

# 10th CBSE MATHEMATICS

2010-11

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<https://github.com/RaghavendraKulkarni6398/QuestionPaper2010>

## 1 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
- 1.2. If  $\alpha, \beta$  are the zeroes of the polynomial  $2y^2 + 7y + 5$ , write the value of  $\alpha + \beta + \alpha\beta$ .
- 1.3. If the sum of the first  $q$  terms of an A.P is  $2q + 3q^2$  what is its common difference?
- 1.4. In Fig 1.4, 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.
- 1.6. If  $5x = \sec \theta$  and  $(\frac{5}{x} = \tan \theta)$  find the value of  $5(x^2 - \frac{1}{x^2})$
- 1.7. What is the distance between the points A (c,0) and B(0,-c)?
- 1.8. In a  $\triangle ABC$ , right-angled at C, AC = 6cm and AB = 12cm. Find  $\angle A$ .
- 1.9. The slant height of the frustum of a cone is 5cm. If the difference between the radii of its two circular ends is 4 cm, write the height of the frustum.
- 1.10. A die is thrown once. What is the probability of getting a number greater than 4?

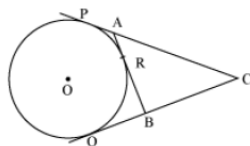


Fig. 1.4.

- 1.5. In Fig 1.5,  $DE \parallel BC$  in  $\triangle ABC$  such that BC = 8cm, AB = 6cm and DA = 1.5cm. Find DE.

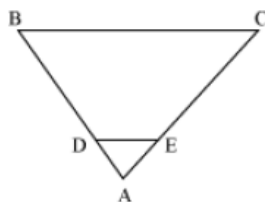


Fig. 1.5.

## 2 SECTION B

- 2.1. For what value of  $k$ , is 3 a zero of the polynomial  $2x^2 + x + k$ ?
- 2.2. 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.
- 2.3. 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.
- 2.4. In Fig 2.4, 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.

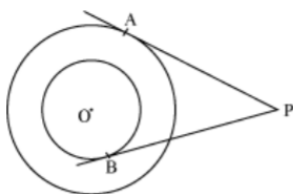


Fig. 2.4.

2.5. Without using trigonometric tables, evaluate the following:

$$\frac{\cos 70^\circ}{3 \sin 20^\circ} + \frac{4(\sec^2 59^\circ - \cot^2 31^\circ)}{3} - \frac{2}{3} \sin 90^\circ$$

### 3 SECTION C

3.1. Prove that  $\sqrt{3}$  is an irrational number

3.2. a) Solve the following pair of linear equations for  $x$  and  $y$ :  $\frac{b}{a}x + \frac{a}{b}y = a^2 + b^2$  and  $x + y = 2ab$

b) The sum of the numerator and the denominator of a fraction is 4 more than twice the numerator. If 3 is added to each of the numerator and denominator, their ratio becomes 2:3. Find the fraction.

3.3. 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.

3.4. In Fig 3.4, 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:  $AB \times EF = AD \times EC$

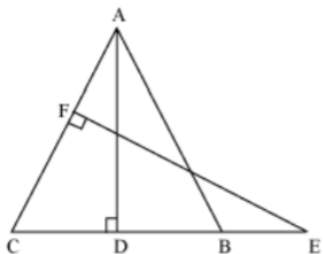


Fig. 3.4.

3.5. a) Prove the following:

$$(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$$

b) Prove the following:

$$\sin A(1 + \tan A) + \cos A(1 + \cot A) = \sec A + \operatorname{cosec} A$$

3.6. 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  $\triangle ABC$ .

3.7. 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  $k$ .

3.8. If the points  $(p, q)$ ;  $(m, n)$  and  $(p - m, q - n)$  are collinear, show that  $pn = qm$ .

3.9. a) 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  $\pi = \frac{22}{7}$ ]

b) In Fig 3.9, AB and CD are two perpendicular diameters of a circle with centre O. If  $OA = 7$  cm, find the area of the shaded region. [Use  $\pi = \frac{22}{7}$ ]

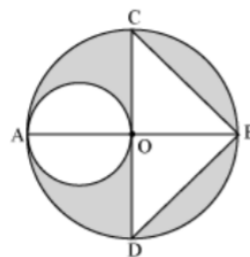


Fig. 3.9.

3.10. 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

- a) a two digit number,
- b) a number which is a perfect square.

#### 4 SECTION D

4.1. 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.

4.2. 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.

4.3. a) 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  $60^\circ$  and the angle of depression of the base of the cliff is  $30^\circ$ . Find the distance of the cliff from the ship and the height of the cliff. [Use  $\sqrt{3} = 1.732$ ]

b) The angle of elevation of a cloud from a point 60 m above a lake is  $30^\circ$  and the angle of depression of the reflection of the cloud in the lake is  $60^\circ$ . Find the height of the cloud from the surface of the lake.

4.4. The surface area of a solid metallic sphere is  $616 \text{ cm}^2$ . It is melted and recast into a cone of height 28 cm. Find the diameter of the base of the cone so formed. [Use  $\pi = \frac{22}{7}$ ]