Trigonometry and Mensuration: Practice Questions with Answers

Class 10 Maths · Units V and VI · Important board-style questions

Name: _____ Class / Section: _____ Date: _____

HOW TO USE THIS SHEET

Try each question on your own first, then check the answer. Marks shown follow the CBSE paper pattern. **Topics covered:** Trigonometric Ratios and Identities, Heights and Distances, Areas Related to Circles, Surface Areas and Volumes.

Q1 If tan θ = 5/12, where θ is an acute angle, find sin θ and cos θ. [2 marks]

ANSWER

tan θ = Perpendicular/Base = 5/12. Let the perpendicular be 5k and the base be 12k.

Hypotenuse = $\sqrt{[(5k)^2 + (12k)^2]} = \sqrt{(169k^2)} = 13k$

sin θ = 5/13 and cos θ = 12/13

Final Answer: sin θ = 5/13, cos θ = 12/13.

Q2 Evaluate: sin 30° cos 60° + cos 30° sin 60° [2 marks]

ANSWER

sin 30° = 1/2, cos 60° = 1/2, cos 30° = √3/2, sin 60° = √3/2

= (1/2)(1/2) + (√3/2)(√3/2) = 1/4 + 3/4 = 1

Final Answer: The value is 1.

Q3 Evaluate: $2\tan^2 45° + \cos^2 30° - \sin^2 60°$ [3 marks]

ANSWER

tan 45° = 1, cos 30° = √3/2, sin 60° = √3/2

$= 2(1)^2 + (\sqrt{3}/2)^2 - (\sqrt{3}/2)^2$

$= 2 + 3/4 - 3/4 = 2$

Final Answer: The value is 2.

Q4 Prove that sec θ (1 − sin θ)(sec θ + tan θ) = 1. [3 marks]

ANSWER

LHS = (1/cos θ)(1 − sin θ)(1/cos θ + sin θ/cos θ)

= (1/cos θ)(1 − sin θ) × (1 + sin θ)/cos θ

$= (1 - \sin^2\theta)/\cos^2\theta$

$= \cos^2\theta/\cos^2\theta = 1 = RHS$

Final Answer: Hence proved.

Q5 **The angle of elevation of the top of a tower from a point on the ground, 30 m away from its foot, is 60°. Find the height of the tower. (Use √3 = 1.732)** **[3 marks]**

ANSWER

Let the height of the tower be h metres. In the right-angled triangle formed:

tan 60° = h/30

√3 = h/30, so h = 30√3 = 30 × 1.732 = 51.96

Final Answer: The height of the tower is about 51.96 m.

Q6 **A ladder 10 m long leans against a wall and makes an angle of 60° with the ground. How high up the wall does it reach? (Use √3 = 1.732)** **[3 marks]**

ANSWER

Let the height reached be h metres.

sin 60° = h/10, so √3/2 = h/10

h = 5√3 = 5 × 1.732 = 8.66

Final Answer: The ladder reaches about 8.66 m up the wall.

Q7 **A cone has radius 7 cm and height 24 cm. Find its curved surface area and volume. (Use π = 22/7)** **[3 marks]**

ANSWER

Slant height l = √(r² + h²) = √(49 + 576) = √625 = 25 cm.

Curved surface area = πrl = 22/7 × 7 × 25 = 550 cm²

Volume = (1/3)πr²h = (1/3) × 22/7 × 7 × 7 × 24 = 22 × 7 × 8 = 1232 cm³

Final Answer: Curved surface area = 550 cm²; volume = 1232 cm³.

Q8 **A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the area of the minor segment. (Use π = 22/7)** **[3 marks]**

ANSWER

Area of sector = (90/360) × 22/7 × 14 × 14 = 154 cm²

Area of the right-angled triangle formed by the two radii and the chord = (1/2) × 14 × 14 = 98 cm²

Area of minor segment = 154 − 98 = 56 cm²

Final Answer: The area of the minor segment is 56 cm².

Q9 **A solid metallic sphere of radius 6 cm is melted and recast into 8 equal small spheres. Find the radius of each small sphere.** **[3 marks]**

ANSWER

Volume of the big sphere = $(4/3)\pi \times 6^3 = (4/3)\pi \times 216$

Let the radius of each small sphere be r. Then $8 \times (4/3)\pi r^3 = (4/3)\pi \times 216$.

$8r^3 = 216$, so $r^3 = 27$ and $r = 3$.

Final Answer: The radius of each small sphere is 3 cm.

BEFORE YOU CLOSE THIS SHEET

Always write the unit (cm, cm^2, cm^3, m) in mensuration answers, and mention the value of π or √3 that you have used.