

Goa Board
Class VII Mathematics
Sample Paper – 4 Solution

Time: 3 hours

Total Marks: 90

Section A

1. Correct answer: D
Since 4 appears a maximum number of times, the mode is 4.
2. Correct answer: C
Let the whole number be x .
Twice of the whole number = $2x$.
9 added to twice of the whole number = $9 + 2x$.
From the given information, we have:
 $9 + 2x = 31$
 $2x = 31 - 9$
 $2x = 22$
 $x = 11$
Thus, the required whole number is 11.
3. Correct answer: A
The two triangles can be proved to be congruent by using the SAS congruency criterion.
The corresponding equal parts in triangles ABC and ADE are
 $AB = AD$; $BC = DE$; $\angle B = \angle D$
4. Correct answer: D
Since $\frac{6}{100} \times \text{number} = 240$
 $\Rightarrow \text{Number} = \frac{240 \times 100}{6} = 400$
5. Correct answer: D
There are infinite or unlimited number of rational numbers between any two rational numbers.
6. Correct answer: A
A triangle can be constructed if two sides and the included angle are given.

The angle included between BC and AC is $\angle C$, hence the answer.
7. Correct answer: C
Sphere.

8. Correct answer: A
Multiplying x^2 with 12 gives $12x^2$

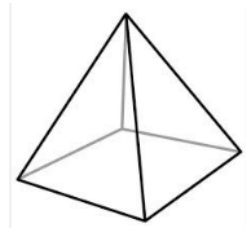
Moreover, subtracting 5 from $12x^2$ gives $12x^2 - 5$.

9. Correct answer: D

$$\frac{3^4 \times 12^2}{9} = \frac{3^4 \times 4^2 \times 3^2}{3^2} = 3^{4+2-2} \times 4^2 = 3^4 \times 4^2$$

10. Correct answer: A
1

11. Correct answer: B
Square Pyramid



12. Correct answer: D

Area of circle = πr^2

Here $r = 5\text{cm}$ then

Area = 25π

Section B

13. Given that, $m \parallel p$ and t is the transversal.

We know that if two parallel lines are cut by a transversal, each pair of alternate interior angles are equal.

So, $\angle a = \angle z$ (pair of alternate interior angles)

Thus, $\angle z = 57^\circ$.

14. The numbers in ascending order are:

11, 12, 12, 12, 19, 23, 33, 34, 34, 45, 46, 49, 50, 55, 56, 65, 67, 78, 81, 87, 98

As the number of observations (21) are odd,

Median = middle observation = 11th observation = 46

Mode is the observation that appears most often.

Here, 12 appears maximum number of times (thrice). So, 12 is the mode.

15. $725 \times (-35) + (-725) \times 65$

$$= 725 \times (-35) - 725 \times 65$$

$$= 725 \times (-35 - 65) \quad [\text{Using distributive property}]$$

$$= 725 \times (-100)$$

$$= -72500$$

16. Sum of 38 and -87 = $38 + (-87) = 38 - 87 = -49$

Subtracting (-134) from -49, we get

$$-49 - (-134) = -49 + 134 = 85$$

17. Total number of votes polled = $(1136 + 7636 + 11628) = 20400$.

Maximum votes of winning candidate = 11628

$$\text{Therefore, required percentage} = \frac{11628}{20400} \times 100 = 57\%$$

18. First, we will make all the denominators equal.

$$\text{Now } \frac{-2}{-7} = \frac{2}{7}$$

So, all the given rational number now have the same denominator.

