sides. Also, using a protractor, we find that each angle of ABCD is 90°.

∴ ABCD is a square.

**3.** Draw at least 3 rotated squares and rectangles on a dot grid. Draw them such that their corners are on the dots. Verify if the squares and rectangles that you have drawn satisfy their respective properties.

Ans:

We draw two rotated squares and two rotated rectangles on a dot grid such that the corners of squares and rectangles are on dots.




Using a protractor, we find that all angles of figures I to IV are 90°.

Using a ruler, we find that the opposite sides of Figures I and IV are equal and all sides of Figures II and III are equal.

∴ By definition, figures I and IV are rectangles, and figures II and III are squares.

**Figure it out**

1. Draw a rectangle with sides of length 4 cm and 6 cm. After drawing, check if it satisfies both the rectangle properties.

Ans:

Step 1. Using a ruler, draw a line AB equal to 6 cm.

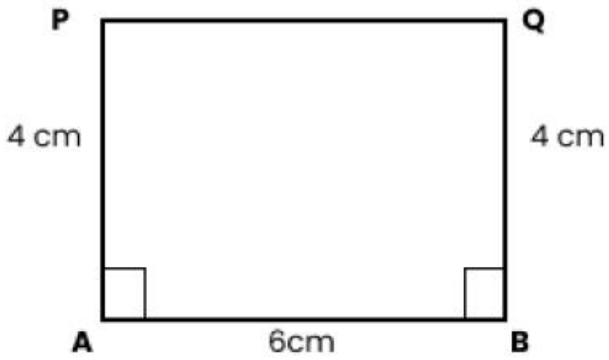
Step 2. Using a protractor, draw perpendicular lines at A and B.

Step 3. Using a ruler, mark point P on the perpendicular line at A such that AP = 4 cm. Using a ruler, mark point Q on the perpendicular line at B such that BQ = 4 cm.

Step 4. Join P and Q using a ruler. Erase the lines above P and Q.

Step 5. Using a ruler, verify that PQ is of length 6 cm.

Using a protractor, verify that ∠P and ∠Q are 90° each.




Step 6. We have:

(i) AB = PQ = 6 cm and AP = BQ = 4 cm

(ii) ∠A = ∠B = ∠Q = ∠P = 90°.

Step 7. ABQP is the required rectangle of sides 4 cm and 6 cm.

2. Draw a rectangle of sides 2 cm and 10 cm. After drawing, check if it satisfies both the rectangle properties.

Ans:

Step 1. Using a ruler, draw a line AB equal to 10 cm.

Step 2. Using a protractor, draw perpendicular lines at A and B.

Step 3. Using a ruler, mark point P on the perpendicular at A such that AP = 2 cm. Using a ruler, mark point Q on the perpendicular at B such that BQ = 2 cm.

Step 4. Join P and Q using a ruler. Erase the lines above P and Q.

Step 5. Using a ruler, verify that PQ is of length 10 cm.

Using a protractor, verify that ∠P and ∠Q are 90° each.

Step 6. We have:

(i) AB = PQ = 10 cm and AP = BQ = 2 cm

(ii) ∠A = ∠B = ∠P = ∠Q = 90°.


Step 7. ABQP is the required rectangle of sides 2 cm and 10 cm.

3. Is it possible to construct a 4-sided figure in which—

• all the angles are equal to 90º but
• opposite sides are not equal?

**Ans:**

Step 1. Using a ruler, draw a line AB equal to 6 cm, say.

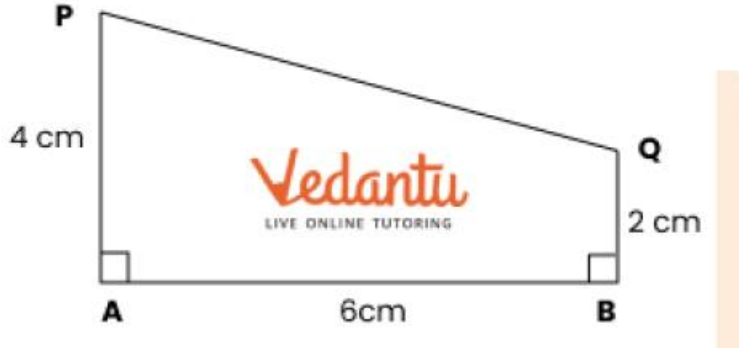
Step 2. Using a protractor, draw perpendicular lines at A and B.

Step 3. Using a ruler, mark point P on the perpendicular at A such that AP = 4 cm.

Using a ruler, mark point Q on the perpendicular at B such that BQ = 2 cm, which is not equal to AP.

Step 4. In Fig. 3, the opposite sides of AP and BQ are not equal. Join P and Q using a ruler. Erase the lines above P and Q.

Step 5. Using a protractor, we find that neither ∠P nor ∠Q is 90°.




Step 6. We conclude that it is not possible to construct a 4-sided figure in which all angles are 90° and opposite sides are not equal.

**Construct**

1. Construct a rectangle in which one of the diagonals divides the opposite angles into 50° and 40°.

**Ans:**

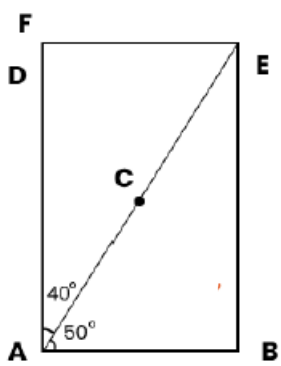
Step 1. Using a ruler, draw a line AB equal to 4 cm, say.

Step 2. Using a protractor, mark dots C and D at angles 50° and 90° (50° + 40°), keeping the central point of the protractor at A.

Step 3. Using a protractor, draw a perpendicular line to AB at B and let it intersect the extended line AC at E.

Step 4. Using a protractor, draw a perpendicular line to BE at E and let it intersect the extended line AD at F.

Step 5. Erase the extra lines.




Step 6. The figure is the required rectangle in which one of the diagonals divides the opposite angles into 50° and 40°.

2. Construct a rectangle in which one of the diagonals divides the opposite angles into 45° and 45°. What do you observe about the sides?

**Ans:**

Do it yourself.

Observation:

When the diagonal divides the opposite angles into 45° and 45°, all sides become equal.

Hence, the rectangle becomes a square.

3. Construct a rectangle one of whose sides is 4 cm and the diagonal is of length 8 cm.

**Ans:**

Step 1. Using a ruler, draw a line AB equal to 4 cm.

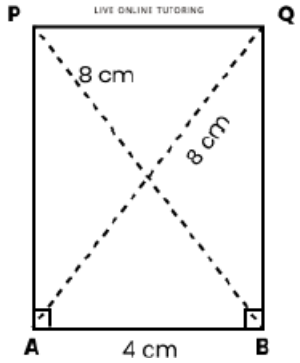
Step 2. Using a protractor, draw perpendicular lines to AB at A and B.

Step 3. With the centre at A and a radius equal to 8 cm, draw an arc to intersect the perpendicular at B.

Similarly, draw an arc of radius 8 cm with centre at B to intersect the perpendicular at A.

Step 4. Join the points of intersection of arcs by PQ.

Step 5. Erase the extra lines.




Step 6. The figure is the required rectangle with one side equal to 4 cm and diagonals of length 8 cm.

4. Construct a rectangle one of whose sides is 3 cm and the diagonal is of length 7 cm.

**Ans:**

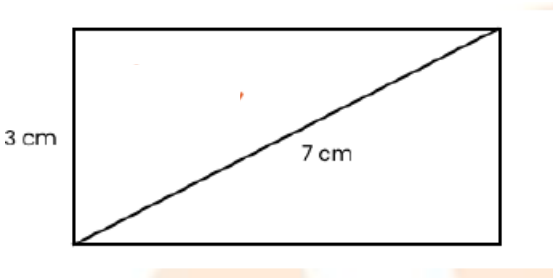
Step 1. Using a ruler, draw a line AB equal to 3 cm.

Step 2. Using a protractor, draw perpendicular lines at A and B.

Step 3. With centres at A and B and radius 7 cm, draw arcs intersecting the perpendiculars.

Step 4. Join the points of intersection to form the rectangle.

Step 5. Erase the extra lines.




Step 6. The obtained figure is the required rectangle with one side 3 cm and diagonal 7 cm.

## Practice Time 8.1

**1.**

*Step 1: Draw a circle of radius 7.3 cm*
Use a compass. Open it to 7.3 cm using a ruler and draw the circle.

*Step 2: Draw two wavy lines on a central line of 8 cm*
Draw a straight line 8 cm long. Draw smooth waves equally on both sides of the line.

*Step 3: Draw a pair of eyes*
Draw two eye shapes, each 5 cm long horizontally. Add pupils and eyelashes.

## Practice Time 8.2

1. Rectangle with base 6 cm and breadth 5 cm
   → Draw a rectangle of dimensions 6 cm × 5 cm.
2. Square of side 5 cm
   → Draw all four sides equal to 5 cm.
3. Rectangle whose diagonal divides opposite angles into 70°and 20°
   → Construct using ruler, compass and protractor.
4. Rectangle with one side 2 cm and diagonal 6 cm
   → Use diagonal and side measurements to complete the rectangle.
5. Rectangle with one side 3 cm and diagonal 8 cm
   → Draw side 3 cm and use compass radius 8 cm for the diagonal.

## Practice Time 8.3

1. Complete the rhombus of side 7 cm
   → Draw arcs from points B and C with radius 7 cm. Their intersection gives the fourth vertex. Join all sides.
2. Find points $P$and $Q$such that

$$AP = BP = QB = QA$$

with $AB = 9$cm.
→ Draw arcs from A and B with equal radius more than half of 9 cm. The two intersection points are $P$and $Q$.

## EXAM TIME

### A. Multiple Choice Questions

1. Compass
2. 90°
3. They are equal in length
4. Draw one side of the square
5. Compass

### B. Fill in the Blanks

1. centre
2. four
3. compass
4. equal and parallel
5. centre

### C. True/False

1. False
2. True

3. False
4. False
5. False

**D. Very Short Answer Questions**

1. Compass
2. 4
3. 2
4. Square
5. 360°

**E. Short Answer Type Questions**

1. Use compass set at 5.5 cm radius and draw the circle from a fixed centre.
2. Draw a 9 cm line and sketch equal waves on both sides evenly.
3. Draw two eye shapes each 6 cm long. Add pupils, eyelids and eyelashes.
4. The diagonal helps determine the remaining vertices of the rectangle accurately.
5. Use ruler, compass and protractor to make the required angles and complete the rectangle.

**F. Long Answer Type Questions**

1. Draw circle with radius 6.8 cm using ruler and compass.
2. Draw a 10 cm line and make equal symmetrical waves.
3. Draw eyes of length 4.5 cm with pupils and eyelashes.
4. Construct rectangle using 60°and 30°angle divisions.
5. Rectangle with side 3 cm and diagonal 5 cm can be constructed using compass arcs.

