

MATHEMATICS

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SECTION A

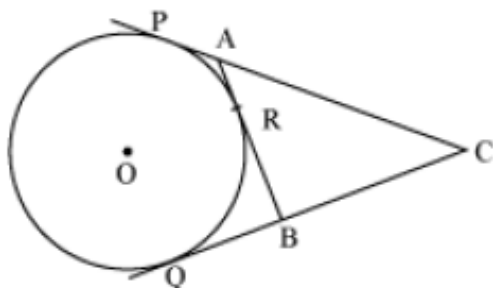
1) 1. Write whether $\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}}$ on simplification gives a rational or an irrational number

2) If α, β are the zeroes of the polynomial $2y^2 + 7y + 5$, write the value of $\alpha + \beta + \alpha\beta$.

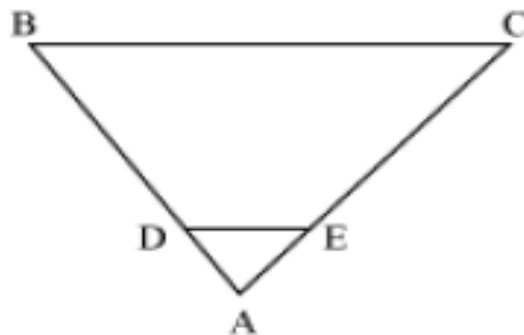
3) If the sum of the first q terms of an A.P is $2q + 3q^2$ what is its common difference?

4) In Figure 1, CP and CQ are tangents from an external point C to a circle with centre O. AB are another tangent which

touches the circle at R. If CP = 11 cm and BR = 4 cm, find the length of BC.



5) In Figure 2, $DE \parallel BC$ in $\triangle ABC$ such that $BC = 8$ cm, $AB = 6$ cm and $DA = 1.5$ cm. Find DE.



6) If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$ find the value of $5(x^2 - \frac{1}{x^2})$

7) What is the distance between the points A (c, 0) and B(0, -c)?

8) In a $\triangle ABC$, right-angled at C, $AC = 6$ cm and $AB = 12$ cm. Find $\angle A$.

9) The slant height of the frustum of a cone is 5 cm. If the difference between the radii of its two circular ends is 4 cm, write the height of the frustum.

10) A die is thrown once. What is the probability of getting a number greater than 4?

11) For what value of k , is 3 a zero of the polynomial $2x^2 + x + k$?

12) Find the value of m for which the pair of linear equations $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions.

13) Find the common difference of an A.P. whose first term is 4, the last term is 49 and the sum of all its terms is 265.

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- 14) In figure 3, there are two concentric circles with centre O and of radii 5 cm and 3 cm. From an external point P, Tangents PA and PB are drawn to these circles. If AP = 12 cm, find the length of BP.
- 15) Without using trigonometric tables, evaluate the following: $\frac{\cos 70^\circ}{3 \sin 20^\circ} + \frac{4(\sec^2 59^\circ - \cot^2 31^\circ)}{3} - \frac{2}{3} \sin 90^\circ$
- 16) Solve the following pair of linear equations for x and y:
- 17) Solve the following pair of linear equations for x and y: $\frac{b}{a}x + \frac{a}{b}y = a^2 + b^2$ and $x + y = 2ab$
- 18) In an A.P., the sum of its first ten terms is – 80 and the sum of its next ten terms is – 280. Find the A.P.
- 19) In figure 4, ABC is an isosceles triangle in which AB = AC. E is a point on the side CB produced, such that $FE \perp AC$. If $AD \perp CB$, prove that: $AB \times EF = AD \times EC$
- 20) Prove the following: $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$
- 21) Construct a triangle ABC in which AB = 8 cm, BC = 10 cm and AC = 6 cm. Then construct another triangle whose sides are $\frac{4}{5}$ of the corresponding sides of $\triangle ABC$.
- 22) Point P divides the line segment joining the points A (–1, 3) and B (9, 8) such that $\frac{AP}{BP} = \frac{k}{1}$. If P lies on the line $x - y + 2 = 0$, find the value of k.
- 23) If the points (p, q); (m, n) and (p – m, q – n) are collinear, show that $pn = qm$.
- 24) The rain-water collected on the roof of a building, of dimensions $22m \times 20m$, is drained into a cylindrical vessel having base diameter 2 m and height 3.5 m. If the vessel is full up to the brim, find the height of rain-water on the roof ($Use \pi = \frac{22}{7}$)
- 25) A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. Find the probability that it bears (i) a two digit number, (ii) a number which is a perfect square.
- 26) A girl is twice as old as her sister. Four years hence, the product of their ages (in years) will be 160. Find their present ages.
- 27) In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then prove that the angle opposite the first side is a right angle. Using the above, do the following: In an isosceles triangle PQR, $PQ = QR$ and $PR^2 = 2PQ^2$. Prove that $\angle Q$ is a right angle
- 28) A man on the deck of a ship, 12 m above water level, observes that the angle of elevation of the top of a cliff is 60° and the angle of depression of the base of the cliff is 30° . Find the distance of the cliff from the ship and the height of the cliff. [$Use \sqrt{3} = 1.732$]
- 29) The surface area of a solid metallic sphere is 616 cm^2 . It is melted and recast into a cone of height 28 cm. Find the diameter of the base of the cone so formed. ($Use \pi = \frac{22}{7}$)