Thus, we have to order the numerators only.

$$\text{i.e. } -11 < -5 < 1 < 2$$

Thus, the list of numbers, from least to greatest:

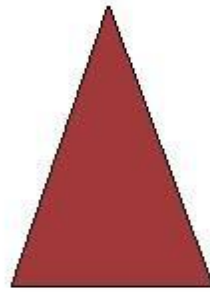
$$\frac{-11}{7} < \frac{-5}{7} < \frac{1}{7} < \frac{2}{7}$$

19. We have to solve the following expression:

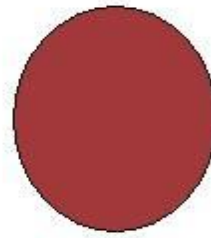
$$\begin{aligned} & (4x + 6) + (3x - 7) \\ &= 4x + 6 + 3x - 7 \\ &= (4x + 3x) + (6 - 7) \\ &= 7x - 1 \end{aligned}$$

20. The given solid is a cone.

When a cone is cut vertically, the cross-section is a triangle and when it is cut horizontally, the cross-section is a circle.



Vertical cut

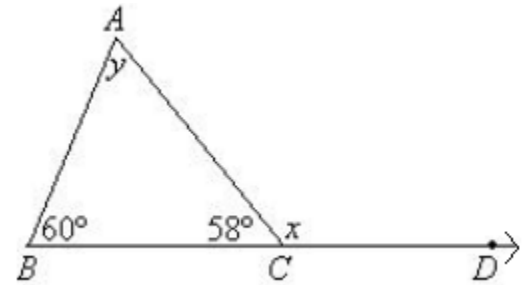


Horizontal cut

Section C

21. According to the given figure, we get:

$$\begin{aligned} x + 58^\circ &= 180^\circ \text{ (linear pair angles)} \\ x + 58^\circ - 58^\circ &= 180^\circ - 58^\circ \text{ (subtract } 58^\circ \text{ from both sides)} \\ x &= 122^\circ \\ \text{Also, } y + 60^\circ + 58^\circ &= 180^\circ \text{ (angle sum property of a triangle)} \\ y + 118^\circ &= 180^\circ \\ y &= 62^\circ \text{ (subtracting } 118^\circ \text{ from both sides)} \\ \text{Thus, } x &= 122^\circ, y = 62^\circ \end{aligned}$$



22. Given: $AD \perp BC$, $BE \perp AC$ and

$$AD = BE$$

To prove: $AE = BD$

Proof:

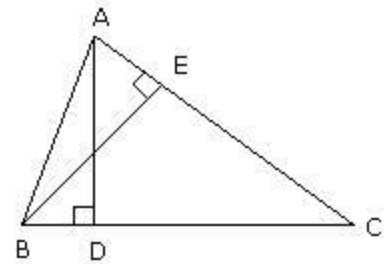
$$\angle ADB = \angle BEA \text{ (right angles)}$$

$$AB = AB \text{ (common)}$$

$$AD = BE \text{ (given)}$$

Thus, $\triangle ABD \cong \triangle BAE$ (By RHS congruence rule).

Hence, $BD = AE$ (As corresponding parts of congruent triangles are equal)



23. Let us write -3 and -1 as rational numbers with denominator 4.

$$\text{We have, } -3 = \frac{-12}{4} \text{ and } -1 = \frac{-4}{4}$$

$$\text{So, } \frac{-12}{4} < \frac{-11}{4} < \frac{-10}{4} < \frac{-9}{4} < \frac{-8}{4} < \frac{-7}{4} < \frac{-6}{4} < \frac{-5}{4} < \frac{-4}{4}$$

Or

$$-3 < \frac{-11}{4} < \frac{-10}{4} < \frac{-9}{4} < \frac{-8}{4} < \frac{-7}{4} < \frac{-6}{4} < \frac{-5}{4} < -1$$

Thus, any four rational numbers between -3 and -1 would be:

$$\frac{-10}{4}, \frac{-9}{4}, \frac{-8}{4}, \frac{-7}{4}$$

$$24. \text{SI} = \frac{P \times R \times T}{100}$$

For borrowing, $P = \text{Rs. } 5000$, $R = 4\% \text{ p.a.}$ and $T = 2 \text{ years}$

$$\text{Thus, SI (borrowing)} = \text{Rs. } \left(\frac{5000 \times 4 \times 2}{100} \right) = \text{Rs. } 400$$

