ICSE Class 10 Mathematics Question Paper with Solutions(Memory Based)

| Time Allowed :3 Hour | Maximum Marks :60 | Total Questions :24 |

1. A retailer buys a TV from a wholesaler for 20,000 and sells it to a consumer at a 10% profit. If the GST rate is 18%, calculate the total tax paid by the retailer to the Government.

Correct Answer: 360

Solution:
Concept: Under the GST system, a dealer pays tax only on the value added.

$$\text{Tax payable} = \text{Output GST} - \text{Input GST (ITC)}$$

Step 1: Purchase price and Input GST. Retailer buys TV for 20,000. GST @ 18%:

$$\text{Input GST} = 18\% \text{ of } 20000 = 0.18 \times 20000 = 3600$$

Step 2: Selling price before GST. Profit = 10% of 20,000 = 2,000

$$\text{Selling price (before GST)} = 20000 + 2000 = 22000$$

Step 3: Output GST on sale. GST @ 18% on 22,000:

$$\text{Output GST} = 0.18 \times 22000 = 3960$$

Step 4: GST payable to Government.

$$\text{Net GST} = \text{Output GST} - \text{Input GST}$$

$$= 3960 - 3600 = 360$$

Conclusion: The retailer pays only the tax on value addition, which is 360.

> **Quick Tip**
>
> In GST, tax is paid only on value addition: Net GST = Output GST Input GST (ITC).

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2. Find the value of k if $(x-3)$ is a factor of the polynomial $x^3 - kx^2 + 15x - 6$.

Correct Answer: $k = 8$

Solution:
Concept: If $(x-a)$ is a factor of a polynomial $f(x)$, then by the Factor Theorem:

$$f(a) = 0$$

Step 1: Apply Factor Theorem. Given polynomial:

$$f(x) = x^3 - kx^2 + 15x - 6$$

Since $(x-3)$ is a factor:

$$f(3) = 0$$

Step 2: Substitute $x = 3$.

$$3^3 - k(3^2) + 15(3) - 6 = 0$$
$$27 - 9k + 45 - 6 = 0$$

Step 3: Simplify.

$$(27 + 45 - 6) - 9k = 0$$
$$66 - 9k = 0$$

Step 4: Solve for k.

$$9k = 66$$
$$k = \frac{66}{9} = \frac{22}{3}$$

Correction Check: Re-evaluating arithmetic:

$$27 + 45 = 72, \quad 72 - 6 = 66$$

So calculation is correct.
But wait: Factor must give integer root consistency. Re-check substitution carefully:

$$f(3) = 27 - 9k + 45 - 6 = 66 - 9k$$

Setting $= 0$:

$$9k = 66 \Rightarrow k = \frac{22}{3}$$

Conclusion: The value of k is $\frac{22}{3}$.

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3. Solve the quadratic equation $x^2 - 5x - 10 = 0$ and give your answer correct to two decimal places.

Correct Answer: $x = 6.53$ or $x = -1.53$

Solution:
Concept: Use the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

for equation $ax^2 + bx + c = 0$.
Step 1: Identify coefficients. Given:

$$x^2 - 5x - 10 = 0$$

$$a = 1, \quad b = -5, \quad c = -10$$

Step 2: Substitute into formula.

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{5 \pm \sqrt{25 + 40}}{2}$$

Step 3: Simplify.

$$x = \frac{5 \pm \sqrt{65}}{2}$$

Step 4: Approximate value.

$$\sqrt{65} \approx 8.062$$

$$x_1 = \frac{5 + 8.062}{2} = \frac{13.062}{2} \approx 6.53$$

$$x_2 = \frac{5 - 8.062}{2} = \frac{-3.062}{2} \approx -1.53$$

Conclusion: The solutions correct to two decimal places are:

$$x = 6.53 \quad \text{or} \quad x = -1.53$$

4. In a circle, two chords AB and CD intersect internally at P. If $AP = 4$ cm, $PB = 6$ cm, and $CP = 3$ cm, find the length of PD.

Correct Answer: $PD = 8$ cm

Solution:
Concept: When two chords intersect inside a circle, the Intersecting Chords Theorem states:

$$AP \times PB = CP \times PD$$

Step 1: Write the formula.
$$AP \cdot PB = CP \cdot PD$$

Step 2: Substitute the given values.

$$4 \times 6 = 3 \times PD$$

Step 3: Simplify.
$$24 = 3 \times PD$$

Step 4: Solve for PD.
$$PD = \frac{24}{3} = 8 \text{ cm}$$

Conclusion: The length of PD is 8 cm.

> **Quick Tip**
>
> For intersecting chords inside a circle: product of segments of one chord = product of segments of the other.

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5. From the top of a 100 m high cliff, the angle of depression of a boat is $45°$. Calculate the distance of the boat from the foot of the cliff.

Correct Answer: 100 m

Solution:
Concept: The angle of depression is equal to the angle of elevation. Using right triangle trigonometry:

$$\tan \theta = \frac{\text{Opposite}}{\text{Adjacent}}$$

Step 1: Interpret the problem. Height of cliff = 100 m Angle of depression = $45°$ So angle of elevation from the boat = $45°$.
Let distance from foot of cliff = x m.
Step 2: Apply tangent ratio.

$$\tan 45° = \frac{\text{height}}{\text{distance}}$$
$$1 = \frac{100}{x}$$

Step 3: Solve for x.
$$x = 100 \text{ m}$$

Conclusion: The distance of the boat from the foot of the cliff is 100 m.

> **Quick Tip**
>
> Angle of depression = angle of elevation. Use $\tan\theta = \frac{\text{height}}{\text{base}}$ in such problems.

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6. A bag contains 5 red, 8 white, and 7 black balls. A ball is drawn at random. Find the probability that the ball drawn is neither red nor black.

Correct Answer: $\frac{2}{5}$

Solution:
Concept: Probability of an event:
$$P(E) = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$$

Step 1: Total number of balls.
$$5 + 8 + 7 = 20$$

Step 2: Meaning of "neither red nor black". This means the ball must be **white**.
Number of white balls = 8
Step 3: Find probability.
$$P(\text{white}) = \frac{8}{20}$$

Step 4: Simplify.
$$\frac{8}{20} = \frac{2}{5}$$

Conclusion: The probability that the ball drawn is neither red nor black is $\frac{2}{5}$.

> **Quick Tip**
>
> "Neither A nor B" means choose outcomes excluding both — here only white balls.