**Competency-Based Questions**

**Assertion–Reason**

1. Both A and R are true and R is the correct explanation of A.
2. A is true but R is false.

**Maths Booster Crossword**

**Across**

1. sides
2. diagonal
3. centre
4. equal

**Down**

1. four
2. shape
3. compass
4. rhombus

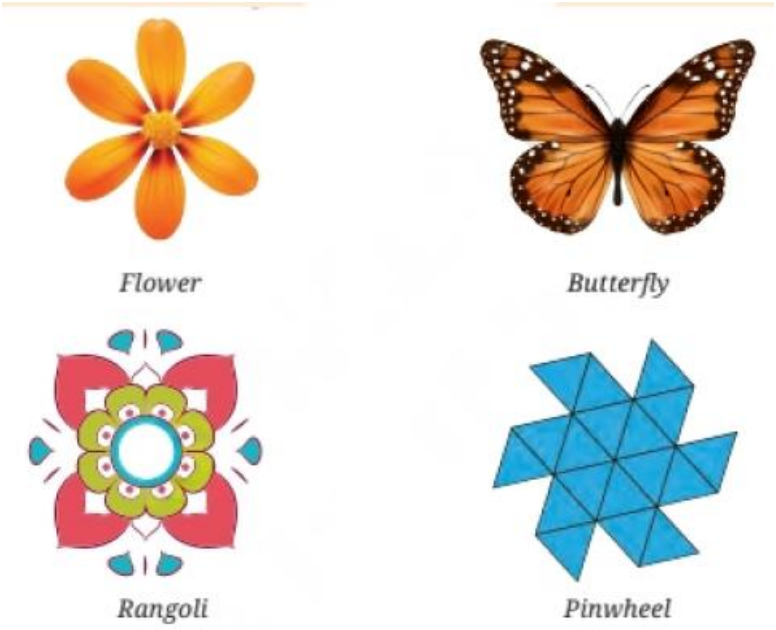
## Chapter 9 – Symmetry

**NCERT CORNER**

**Figure it Out**

1. Do you see any line of symmetry in the figures at the start of the chapter? What about in the picture of the cloud?

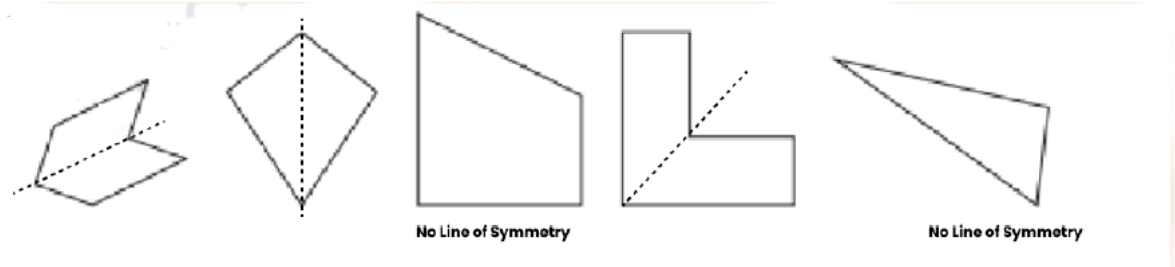
**Ans:**




• A flower exhibits 6 lines of symmetry.
• A butterfly has 1 line of symmetry.
• Rangoli patterns typically have 4 lines of symmetry.
• A pinwheel does not possess any lines of symmetry.
• A cloud's shape can vary, so it may or may not have a line of symmetry.

2. For each of the following figures, identify the line(s) of symmetry if it exists.

**Ans:**




• First figure → 1 line of symmetry
• Second figure → 1 line of symmetry
• Third figure → No line of symmetry
• Fourth figure → 1 diagonal line of symmetry
• Fifth figure → No line of symmetry

**Punching Game**

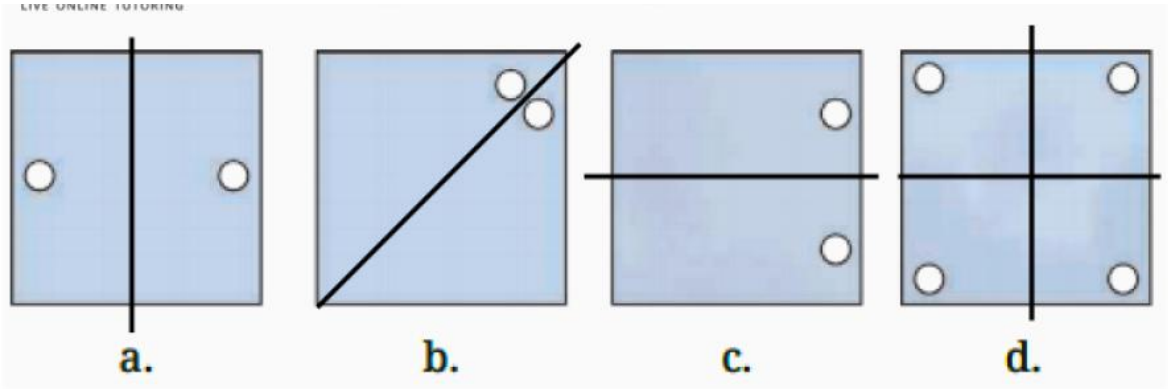
The fold is a line of symmetry. Punch holes at different locations of a folded square sheet of paper using a punching machine and create different symmetric patterns.

1. In each of the following figures, a hole was punched in a folded square sheet of paper and then the paper was unfolded. Identify the line along which the paper was folded.

Figure (d) was created by punching a single hole. How was the paper folded?

**Ans:**

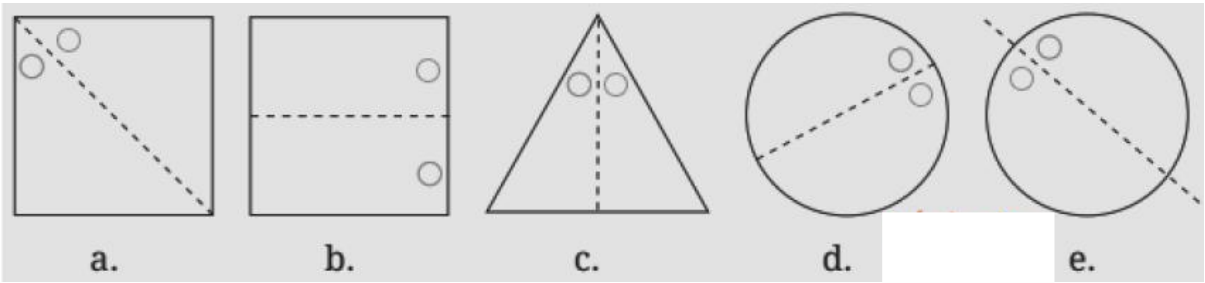
(a) Vertical fold
(b) Diagonal fold
(c) Horizontal fold
(d) Folded vertically and horizontally together.




2. Given the line(s) of symmetry, find the other hole(s).

**Ans:**

The missing holes are drawn exactly opposite to the given holes across the line of symmetry.

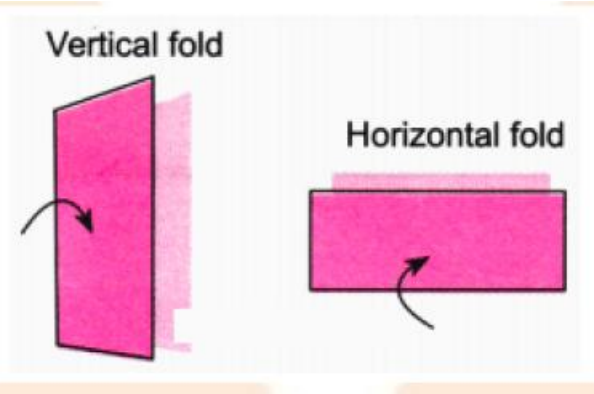



3. Here are some questions on paper cutting. Consider a vertical fold. We represent it this way:

Similarly, a horizontal fold is represented as follows.

**Ans:**

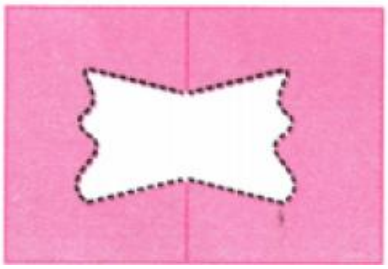
Vertical Fold → Folding paper from left to right.
Horizontal Fold → Folding paper from top to bottom.



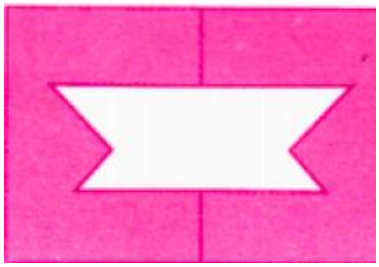

4. After each of the following cuts, predict the shape of the hole when the paper is opened. After you have made your prediction, make the cutouts and verify your answer.

**Ans:**

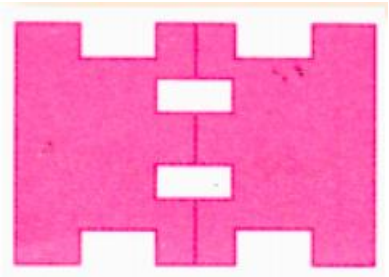
(a) Symmetric bow-shaped hole.



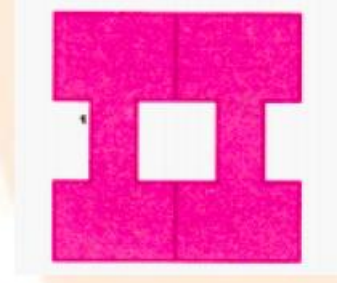
(b) Symmetric arrow-shaped hole.



(c) Symmetric rectangular cut design.



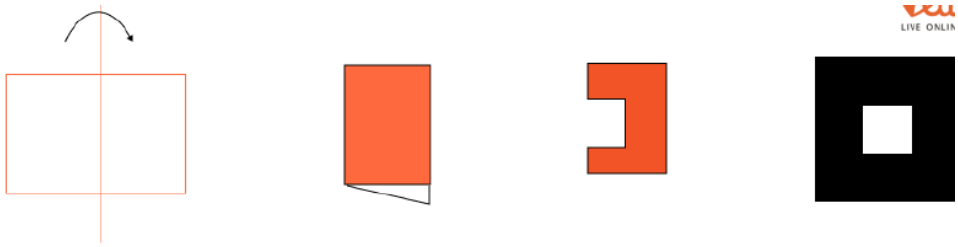
(d) Symmetric I-shaped design.



4. Suppose you have to get each of these shapes with some folds and a single straight cut. How will you do it?

a. The hole in the centre is a square.