For lending, $P = \text{Rs. } 5000$, $R = 6\frac{1}{4}\% = \frac{25}{4}\% \text{ p.a.}$ and $T = 2 \text{ years}$

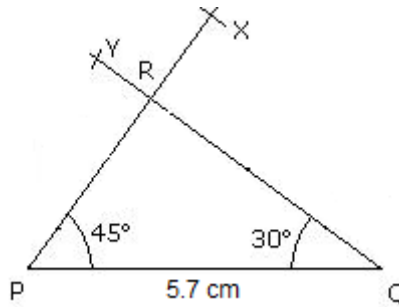
$$\text{Thus, SI (lending)} = \text{Rs. } \left(\frac{5000 \times \frac{25}{4} \times 2}{100} \right) = \text{Rs. } 625$$

Hence, Gain = Rs. $(625 - 400) = \text{Rs. } 225$ for 2 years

$$\text{Therefore, gain per year} = \text{Rs. } \left(\frac{225}{2} \right) = \text{Rs. } 112.50$$

25. Steps of construction:

1. Draw a line segment $PQ = 5.7$ cm.
2. Draw an angle of 45° at P and 30° at Q and let them intersect at R.
3. Thus, PQR is the required triangle.



26. Given that area of the rectangle = 24 m^2

Let the width of the rectangle be 'b' m

Thus, length (l) of the rectangle = $(b + 2)$ m

Area = length \times width

$$24 = (b + 2) \times b$$

$$24 = b^2 + 2b \text{ (using distributive law)}$$

$$b^2 + 2b = 24 \text{ (swap the left side with the right side)}$$

$$b^2 + 2b - 24 = 0$$

$$(b + 6) \times (b - 4) = 0$$

$$b = -6 \text{ and } b = 4$$

Because the width of the rectangle cannot be negative,

Width = 4 m and length = $4 + 2 = 6$ m

27. Time taken by Mala to drink a glass of milk = $\frac{7}{8}$ min

Time taken by Varun to drink a glass of milk = $\frac{9}{16}$ min

To compare both the fractions, we have to change them into like fractions.

$$\frac{7}{8} = \frac{7 \times 2}{8 \times 2} = \frac{14}{16}; \frac{9}{16} = \frac{9 \times 1}{16} = \frac{9}{16}$$

Since $14 > 9$, $\frac{7}{8} > \frac{9}{16}$

Thus, Mala took a longer time to finish the glass of milk.

Now, we subtract the time durations of Mala and Varun to calculate how slow Mala was than Varun.

$$\begin{aligned} &= \frac{14}{16} - \frac{9}{16} \\ &= \frac{14-9}{16} \\ &= \frac{5}{16} \text{ mins} \end{aligned}$$

Thus, Mala took $\frac{5}{16}$ mins more than Varun to finish a glass of milk.

28. While dividing one rational number with another, we multiply the rational number by the reciprocal of the other.

$$\text{a) } \frac{3}{5} \div (-2) = \frac{3}{5} \times \left(-\frac{1}{2}\right) = \frac{3 \times (-1)}{5 \times 2} = \frac{-3}{10}$$

$$\text{b) } (-7) \div \left(\frac{-5}{4}\right) = -7 \times \frac{-4}{5} = \frac{-7 \times -4}{5} = \frac{28}{5}$$

29. Given that,

Area of the circular cardboard sheet = 154 cm^2

$$\Rightarrow \pi r^2 = 154$$

$$\Rightarrow \frac{22}{7} \times r^2 = 154$$

$$\Rightarrow r^2 = \frac{7 \times 154}{22} = 49$$

$$\Rightarrow r = 7$$

Hence, the radius is 7 cm.

