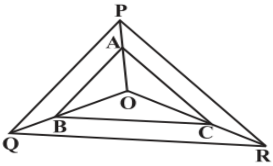
Mathematics

REVISION and MODEL QUESTIONS

25) In the figure, A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC || PR. Show that BC || QR.



Solution: **(…….Contd)**

In ΔOPR, AC || PR

By using Basic Proportionality Theorem

$$\therefore \frac{QA}{AP} = \frac{OC}{CR} \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

From equation (i) and (ii), we get,

$$\frac{OB}{BQ} = \frac{OC}{CR}$$

Therefore, by converse of Basic Proportionality Theorem,

In ΔOQR,

BC || QR.

26) If the value of discriminant of a quadratic equation is zero, then write the nature of roots of the quadratic equation.

Ans. $\therefore \Delta = b^2 - \Delta ac = 0$

Roots are equal and real

27) Write the number of roots of the equation $x = \frac{36}{x}$.

Soln:-

$$x = \frac{36}{x}$$

$$x^2 = 36$$

$$x = \pm 6$$

It has 2 roots

28) A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs.90, find the number of articles produced and the cost of each article.

Solution:

Let us say the number of articles produced is x.

Therefore, cost of production of each article = Rs $(2x + 3)$

Given the total cost of production is Rs.90

$\therefore x(2x + 3) = 90$

$\Rightarrow 2x^2 + 3x - 90 = 0$

$\Rightarrow 2x^2 + 15x - 12x - 90 = 0$

$\Rightarrow x(2x + 15) - 6(2x + 15) = 0$

$\Rightarrow (2x + 15)(x - 6) = 0$

Thus, either $2x + 15 = 0$ or $x - 6 = 0$

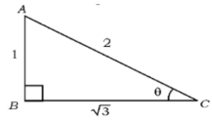
$\Rightarrow x = -15/2$ or $x = 6$

As the number of articles produced can only be a positive integer, x can only be 6.

Hence, the number of articles produced = 6

Cost of each article = 2 × 6 + 3 = Rs 15

29) **Find the value of θ in the figure.**



Soln:

$$\tan\theta = \frac{1}{\sqrt{3}}$$

$$\tan 30° = \frac{1}{\sqrt{3}}$$

$$\therefore \theta = 30°$$

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30) Solve the equation by using formula:

$x^2 - 4x + 2 = 0$

Solution: This is of the form $ax^2 + bx + c = 0$

Where a = 1 b = -4, c = 2

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4\times1\times2}}{2\times1}$$

$$= \frac{4 \pm \sqrt{16-8}}{2} = \frac{2(2 \pm \sqrt{2})}{2} = 2 \pm \sqrt{2}$$

If $x = 2 + \sqrt{2}$, $x = 2 - \sqrt{2}$

$\therefore (2 + \sqrt{2})$ and $(2 - \sqrt{2})$ are the roots of the given quadratic equation.

31) Find the area of a quadrant of a circle whose circumference is 22 cm.

Soln: Circumference of the circle, C= 22 cm (given)

It should be noted that a quadrant of a circle is a sector which is making an angle of 90°.

Let the radius of the circle = r

As C = 2πr = 22,

R = 22/2π cm = 7/2 cm

∴ area of the quadrant = (θ/360°) × πr^2

Here, θ = 90°

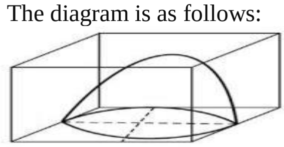
So, A = (90°/360°) × πr^2 cm^2

= (49/16) π cm^2

= 77/8 cm^2 = 9.6 cm^2

32) A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

Ans: The diagram is as follows:



Now, the diameter of the hemisphere = Edge of the cube = l

So, the radius of the hemisphere = l/2

∴ The total surface area of solid = surface area of cube + CSA of the hemisphere – Area of the base of the hemisphere

The surface area of the remaining solid =

$= 6\,(edge)^2 + 2\pi r^2 - \pi r^2$

$= 6l^2 + \pi r^2$

$= 6l^2 + \pi(l/2)^2$

$= 6l^2 + \pi l^2/4$

$= l^2/4(24+\pi)$ sq. units