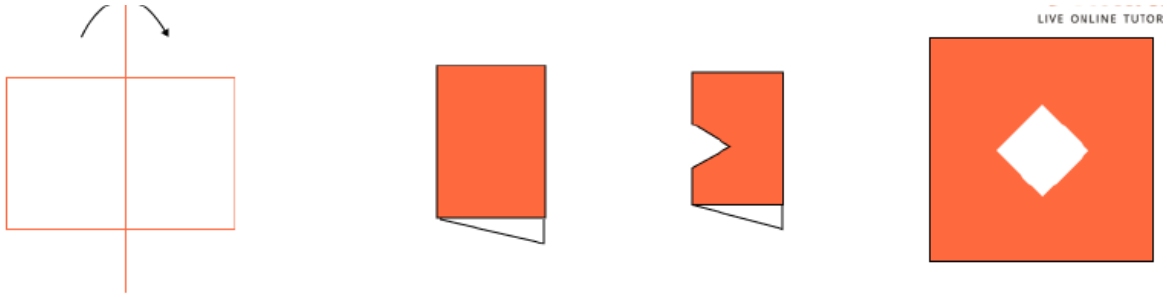
**Ans:**



Fold the paper vertically into half.
Make one straight cut in the folded paper.
On opening the paper, a square-shaped hole appears at the centre.

b. The hole in the centre is a tilted square.

**Ans:**

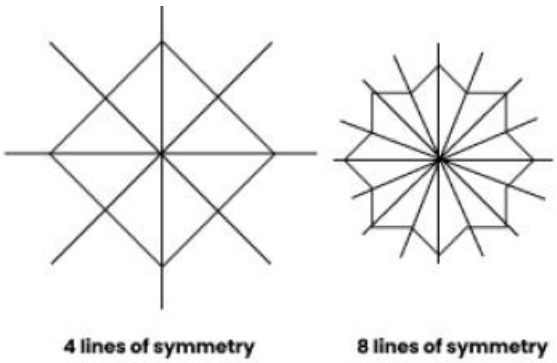



Fold the paper vertically.
Make a slant straight cut.
After opening, a diamond-shaped (tilted square) hole appears at the centre.

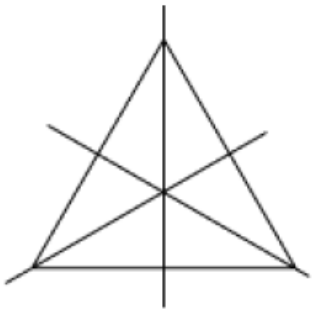
Note: For the above two questions, check if the 4-sided figures in the centre satisfy both the properties of a square.

5. How many lines of symmetry do these shapes have?

Ans:



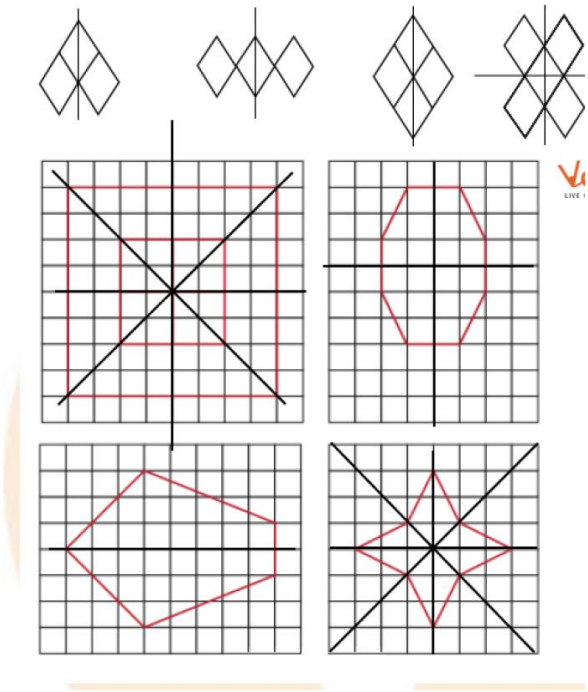

(b) A triangle with equal sides and equal angles has 3 lines of symmetry.



(c) A hexagon with equal sides and equal angles has 6 lines of symmetry.


6. Trace each figure and draw the lines of symmetry, if any.

**Ans:**

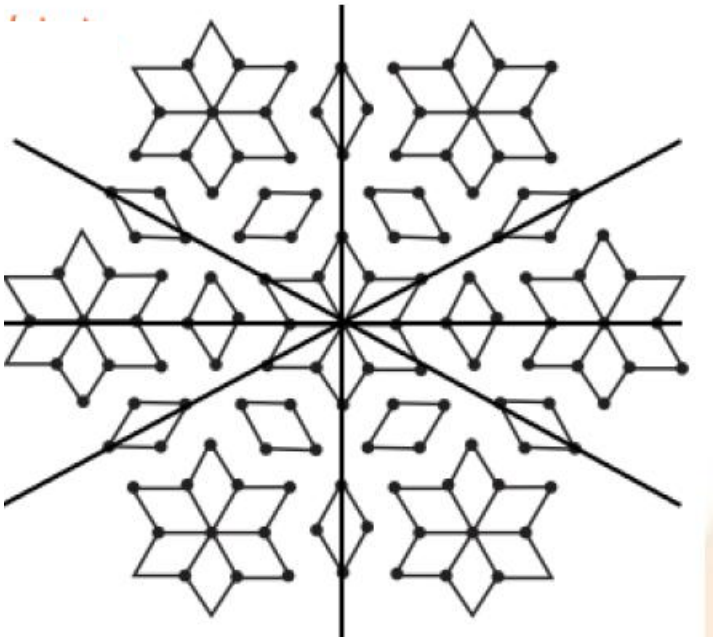


(a) First figure → 1 vertical line of symmetry
(b) Second figure → 1 vertical line of symmetry
(c) Third figure → 2 diagonal lines of symmetry
(d) Fourth figure → 2 lines of symmetry
(e) Fifth figure → 1 horizontal line of symmetry
(f) Sixth figure → 4 lines of symmetry

7. Find the lines of symmetry for the kolam below.

**Ans:**

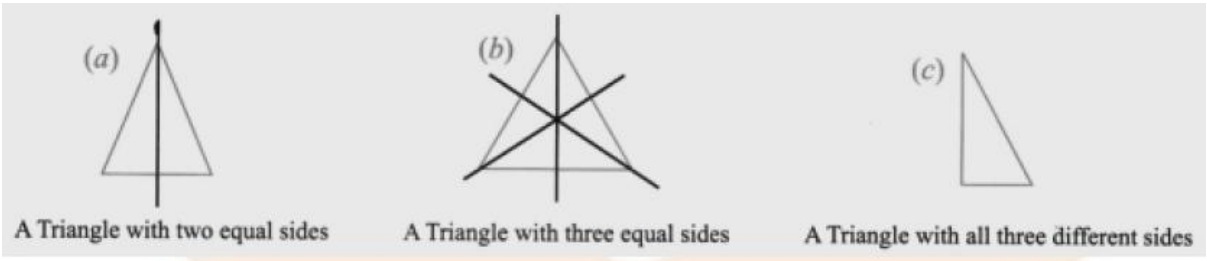
The kolam has 6 lines of symmetry.



8. Draw the following.

a. A triangle with exactly one line of symmetry.

**Ans:**




An isosceles triangle.

b. A triangle with exactly three lines of symmetry.

Ans:

An equilateral triangle.

c. A triangle with no line of symmetry.

Ans:

A scalene triangle.

Is it possible to draw a triangle with exactly two lines of symmetry?

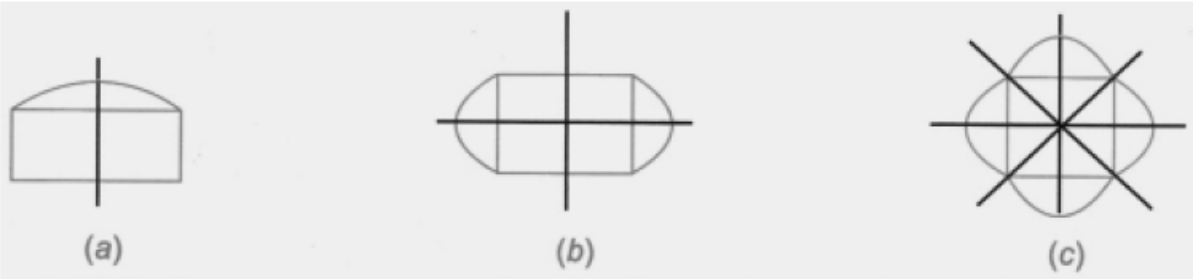
Ans:

No, it is not possible to create a triangle that has exactly two lines of symmetry.

9. Draw the following. In each case, the figure should contain at least one curved boundary.

**Ans:**

(a) Semi-circular design with one vertical symmetry line.
(b) Oval-shaped figure with two symmetry lines.
(c) Circular flower-like figure with four symmetry lines.

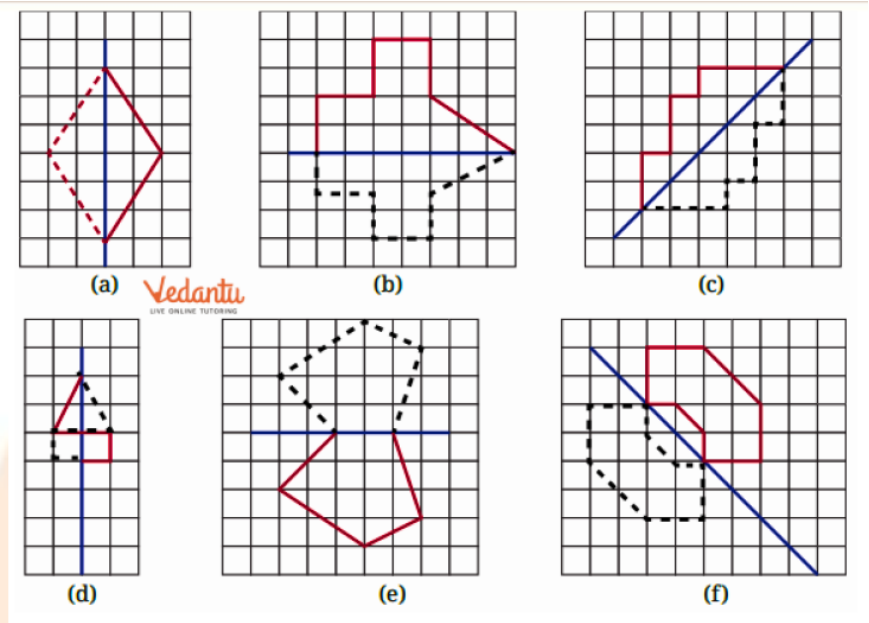



10. Copy the following on squared paper. Complete them so that the blue line is a line of symmetry. Problem (a) has been done for you.