30. The removed number could be obtained by difference between the sum of original 6 numbers and the sum of remaining 5 numbers, i.e. = sum of original 6 numbers - sum of remaining 5 numbers

Using the formula-

Sum of terms = mean \times number of terms

Sum of original 6 numbers = $20 \times 6 = 120$

Sum of remaining 5 numbers = $15 \times 5 = 75$

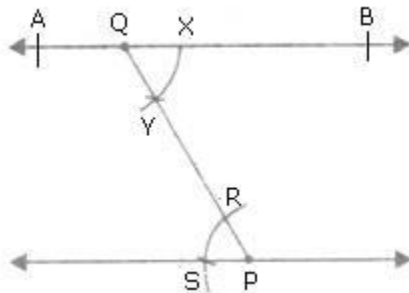
Number removed = sum of original 6 numbers - sum of remaining 5 numbers
= $120 - 75 = 45$

The number removed is 45.

Section D

31. Steps of constructions:

1. Draw a line AB of any length and take a point P below it.
2. Take any point Q on AB and join PQ.
3. Taking Q as the centre and any small radius, draw an arc XY.
4. With the same radius and P as the centre, draw an arc SR, which cut PQ at R.
5. Measure the arc XY using a compass and with same measure cut another arc from R to S.
6. Join the points PS and extend in both the directions.
7. The drawn line is the required parallel line.



32. Let Rahul's and Karan's age be $7x$ and $5x$, respectively.
After 10 yrs, their ages are $7x + 10$ and $5x + 10$, respectively.
As per the given conditions, the ratio after 10 years is 9:7.

$$\text{So, } \Rightarrow \frac{7x+10}{5x+10} = \frac{9}{7}$$

Cross-multiplying, we get

$$7(7x + 10) = 9(5x + 10)$$

$$49x + 70 = 45x + 90$$

$$49x - 45x = 90 - 70$$

$$4x = 20$$

$$x = 5$$

Therefore,

$$\text{Rahul's age} = 7 \times 5 = 35 \text{ years}$$

$$\text{Karan's age} = 5 \times 5 = 25 \text{ years}$$

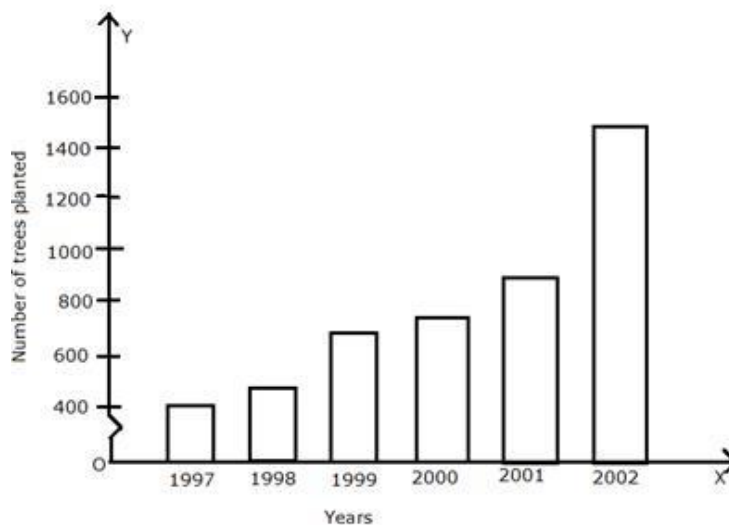
33. **Step 1:** We draw two perpendicular lines OX and OY.

Step 2: On OX, we represent years, from 1997-2002 and on OY, we represent the number of trees planted.

Step 3: On OY, we start with 400 and mark points at equal intervals of 200.

Step 4: The height of the bars are calculated according to the number of trees.

A kink (\sim) has been shown on the vertical axis showing that the marking on the vertical axis starts from zero but has been shown to start from 400 as the data needs.



34. Given that:

Perimeter of square = Perimeter of rectangle.

Length (l) of the rectangle = 10 m

Breadth (b) of the rectangle = 8 m

Perimeter of the rectangle = $2 \times (l + b) = 2 \times (10 + 8) = 2 \times 18 = 36$ m

So, perimeter of the square = 36 m

Formula for perimeter of square:

Perimeter of square = $4 \times s$

$36 = 4 \times s$ [swap both sides]

$4 \times s = 36$

$$s = \frac{36}{4} = 9 \text{ m}$$

Thus, the side of the square is 9 m.

