11. $\frac{4}{3}$

$\cot 60° = \frac{1}{\sqrt{3}}$, $\sec 30° = \frac{2}{\sqrt{3}}$, $\sin 45° = \cos 45° = \frac{1}{\sqrt{2}}$,

$\sin 60° = \frac{\sqrt{3}}{2}$ (1/2)

Numerator $= 4 \times \frac{1}{3} + \frac{4}{3} - 2 \times \frac{1}{2} = \frac{4}{3} + \frac{4}{3} - 1 = \frac{5}{3}$ (1/2)

Denominator $= \frac{3}{4} + \frac{1}{2} = \frac{5}{4}$ (1/2)

Value $= \frac{5}{3} \div \frac{5}{4} = \frac{5}{3} \times \frac{4}{5} = \frac{4}{3}$ (1/2)

12. (d) 4

$x^2 - y^2 = 4\,\text{cosec}^2\theta - 4\cot^2\theta = 4(\text{cosec}^2\theta - \cot^2\theta)$.
$= 4 \times 1 = 4$.

13. (c) $\frac{5}{12}$

$QR = \sqrt{PR^2 - PQ^2} = \sqrt{169 - 25} = \sqrt{144} = 12$ cm.
For angle R, the opposite side is PQ and the adjacent side is QR, so $\tan R = \frac{PQ}{QR} = \frac{5}{12}$.

14. $\sin A = \frac{40}{41}$, $\tan C = \frac{9}{40}$

$AC^2 - BC^2 = AB^2 = 81$, so $(AC - BC)(AC + BC) = 81$ and $AC - BC = \frac{81}{81} = 1$. With $AC + BC = 81$, $AC = 41$ cm and $BC = 40$ cm (1)

$\sin A = \frac{BC}{AC} = \frac{40}{41}$ and $\tan C = \frac{AB}{BC} = \frac{9}{40}$ (1)

Chapter - 7

Coordinate Geometry

Questions

1. The ratio in which the x-axis divides the line segment joining (3, -6) and (5, 2) is

(a) 3 : 1 (b) 1 : 3

(c) 2 : 3 (d) 3 : 2

Asked : 2016, 2017, 2018, 2019, 2022, 2023, 2024, 2026 (1 mark)

2. Find the ratio in which the point P(x, 4) divides the line segment joining A(-2, 9) and B(6, 1). Also find the value of x.

OR

Find the ratio in which the point P(m, 6) divides the line segment joining A(-4, 3) and B(6, 8). Also find the value of m.

Asked : 2016, 2017, 2018, 2019, 2022, 2023, 2024, 2026 (3 marks)

3. If the distance between the points (2, -3) and (x, 5) is 10 units, then x is

(a) -8 or 4 (b) 8 or -4

(c) 8 or 4 (d) 6 or -6

Asked : 2016, 2017, 2019, 2020, 2022, 2024, 2025, 2026 (1 mark)

4. A point on the x-axis is at the same distance from A(7, 6) and from B(-3, 4). Find that point.

Asked : 2016, 2017, 2019, 2020, 2022, 2024, 2025, 2026 (2 marks)

8. (a) Both A and R are true and R is the correct explanation of A.

R is a true property of a parallelogram, so the midpoint of AC equals the midpoint of BD.

Midpoint of AC = (5, 6). So $\frac{4+x}{2} = 5$ and $\frac{7+y}{2} = 6$, giving D(6, 5). A is true and R explains A.

9. $5\sqrt{2}$ units

D is the midpoint of BC: D = $(\frac{-2+4}{2}, \frac{3-5}{2}) = (1, -1)$. (1)

AD = $\sqrt{(6-1)^2 + (4+1)^2} = \sqrt{50} = 5\sqrt{2}$ units. (1)

10. (c) isosceles and right-angled

AB = $\sqrt{9+16} = 5$, AC = $\sqrt{16+9} = 5$ and

BC = $\sqrt{49+1} = \sqrt{50}$.

AB = AC and $AB^2 + AC^2 = 25 + 25 = 50 = BC^2$, so the triangle is isosceles and right-angled at A.

11. A rhombus (all sides $\sqrt{50}$ units); not a square, since AC ≠ BD

AB = $\sqrt{25+25} = \sqrt{50}$, BC = $\sqrt{1+49} = \sqrt{50}$,

CD = $\sqrt{25+25} = \sqrt{50}$ and DA = $\sqrt{1+49} = \sqrt{50}$. (1 1/2)

All four sides are equal, so ABCD is a rhombus. (1/2)

Diagonals: AC = $\sqrt{36+4} = \sqrt{40}$ and

BD = $\sqrt{16+144} = \sqrt{160}$. The diagonals are not equal, so ABCD is not a square. (1)

12. PQ + QR = PR, so the points are collinear.

PQ = $\sqrt{16+9} = 5$, QR = $\sqrt{16+9} = 5$ and

PR = $\sqrt{64+36} = 10$. (1)

PQ + QR = 10 = PR, so Q lies on PR and the three points are collinear. (1)

Chapter - 1

Real Numbers

Questions

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

OR

Prove that $\sqrt{2}$ is an irrational number.

Asked : 2016, 2017, 2018, 2019, 2020, 2023, 2024, 2025, 2026 (3 marks)

2. Two numbers have HCF 18 and their product is 3240. Their LCM is

(a) 90 (b) 180

(c) 360 (d) 58320

Asked : 2016, 2017, 2018, 2019, 2022, 2023, 2024 (1 mark)

3. Can two numbers have 15 as their HCF and 175 as their LCM? Give a reason.

Asked : 2016, 2017, 2018, 2019, 2022, 2023, 2024 (2 marks)

4. If $a = 2^3 \times 3 \times 5^2$ and $b = 2^2 \times 3^3 \times 7$, then LCM(a, b) is

(a) $2^2 \times 3$ (b) $2^3 \times 3^3$

(c) $2^3 \times 3^3 \times 5^2 \times 7$ (d) $2^5 \times 3^4 \times 5^2 \times 7$

Asked : 2018, 2019, 2020, 2023, 2024, 2026 (1 mark)

5. Find the HCF and LCM of 360 and 84 using prime factorisation.

Asked : 2018, 2019, 2020, 2023, 2024, 2026 (2 marks)