Hint: For (c) and (f), see if rotating the book helps!

**Ans:**

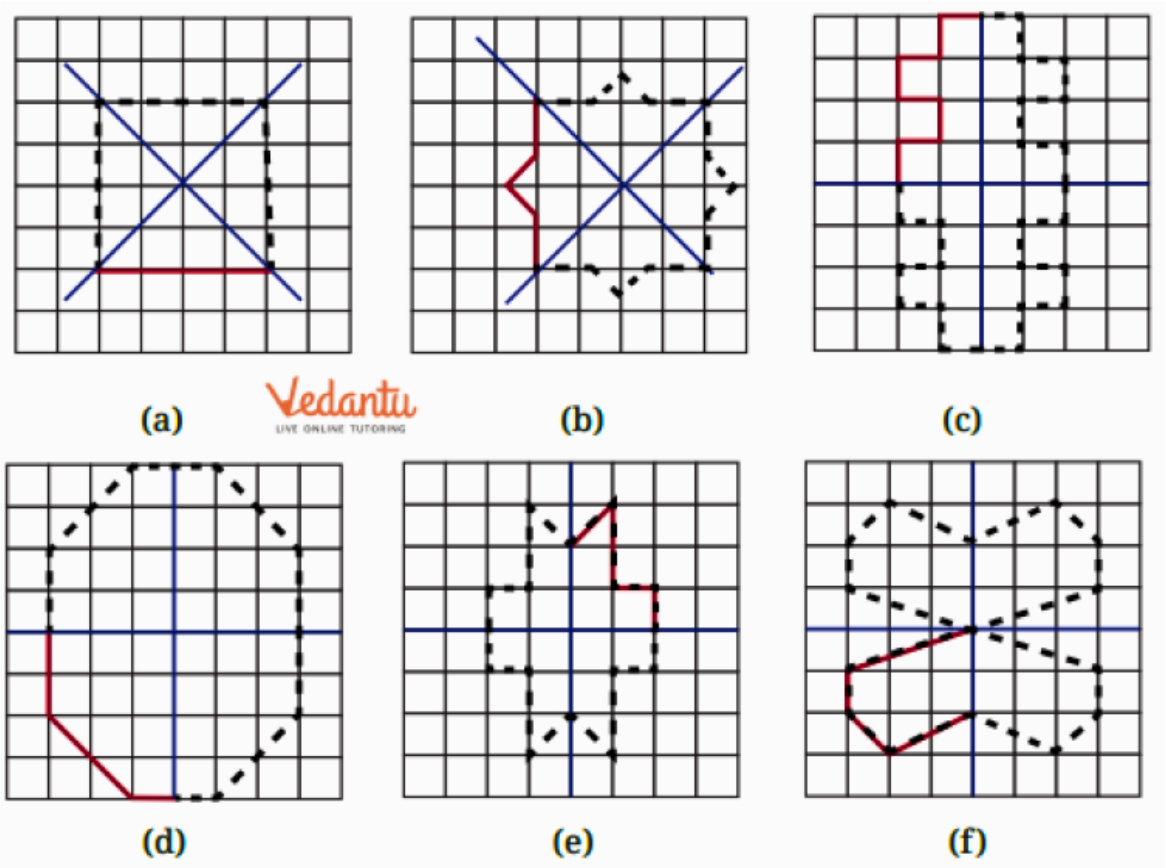
Complete each figure by drawing the mirror image of the given portion across the blue symmetry line.




11. Copy the following drawing on squared paper. Complete each one of them so that the resulting figure has the two blue lines as lines of symmetry.

Ans:

Complete the figures by reflecting the given shapes across both blue symmetry lines.




12. Copy the following on a dot grid. For each figure draw two more lines to make a shape that has a line of symmetry.

**Ans:**

Add two matching lines in each figure such that the completed figure becomes symmetric about one line.

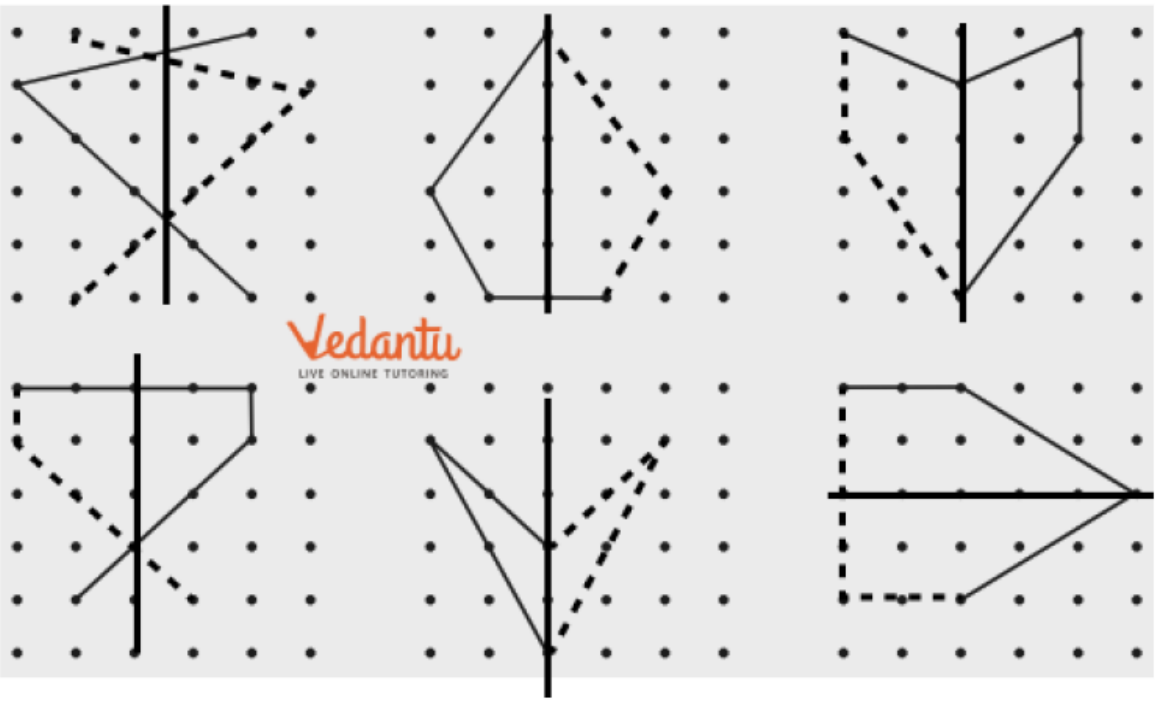
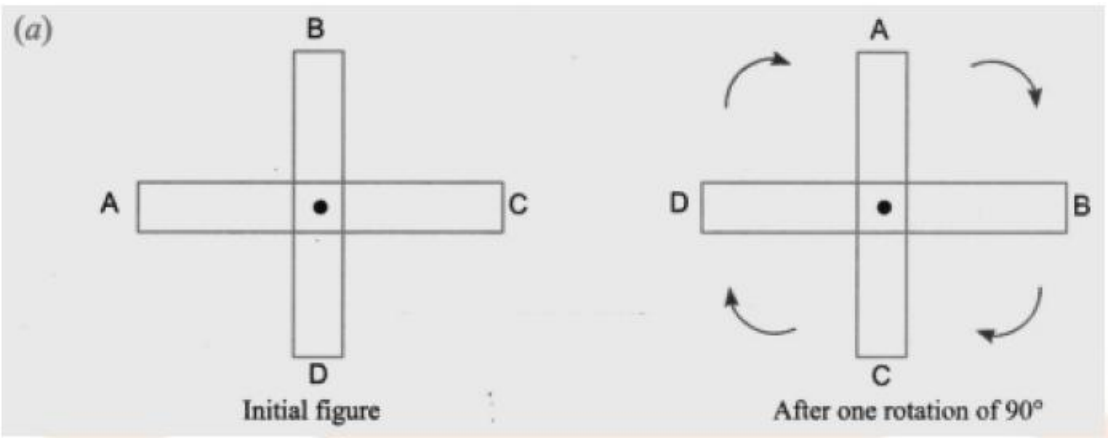



**Figure it Out**

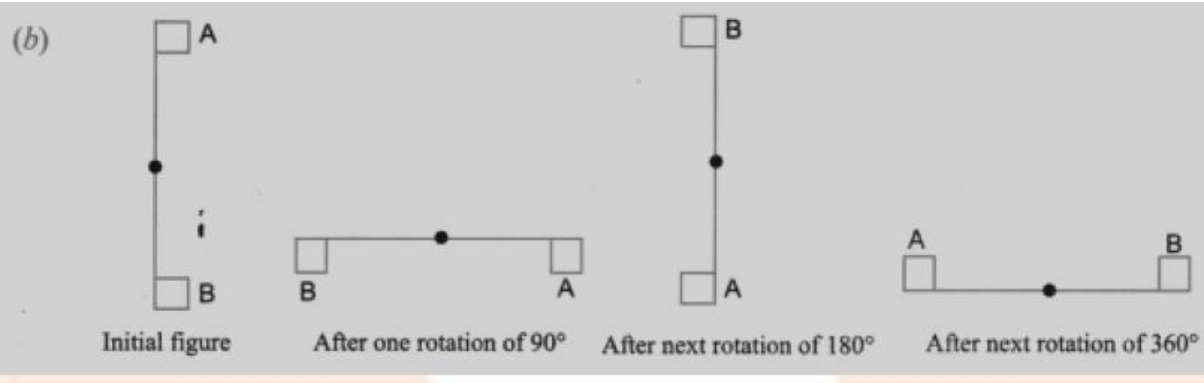
1. Find the angles of symmetry for the given figures about the point marked •.

**Ans:**

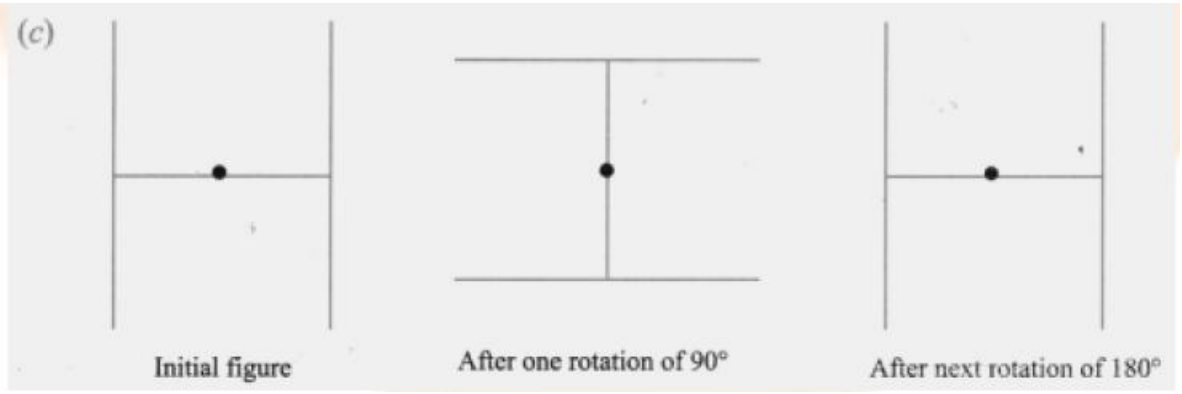
(a) After a 90° rotation, the figure remains unchanged, indicating that 90° is the angle of symmetry.