35. Let the cost price of the bicycle be Rs. x.

SP of the bicycle at 8% gain

$$= \left(\frac{100 + \text{gain}\%}{100} \times \text{CP} \right)$$

$$= \text{Rs.} \left(\frac{100 + 8}{100} \times x \right)$$

$$= \text{Rs.} \left(\frac{108}{100} \times x \right)$$

$$= \text{Rs.} \frac{27x}{25}$$

S.P. of bicycle at 14% gain

$$= \text{Rs.} \left(\frac{100 + 14}{100} \times x \right)$$

$$= \text{Rs.} \left(\frac{114}{100} \times x \right)$$

$$= \text{Rs.} \frac{57x}{50}$$

$$\text{Next, } \frac{57x}{50} - \frac{27x}{25} = 75$$

$$\Rightarrow \frac{57x - 54x}{50} = 75$$

$$\Rightarrow 3x = (50 \times 75)$$

$$\Rightarrow x = 1250$$

Hence, cost price of the bicycle = Rs. 1250

36. Let 'a' and 'b' be the lengths of the two shorter sides.

The sum is $a + b = 49$.

So, $a = 49 - b$

Using the Pythagorean Theorem:

Perpendicular² + Base² = hypotenuse²

$(49 - b)^2 + b^2 = 41^2$ (by substitution)

$2401 - 98b + b^2 + b^2 = 1681$

$2b^2 - 98b + 720 = 0$ (take 2 common from L.H.S)

$b^2 - 49b + 360 = 0$

$(b - 9)(b - 40) = 0$

$b = 9$ or $b = 40$

In this case, either solution will do.

If $b = 9$, then $a = 49 - b = 49 - 9 = 40$.

Or if $b = 40$, then $a = 49 - b = 49 - 40 = 9$.

Thus, one side is 40 inches long, and the other side is 9 inches long.

37. Consider:

$$\begin{aligned}
 & 20x - [15x^3 + 5x^2 - \{8x^2 - (4 - 2x - x^3) - 5x^3\} - 2x] \\
 &= 20x - [15x^3 + 5x^2 - \{8x^2 - 4 + 2x + x^3 - 5x^3\} - 2x] \\
 &= 20x - [15x^3 + 5x^2 - \{8x^2 - 4 + 2x - 4x^3\} - 2x] \\
 &= 20x - [15x^3 + 5x^2 - 8x^2 + 4 - 2x + 4x^3 - 2x] \\
 &= 20x - [19x^3 - 3x^2 - 4x + 4] \\
 &= 20x - 19x^3 + 3x^2 + 4x - 4 \\
 &= -19x^3 + 3x^2 + 24x - 4
 \end{aligned}$$

38. We have to first solve the bracket terms and then check for any common factors between the numerator and the denominator and then cancel them out.

$$\begin{aligned}
 \text{(a)} \quad \frac{-15}{35} \times \left(\frac{27}{-63} \div \frac{81}{14} \right) &= \frac{-15}{35} \times \left(\frac{27}{-63} \times \frac{14}{81} \right) \\
 &= \frac{-15}{35} \times \left(\frac{1}{-9} \times \frac{2}{3} \right) \\
 &= \frac{-15}{35} \times \left(\frac{2}{-27} \right) \\
 &= \frac{-3}{7} \times \frac{-2}{27} \\
 &= \frac{-1}{7} \times \frac{-2}{9} \\
 &= \frac{2}{63}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \left(\frac{-2}{-72} \div \frac{4}{9} \right) \div \frac{-6}{14} &= \left(\frac{2}{72} \times \frac{9}{4} \right) \div \frac{-6}{14} \\
 &= \left(\frac{1}{8} \times \frac{1}{2} \right) \div \frac{-6}{14} \\
 &= \frac{1}{16} \div \frac{-6}{14} \\
 &= \frac{1}{16} \times \frac{-14}{6} \\
 &= \frac{1}{8} \times \frac{-7}{6} \\
 &= \frac{-7}{48}
 \end{aligned}$$