(b) A 90° rotation results in a new figure that does not overlap with the original. The figure returns to its original shape only after completing a full 360° rotation.




(c)




The figure remains unchanged after a 180° rotation, confirming that 180° is an angle of symmetry.

2. Which of the following figures have more than one angle of symmetry?

**Ans:**

All options except (g) have multiple angles of symmetry. This indicates that those figures possess various ways to rotate and maintain their original appearance.

3. Give the order of rotational symmetry for each figure.

**Ans:**

(a) 2
(b) 1
(c) 6
(d) 3
(e) 4
(f) 5

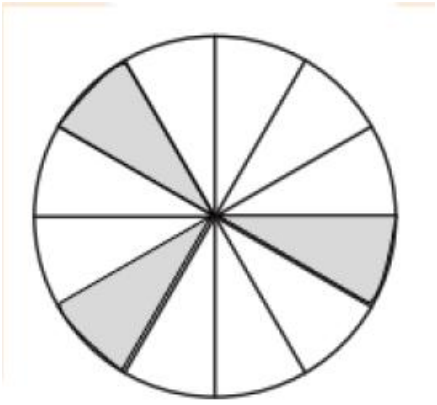
**Figure it Out**

1. Colour the sectors of the circle below so that the figure has:

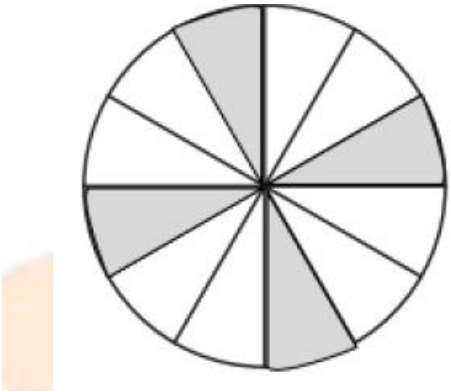
i) 3 angles of symmetry
ii) 4 angles of symmetry
iii) What are the possible numbers of angles of symmetry you can obtain by colouring the sectors in different ways?

**Ans:**

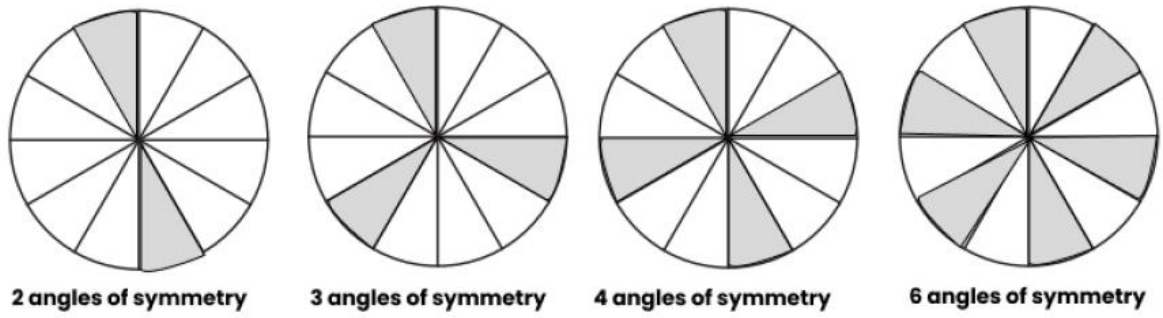
(a) It will appear the same after each 120° rotation.



(b) It will look the same after every 90° rotation.



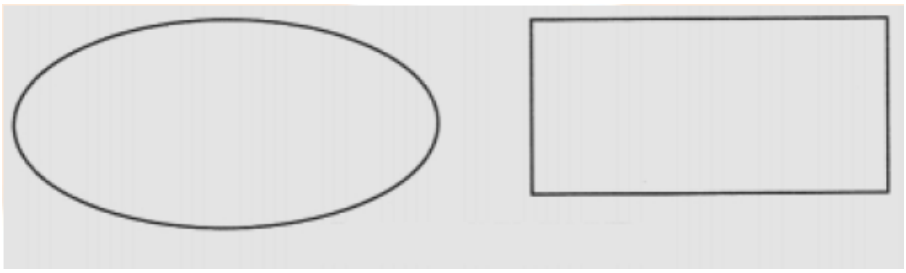
(c) There are four possible ways:
• 2 angles of symmetry
• 3 angles of symmetry
• 4 angles of symmetry
• 6 angles of symmetry




2. Draw two figures other than a circle and a square that have both reflection symmetry and rotational symmetry.

**Ans:**

• Rectangle
• Regular hexagon

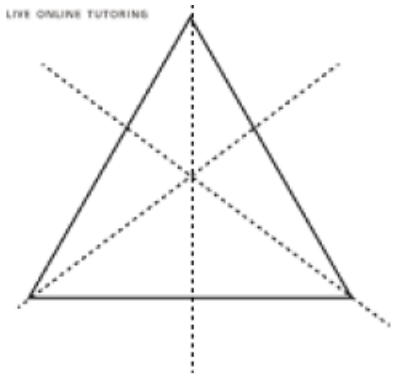


3. Draw, wherever possible, a rough sketch of:

a. A triangle with at least two lines of symmetry and at least two angles of symmetry.

**Ans:**

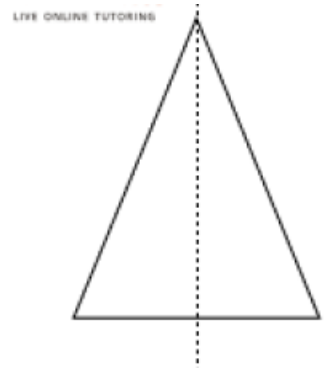
An equilateral triangle.




b. A triangle with only one line of symmetry but not having rotational symmetry.

**Ans:**

An isosceles triangle.




c. A quadrilateral with rotational symmetry but no reflection symmetry.

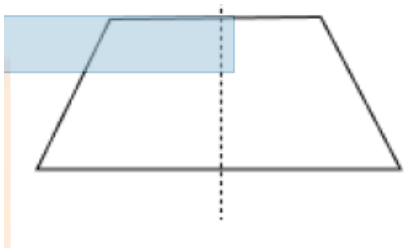
**Ans:**

A parallelogram.

d. A quadrilateral with reflection symmetry but not having rotational symmetry.

**Ans:**

A trapezium with one symmetry line.



4. In a figure, 60° is the smallest angle of symmetry. What are the other angles of symmetry of this figure?

**Ans:**

The other angles of symmetry are:

120°, 180°, 240°, 300°, and 360°.

5. In a figure, 60° is an angle of symmetry. The figure has two angles of symmetry less than 60°. What is its smallest angle of symmetry?

**Ans:**

The smallest angle of symmetry is:

$60° \div 3 = 20°$

6. Can we have a figure with rotational symmetry whose smallest angle of symmetry is:

a. 45°?

**Ans:**

Yes, because 360 is divisible by 45.

b. 17°?

**Ans:**

No, because 360 is not divisible by 17.

7. This is a picture of the new Parliament Building in Delhi.

a. Does the outer boundary of the picture have reflection symmetry? If so, draw the lines of symmetries. How many are they?

**Ans:**

The outer boundary displays reflection symmetry with 3 lines of symmetry.

b. Does it have rotational symmetry around its centre? If so, find the angles of rotational symmetry.

**Ans:**

Yes.

The smallest angle of rotation is:

$360° \div 3 = 120°$

Other rotational symmetry angles are:

240° and 360°.

## Practice Time 9.1

**1. Draw the line of symmetry**

(i) T → 1 vertical line
(ii) E → 1 horizontal line
(iii) 33 → No line of symmetry

**2. Lines of symmetry of figures**

(i) 4 lines of symmetry
(ii) 2 lines of symmetry

**3. Number of lines of symmetry**

Figure has **8** lines of symmetry.

**4. Mirror images**DO IT YOURSELF

**5.**

Correct mirror image of "SHE" is:

**EHS** (reversed in mirror form)

**6.**

Axes of symmetry = **2**
(Vertical and horizontal)

**Practice Time 9.2**

**1.**

Rotate the figure by **90°** each time to fit onto itself.

**2.**

Order of rotational symmetry = **4**

**3.**

Order of rotational symmetry = **2**

**4. Order of rotational symmetry**

(i) 2
(ii) 4

**5.**

After rotating 270° clockwise, arrow points **left**.

**6.**

Resultant figure after 240° anti-clockwise rotation is same triangle turned left side.

**7.**

Example: Rectangle
(It has line symmetry but not rotational symmetry of order more than 1.)

**8.**

A circle looks same after **any angle** of rotation.

## Practice Time 9.3

**1.**

Triangle has:

- 3 lines of symmetry
- Rotational symmetry of order 3

**2.**

The figure has **1 vertical line** of symmetry.

**3.**

Order of rotational symmetry = **1**

**4.**

Figure has:

- 4 lines of symmetry
- Rotational symmetry order = 4

**5. Table**

| Letter | Lines of Symmetry | Number | Rotational Symmetry | Order |
|---|---|---|---|---|
| Z | No | 0 | Yes | 2 |
| D | Yes | 1 | No | 1 |
| N | No | 0 | Yes | 2 |
| C | Yes | 1 | No | 1 |

**6.**

Examples: H, I, X

**7.**

Order of rotational symmetry = **4**

**8.**

(i) 4 lines, order 4
(ii) 1 line, order 1
(iii) No line, order 5

**9.**

Example: Equilateral triangle

**10.**

Other angles:
60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°, 300°, 330°, 360°

## Exam Time

**(MCQs)**

1. (b) 8
2. (c) T
3. (b) O
4. (b)
5. (c)

6. (c) 6
7. (b) 2
8. (d) 120°
9. (c) 90°
10. (b) H and S

**Fill in the blanks**

1. 1
2. Isosceles
3. 2
4. Infinite
5. Centre of rotation

**True / False**

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

**Match the Columns**

(i) → (a) 180°
(ii) → (c) 90°
(iii) → (d) 360°
(iv) → (b) sides and angles

**Very Short Answers**

1. Vertical line
2. 3
3. Mirror image of E
4. Draw reflected figure
5. A, H,I, M, O, T, U, V, W, X, Y

**Long Answers**

**1.**

Figures with lines of symmetry:

(i) 2
(ii) 1
(iii) 2
(iv) 0
(v) 1
(vi) 0
(vii) 2
(viii) 6
(ix) 2
(x) 2
(xi) 1

**2.**

Complete figure will be symmetrical about fold line.

**3.**

No, the figure does not have rotational symmetry.

**4.**

Order = 4
Angle = 90°

**5.**

Order = 3
Angle = 120°

**6.**

Order = 6
Angle = 60°

**G. Long Answer Type Questions**

**1.**

Flag of Japan has **2 lines** of symmetry.

**2.**

A → 1 vertical
B → 1 horizontal
S → none
O → infinitely many

**3.**

Yes, figure has rotational symmetry of order 4.

**4.**

Yes, order = 4

**5.**

(i) Ship wheel:

- 8 lines of symmetry
- Rotational symmetry order 8

(ii) Star:

- 5 lines of symmetry
- Rotational symmetry order 5

**Competency-Based Questions**

**Assertion Reason**

1. (a)
2. (a)

**Case Study**

(i) (a) 0
(ii) Draw 3 more congruent quadrilaterals around O
(iii) (c)

**Maths Booster**

(i) Vertical symmetry letters: A, I, H
(ii) Horizontal symmetry letter: H
(iii) Mirror image of ENGLISH → HSILGNE

Great effort uploading all pages and continuing step by step!
If you want, I can also:

- draw the symmetry lines on figures,
- make neat notebook answers,
- or solve chapter 10 too.

## Chapter 10- The Other Side of Zero

**NCERT CORNER**

**Figure it out**

Question 1.

**Solution:**
The starting floor is (+ 2)
and the number on the button pressed is (- 3).
∴ The target floor (+2) + (- 3) = + 2 – 3 = -1

Question 2

**Solution:**
(a) (-1) + (+ 4) = + 5
(b) (+4) + (+1) = +5
(c) (+ 4) + (- 3) = +1
(d) (-1) + (+ 2) = +1
(e) (-1) + (+1) = 0
(f) 0 + (+ 2) = +2
(g) 0 + (-2) = -2

Question 3.
**Solution:**
Other such expressions are:
(+3) + (-8) = -5
(+4) + (-9) = -5
(+5) + (-10) = -5
(+6) + (-11) = -5
And there could be infinite such expressions.

**Figure it out**

Evaluate these expressions by thinking of them as the resulting movement of combining button presses:
(a) (+1) + (+4) = _____
Solution:
Target floor = (+1) + (+4) = +5

(b) (+4) + (+1) = _____
Solution:
Target floor = (+4) + (+1) = +5

(c) (+4) + (-3) + (-2) = _____
Solution:
Target floor = (+4) + (-3) + (-2)
= 4 + (-5)
= -1

(d) (-1) + (+2) + (-3) = _____
Solution:
Target floor = (-1) + (+2) + (-3)
= (-4) + (2)
= -2

**Figure it Out**

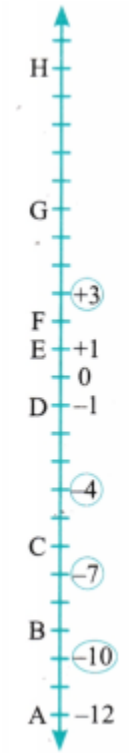
Question 1.

**Solution:**
(a) Floor – 2 is lower than the floor + 5.
So, – 2 < + 5
(b) Floor – 5 is lower than the floor + 4.
So, – 5 < + 4
(c) Floor – 5 is lower than the floor – 3.
So, – 5 < – 3
(d) Floor + 6 is higher than the floor – 6.
So, + 6 > – 6
(e) Floor 0 is higher than the floor – 4.
So, 0 > – 4
(f) Floor 0 is lower than the floor + 4.
So, 0 < + 4

Question 2.
**Solution:**

(a) -10 > -12
(b) +17 > -10
(c) 0 > – 20
(d) + 9 > – 9
(e) – 25 < – 7
(f) +15 > -17

Question 3.




**Solution:**
Floor B is 9 floors lower than Floor 0.
So, the number of Floor B is -9.
Floor C is 6 floors lower than Floor 0.
So, the number of Floor C is -6.
Floor F is 2 floors higher than Floor 0.
So, the number of Floor F is +2.
Floor G is 6 floors higher than Floor 0.
So, the number of Floor G is +6.
Floor H is 11 floors higher than Floor 0.
So, the number of Floor H is +11.

Question 4.

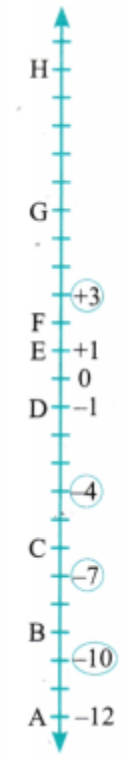



**Figure it out**

Question 1.

**Solution:**
(a) (+1) – (+4) = 1 – 4 = -3
(b) (0) – (+2) = 0 – 2 = -2
(c) (+4) – (+1) = 4 – 1 = 3
(d) (0) – (-2) = 0 + 2 = 2
(e) (+4) – (-3) = 4 + 3 = 7
(f) (-4) – (-3) = -4 + 3 = -1
(g) (-1) – (+2) = -1 – 2 = -3
(h) (-2) – (-2) = -2 + 2 = 0
(i) (-1) – (+1) = -1 – 1 = -2
(j) (+3) – (-3) = 3 + 3 = 6

**Figure it Out**

**Solution:**
(a) (+40) + _____ = +200
Solution:
Given (+40) + _____ = +200

Let (+40) + x = +200
⇒ +x = 200 – 40 = 160
∴ (+40) + (+160) = +200

(b) (+40) + _____ = -200
Solution:
Given (+40) + _____ = -200
Let (+40) + x = -200
⇒ x = -200 – 40 = -240
∴ (+40) + (-240) = -200

(c) (-50)+ _____ = +200
Solution:
Given (-50) + _____ = +200
Let (-50) + x = +200
⇒ x = +200 – (-50) = +250
∴ (-50) + (+250) = +200

(d) (-50) + _____ = -200
Solution:
Given (-50) + _____ = -200
Let (-50) + x = -200
⇒ x = -200 – (-50) = -150
∴ (-50) + (-150) = -200

(e) (-200) – (-40) = _____
Solution:
Given (-200) – (-40) = _____
Let (-200) – (-40) = x
⇒ (-200) – (-40) = -160 = x
∴ (-200) – (-40) = -160

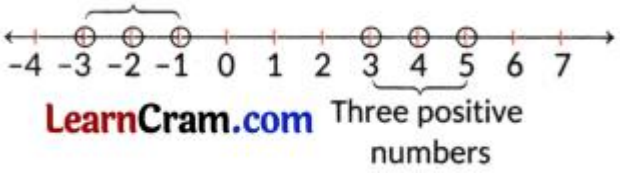
(f) (+200) – (+40) = _____
Solution:
Given (+200) – (+40) = _____
Let (+200) – (+40) = x
⇒ +160 = x
∴ (+200) – (+40) = +160

(g) (-200) – (+40) = _____
Solution:

Given (-200) – (+40) = _____
Let (-200) – (+40) = x
⇒ (-200) + (-40) = -240 = x
∴ (-200) + (-40) = -240

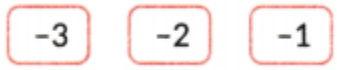
**Figure it Out**

Question 1.
**Solution:**




Question 2.

**Solution:**




Question 3.
**Solution:**
Represent the numbers 2, -3, -2 and 3 on a number line.


2 is to the right of-3 on the number line.
So, 2 > -3.
And, -2 is to the left of 3 on the number line. So, -2 < 3.

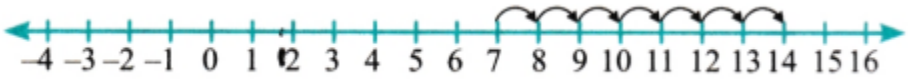
Question 4.
(i) -5 + 0
Solution:


(ii) 7 +(-7)
Solution:

(iii) -10 + 20
Solution:


(iv) 10 – 20
Solution:


(v) 7 – (-7)
Solution:




(vi) -8 – (-10)?
Solution:


**Figure it Out**

**Question 1.**

Solution:

(a) ⊕ ⊕ ⊕ ⊕ ⊕ ⊕
⊕ ⊕ ⊕ ⊕
∴ (+6) + (+4) = +10

(b) ⊖ ⊖ ⊖
⊖ ⊖

∴ (–3) + (–2) = –5

(c) ⊕⊖ ⊕⊖ ⊕⊖ ⊕⊖ ⊕⊖ ⊖ ⊖
∴ (+5) + (–7) = –2

(d) ⊖⊕ ⊖⊕ ⊕ ⊕ ⊕ ⊕
∴ (–2) + (+6) = +4

**Question 2.**
**Solution:**
(a) From the picture we see that we can remove three pairs.

This cancels out to 0.

Remaining tokens = 

Since two negative tokens is remaining, the lift attendant is on the second floor below the ground floor.

The corresponding addition statement is (+3) + (-5) = (-2)

(b) From the picture we see that we can remove three pairs.


This cancels out to 0.

Remaining tokens = 

Since three positive tokens are remaining, the lift attendant is on the third floor above the ground floor.

The corresponding addition statement is (+6) + (-3) = (+3)

**Figure it Out**

**Question 1.**

(a) (+10) – (+7)

Solution:

(+10) – (+7) = 3

(b) (-8) – (-4)

Solution:

(-8) – (-4) = -4

(c) (-9) – (-4)

Solution:

(-9) – (-4) = -5

(d) (+9) – (+12)

Solution:

Start with 9 positives.

But there are not enough tokens to take out 12 positives. So, we will add 3 extra zero pairs and then take out 12 positives.

(+9) – (+12) = -3

(e) (-5) – (-7)
Solution:
Start with 5 negatives.

But there are not enough tokens to take out 7 negatives. So, we will add 2 extra zero pairs and then take out 7 negatives.

(-5) – (-7) = +2

(f) (-2) – (-6)
Solution:
Start with 2 negatives.

But there are not enough tokens to take out 6 negatives. So, we will add 4 extra zero pairs and then take out 6 negatives.

(-2) – (-6) = +4

**Figure it Out**

**Question 1.**

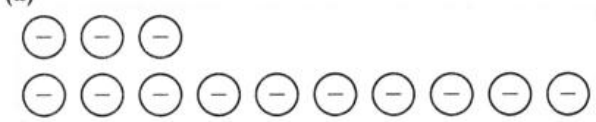
**Solution:**
You have – 3 (3 negative tokens). Subtracting + 5 means you need to remove 5 positive tokens.

Add 5 zero pairs to introduce 5 positive tokens that can be removed.
Remove the 5 positive tokens.
After removing these, you are left with 3 original negative tokens and 5 additional negative tokens.
3 original negative tokens + 5 additional negative tokens
= 8 negative tokens
So, the result is – 8 and you needed to add 5 zero pairs to perform the subtraction.
– 3 – (+ 5) = – 8

Question 2.

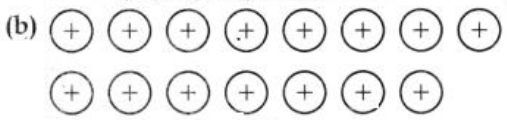
**Solution:**

(a)



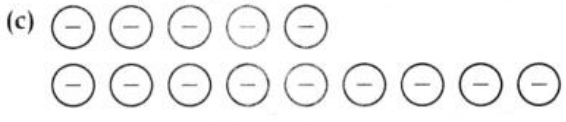
$\therefore \quad (-3) - (+10) = -13$

(b)



$\therefore \quad (+8) - (-7) = 15$

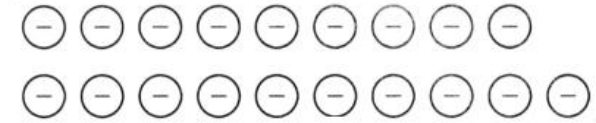
(c)



$\therefore \quad (-5) - (+9) = -14$

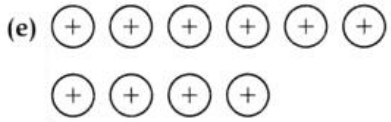


(d)



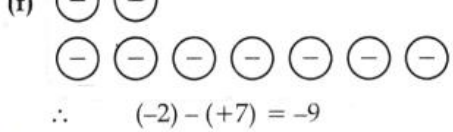
$\therefore \quad (-9) - (+10) = -19$

(e)



$\therefore \quad +6 - (-4) = +10$

(f)



$\therefore \quad (-2) - (+7) = -9$

**Figure it Out**

Question 1.

**Solution:**
Here, Credits = ₹ 30 + ₹ 40 + ₹ 50 = ₹ 120
and Debits = ₹ 40 + ₹ 50 + ₹ 60 = ₹ 150
∴ Balance = Credits – Debits
= ₹ 120 – ₹ 150
= – ₹30
Therefore, your bank account balance is – ₹ 30.

Question 2.
**Solution:**
Consider 'credits' as positive numbers and 'debits' as negative numbers.
Total credits = +256
Total debits = (-1) + (-2) + (-4) + (-8) + (-16) + (-32) + (-64)+ (-128) =-255
Account balance = Total credits + Total debits = (+256) + (-255) = +1
Hence, the account balance is ₹ 1.

Question 3.
**Solution:**
Maintaining a positive balance ensures you avoid fees or interest charges. In situations like making an investment that will quickly pay off a profit, a temporary negative balance might be worthwhile.

**Figure it Out**

Question 1.
**Solution:**
A = +1500 m
B = -500 m
C = +300 m
D = -1200 m
E = +1200 m
F = -200 m
G = +100 m

Question 2.

**Solution:**
Identify the point on the graph that reaches the height point above sea level. Point A shows the highest point. Similarly find the point that is the lowest, considering points below sea level as well. Point D shows the lowest point.

Question 3.
**Solution:**

Based on the heights we determined in question 1, arrange the points from highest to lowest (decreasing order) A > E > C > G > F > B > D and then from lowest to highest (increasing order) D < B < F < G < C < E < A.

Question 4.

**Solution:**

The highest point above sea level on Earth is the peak of Mount Everest. It stands at approximately 29,032 feet or 8,848 metres above sea level.

**Question 5.**

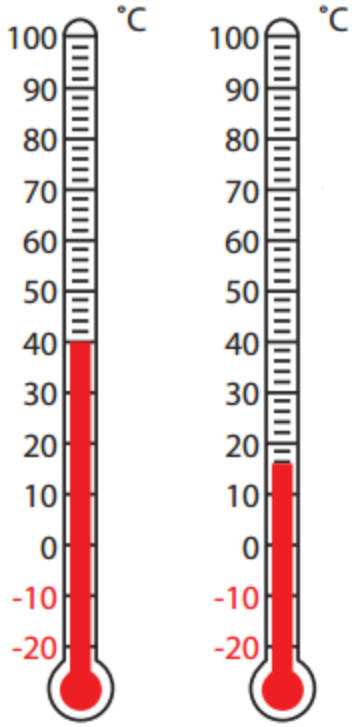
Solution:

The lowest point on land with respect to sea level is the shoreline of the Dead Sea, which is approximately 1,410 feet (430 metres) below sea level. In terms of height, we can write it as approximately -1,410 feet or -430 metres.

But the lowest point on the ocean floor is the Challenger Deep in the Mariana Trench, which is about 36,070 feet or 10,994 metres below sea level. In terms of height, we can write it as -36070 feet or -10994 metres.

**Figure it Out**

Question 1.




**Solution:**

Thangu Valley (North Sikkim), Leh, Ladakh, Spiti Valley. Dras Valley, Sinchen, etc. All these are high altitude places.

Therefore, it becomes colder there and not in other places.

**Question 2.**

| Temperature | Time |
|---|---|
| 14°C | 02:00 am |
| 8°C | 11:00 pm |
| -2°C | 02:00 pm |
| -4°C | 11:00 am |

**Answer:**
14°C → 02: 00 PM
8°C → 11:00 AM

**Figure it Out**

**Question 1.**
Do the calculations for the second grid above and find the border sum.

| | | |
|---|---|---|
| 5 | −3 | −5 |
| 0 | | −5 |
| −8 | −2 | 7 |

Solution:
5 + (-3) + (-5) = -3
(-8) + (-2) + 7 = -3
5 + 0 + (-8) = -3
(-5) + (-5) + 7 = -3

Question 2.

**Solution:**



| | | |
|---|---|---|
| −10 | 0 | 14 |
| 5 | | −5 |
| 9 | 0 | −5 |

| | | |
|---|---|---|
| 6 | 8 | −16 |
| 11 | | −5 |
| −19 | −2 | 19 |

| | | |
|---|---|---|
| 7 | −9 | −2 |
| −1 | | −5 |
| −10 | 3 | 3 |

**Solution:**
There are multiple ways to fill the last grid with a border sum of -4, here are two examples:

| | | |
|---|---|---|
| 7 | –19 | 8 |
| –2 | | –5 |
| –9 | 12 | –7 |



| | | |
|---|---|---|
| 7 | 6 | –17 |
| 8 | | –5 |
| –19 | 5 | 18 |

**Solution:**
We can also fill up the grid 1 in multiple ways. Any grid with 3 or fewer prefilled numbers can be filled in multiple ways.

**Figure it Out**

Question 1.
**Solution:**
(a) -6, -5, -4, -3, -2, -1
(b) -3, -2, -1, 0, 1, 2, 3
(c) -14, -13, -12, -11, -10, -9
(d) -29, -28, -27, -26, -25, -24

Question 2.
**Solution:**
Three numbers whose sum is – 8, are – 2, – 5, -1.

Question 3.
**Solution:**
The required numbers are – 9, 0, 7, 9 and 11.

Question 4.
**Solution:**

| | | | |
|---|---|---|---|
| 8 – 13 = –5 | (–8) – (13) = –21 | (–13) – (–8) = –5 | (–13) + (–8) = –21 |
| 8 + (–13) = –5 | (–8) – (–13) = 5 | (13) – 8 = 5 | 13 – (–8) = 21 |

Question 5.
Find the years below.
(a) From the present year, which year was it 150 years ago?
(b) From the present year, which year was it 2200 years ago?
(Hint Recall that there was no year 0.)
(c) What will be the year 320 years after 680 BCE?
**Solution:**
(a) 1874
(b) 176 BCE
(c) 360 BCE

Question 6.
Complete the following sequences:
(a) (-40), (-34), (-28), (-22) _____, _____, _____
(b) 3, 4, 2, 5, 1, 6, 0, 7, _____, _____, _____
(c) _____, _____, 12, 6, 1, (-3), (-6), _____, _____, _____
**Solution:**
(a) In this sequence, each consecutive number is obtained by adding 6 to the previous number.
The required sequence is -40, -34, -28, -22, -16, -10, -4,…..

(b) Identify the Differences Between Consecutive Terms:
3 to 4: +1
4 to 2: -2
2 to 5: +3
5 to 1: -4
1 to 6: +5
6 to 0: -6
0 to 7: +7
So, now 7 – 8 = -1
-1 + 9 = 8
8 – 10 = -2

Therefore, the required numbers are -1, 8 and -2
3, 4, 2, 5, 1, 6, 0, 7, -1, 8, -2

(c) The numbers to the right of 12 are decreasing as per the following rule:
12 to 6 = -6
6 to 1 = -5
1 to -3 = -4
-3 to -6 = -3
So, further, they should decrease as follows:
-6 – 2 = -8
-8 – 1 = -9
Now, the numbers to the left of 12 should each increase as follows:
12 + 7 = 19
19 + 8 = 27
27, 19, 12, 6, 1, (-3), (-6), -8, -9, -9

**Question 7.**
Here are six integer cards: (+1), (+7), (+18), (-5), (-2), (-9).
You can pick any of these and make an expression using addition(s) and subtraction(s).
Here is an expression: (+18) + (+1) – (+7) – (-2) which gives a value (+14).
Now, pick cards and make an expression such that its value is closer to (-30).
Solution:
Let's try to create an expression that gets as close to (-30) as possible using the given cards: (+1, +7, +18, -5, -2, -9).
One possible expression is: (-9) + (-5) + (-2) + (-18) + (+1)
Let's calculate the value step by step:

1. 1. (-9) + (-5) = -14
2. 2. -14 + (-2) = -16
3. 3. -16 + (-18) = -34
4. 4. -34 + (+1) = -33

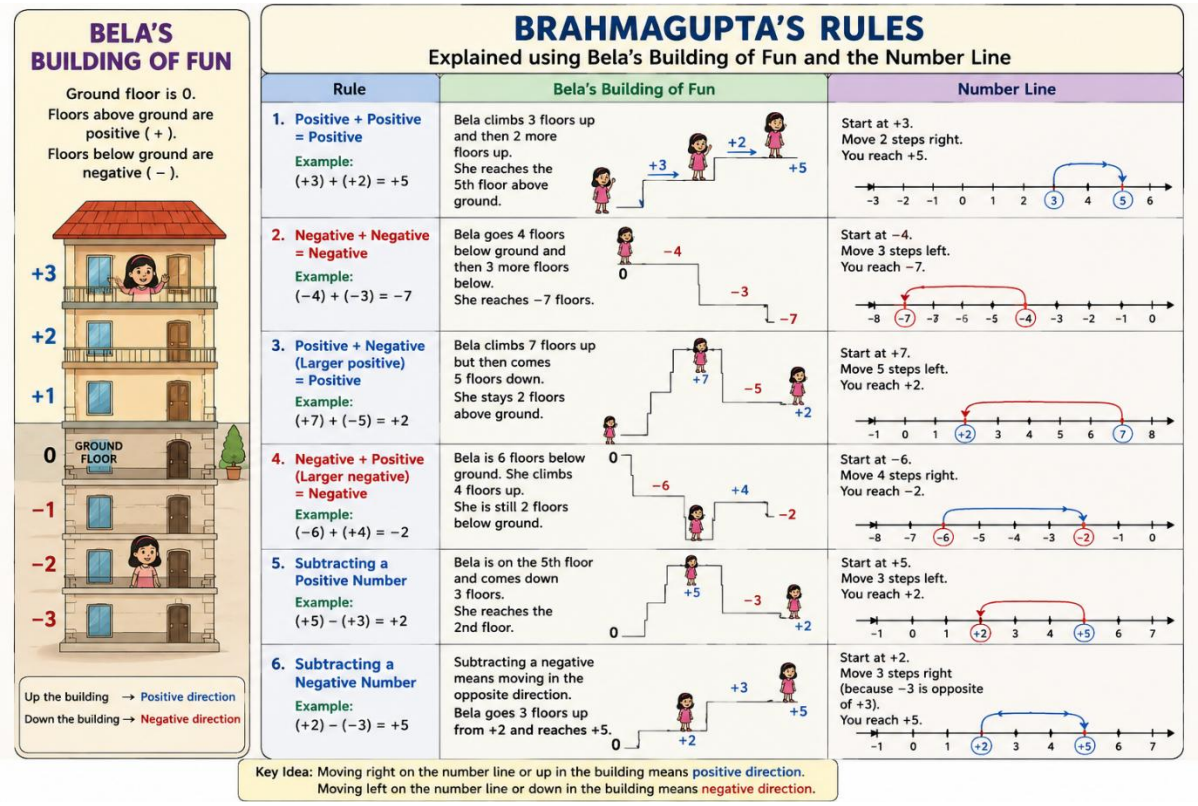
Hence, the value of this expression is (-33), which is quite close to (-30).

**Question 9.**
This string has a total of 100 tokens arranged in a particular pattern. What is the value of the string?

Solution:
The group of 5 tokens hasthe value, (+3) + (-2) = +1
There will be 20 such groups in a string of 100 tokens.
So, the total value will be +20.

**Figure it Out**

**Question 1.**
Solution:




**Question 2.**
Give your examples of each rule.
Solution:
**Rules for Addition:**
1. The sum of two positives is positive.
3 + 4 = 7

2. The sum of two negatives is negative.
(-4) + (-6) = -10

3. To add a positive number and a negative number, subtract the smaller number (without the sign) from the greater number (without the sign), and place the sign

of the greater number to obtain the result.
(-3) + 4 = 1

4. The sum of a number and its inverse is zero.
(-4) + 4 = 0

5. The sum of any number and zero is the same number.
(-7) + 0 = -7

**Rules for Subtraction:**
1. If a smaller positive is subtracted from a larger positive, the result is positive.
9 – 8 = 1

2. If a larger positive is subtracted from a smaller positive, the result is negative.
7 – 8 = -1

3. Subtracting a negative number is the same as adding the corresponding positive number.
3 – (-5) = 3 + 5 = 8

4. Subtracting a number from itself gives zero.
9 – 9 = 0

5. Subtracting zero from a number gives the same number.
8 – 0 = 8

## Practice Time 10.1

**1. Write the opposite of each**

(i) Increase in height → Decrease in height
(ii) 50 km East → 50 km West
(iii) 200 m below sea level → 200 m above sea level
(iv) Profit of ₹1000 → Loss of ₹1000
(v) Deposit of ₹2000 → Withdrawal of ₹2000

**2. Using '+' or '−' sign**

(i) A train late by 30 min → −30 min
(ii) A gain of ₹15000 → +₹15000
(iii) 2 km above the Earth surface → +2 km

(iv) 15°C below the freezing point → −15°C
(v) 1 km below sea level → −1 km

## Practice Time 10.2

### 1. Write the answer

(i) (+19)+(+3)=22
(ii) (+41)+(+46)=87
(iii) (−16)+(−11)=−27
(iv) (−27)+(−16)=−43
(v) (−16)+(+27)=11
(vi) (+37)+(−11)=26
(vii) (+9)+(−15)=−6
(viii) (+17)+(−9)=8
(ix) (+11)+(−14)=−3
(x) (−16)+(+17)=1
(xi) (−10)+(+31)=21
(xii) (+13)+(−6)=7

### 2. Find the sum

(i) 297 + (−160) = 137
(ii) −46 + 46 = 0
(iii) −360 + 180 = −180
(iv) −70 −190 +300 = 40

### 3. Find the sum

(i) (−11)+6+(−13)+7 = −11
(ii) 17+(−21)+(−23)+17 = −10
(iii) (−19)+31+35+(−16) = 31
(iv) (−41)+36+(−41)+14 = −32

### 4. Find the solution

(i) (−4)+8 = 4
(ii) (−4)+3 = −1
(iii) (−4)+(−6) = −10
(iv) (−4)+6+(−8) = −6

### 5. Write the integers

(i) 4 more than −2 = 2
(ii) 3 less than −1 = −4

(iii) 6 more than $-4 = 2$
(iv) 5 less than $4 = -1$

Note: Explained in ncert corner

## Practice Time 10.3

**1. Find the value**

(i) $35-10 = 25$
(ii) $70-79 = -9$
(iii) $-10-(-5)=-5$
(iv) $10-(-4)=14$

**2. Solve**

(i) $8+(-6)+4 = 6$
(ii) $(-9)+(-8)-(-7)=-10$
(iii) $4-(-3)+(-4)-3 = 0$
(iv) $8-(-6)+6-(-9)=29$

**3. Subtract**

(i) $-6$ from $4 = 10$
(ii) 2 from $-10 = -12$
(iii) 8 from $10 = 2$
(iv) $-11$ from $-10 = 1$

**4.**

Subtract $-10$ from the sum of 10 and 5:

$(10+5)-(-10)=25$

**5.**

Sum is 23 and one integer is $-45$.

Other integer $= 23-(-45)=68$

**6. Fill with >, < or =**

(i) $(-10)+(-9) < (-6)-(-8)$
(ii) $(-33)-(-14) < (-35)+(-14)$
(iii) $40-(-15) > 50+(-7)$
(iv) $(-22)-(-11) < (-15)-(-25)$

**7. Fill in the blanks**

(i) $(-3)+3=0$
(ii) $-6-(-16)=10$
(iii) $-8+34=26$
(iv) $19+(-19)=0$

**8. Find the value**

(i) $-9-(-10)=1$
(ii) $11-(-2)=13$
(iii) $-11-(-3)=-8$
(iv) $11-4=7$

**9. Additive inverse**

(i) $-99 \rightarrow 99$
(ii) $11 \rightarrow -11$
(iii) $-3 \rightarrow 3$
(iv) $8 \rightarrow -8$

## Practice Time 10.4

**1.**

$30000-5000+12000 = ₹37000$

**2. Arrange warmest to coolest**

$2°C, -5°C, -8°C$

So:

Kashmir → Dras → Leh

**3.**

$5°C-10°C = -5°C$

**4.**

Do it youself

**5.**

Do it youself

**6.**

A = −1200
B = 200
C = −400
D = −1000

## Exam Time

### MCQs

1. (a) +5
2. (a) 3
3. (c) 5
4. (c) −15
5. (a) A is cooler than B
6. (d) depends on values
7. (b) −4°C to 8°C
8. (c) same integer with opposite sign
9. (c) to the right of 41
10. (a) (−3,−4)

### Fill in the blanks

1. left
2. 9
3. −4870
4. 1
5. 0

### True / False

1. True
2. True
3. False

4. True
5. True

**Match the Columns**

(i) → (b) −2
(ii) → (e) −1
(iii) → (d) 1
(iv) → (a) 0
(v) → (c) 2

**Very Short Answer**

1.

(i) −100 m
(ii) −15°C

2. −1
3. 121
4. 5
5. Example: 0 and 5
6. Floor 2 ; expression: −5+(+7)=2
7. (−1)+(−4)=−5
8. −3 < −2
9. Example: −1, −2, −2

**Short Answer**

**1.**

(i) +35 km
(ii) −₹400

**2.**

Integers between −8 and −2 are:
−7, −6, −5, −4, −3

Total = 5

**3. Find the sums**

(i) −6+(−5)=−11
(ii) +4+(−3)=1

**4.**

−3+(−4)=−7

**5.**

Example: −2 and −3
Sum = −

**6.**

Pairs equidistant from 2:

(1,3), (0,4), (−1,5), (−2,6)

**7.**

(i) 0+1+2+3−4+5=7
(ii) 0−1−2−3−4+5=−5

**8.**

X+Y = 35

X= -12

So, Y = 35-(-01) = 47

Other integer = 47

**9.**

(i) −6−5=−11
(ii) −6−(−3)=−3

**10.**

(i) −2−3=−5
(ii) −3−(−5)=2

**11.**

$(+4)-(-5)=9$
Need 5 zero pairs.

**12.**

$0-5-10-20-40-80-160-320+600 = -35$

**13.**

Do it youself

**14.**

2200 years ago = 176 BC (approximately)

**Long Answer Type**

**1.**

(i) $30+(-50)+(-20)=-40$
(ii) $40+(-10)+(-15)=15$
(iii) $45-(-5)+10=60$
(iv) $60-10+5-(-5)=60$
(v) $16+(-13)+(-10)=-7$
(vi) $0+5-(-6)+(-7)=4$

**2.**

(i) +200 m
(ii) −100 m
(iii) +10 m
(iv) 0

**3.**

Example:
1, 2, 3, −1, −2, 4
Sum = 7

**4.**

Integer = 2

**5.**

Temperature at 2 PM:

$5+3-1 = 7°C$

**6.**

(a) $(+3)-(+6)=-3$
(b) $(+2)-(+5)=-3$

**7.**

$-100+(-70)=-170$

**8. Match temperatures with time**

(i) $-6°C \rightarrow$ 01:00 am
(ii) $5°C \rightarrow$ 03:00 pm
(iii) $-1°C \rightarrow$ 10:00 pm
(iv) $0°C \rightarrow$ 07:00 am

**Competency-Based Questions**

**Assertion Reason**

1. (d)
2. (c)

**Case Study**

(i) Distance Q and R = 6371 km
(ii) Position of R with reference to P = −7671 km

**Maths Booster**

(i) Possible scores:
−5 to +11

(ii) Maximum score = 11

(iii) Minimum score = −5

(iv)
$5-4+6+2+5+4+2 = 20$
Yes, winner.

(v) Minimum throws needed = 2