Introduction to Trigonometry

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. The value of sin 45° is:
(a) 1/√2 **(b)** 0 **(c)** √3 **(d)** 1/√3

2. In △ABC, right-angled at B, AB = 180 cm, BC = 33 cm and AC = 183 cm. sin A equals:
(a) 60/11 **(b)** 60/61 **(c)** 61/11 **(d)** 11/61

3. If tan A = 5/12, then cos A equals:
(a) 13/12 **(b)** 13/5 **(c)** 12/13 **(d)** 12/5

4. If cosec A = 29/20, then tan A equals:
(a) 21/20 **(b)** 20/21 **(c)** 20/29 **(d)** 21/29

5. $\sin^2 A + \cos^2 A$ equals:
(a) $\tan^2 A$ **(b)** 0 **(c)** 1 **(d)** 2

6. The value of $2\cos^2 60° - 3\cos^2 0°$ is:
(a) −3/2 **(b)** 7/2 **(c)** −5/2 **(d)** −5

7. The value of tan 60° cos 30° + cos 60° tan 45° is:
(a) 2 **(b)** 1 **(c)** 3/2 **(d)** 4

8. Assertion (A): If sin A = 35/37, then cos A = 35/12.
Reason (R): For every acute angle A, $\sin^2 A + \cos^2 A = 1$.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. If sin A = 4/5, find cos A and tan A.

10. Evaluate: $(\sin^2 0° + 2\cos^2 60°) \div (\cos^2 30°)$

11. If tan A = 60/11, find sin A and cos A.

12. If 2 tan A = $2\sqrt{3}$, where A is acute, find A.

13. If cos(A − B) = 1/2 and cos(A + B) = 0, with 0° < A + B ≤ 90° and A > B, find A and B.

14. Evaluate: $(\cos 60° - \sin 60°)^2$

15. In △ABC, right-angled at B, AC = 18 cm and ∠A = 45°. Find BC and AB.

16. If cot θ = 20/21, evaluate ((1 + sin θ)(1 − sin θ)) ÷ ((1 + cos θ)(1 − cos θ)).

Section C — Word problems — 4 × 4 = 16 marks

17. From a point on the ground 15 m from the foot of a tower, the angle of elevation of its top is 30°. Find the height of the tower.

18. A kite flies on a string 122 m long, which makes an angle of 30° with the ground. Assuming the string is straight, how high is the kite?

19. A ladder leans against a wall and makes an angle of 60° with the ground. Its foot is 5 m from the wall. How long is the ladder?

20. From the top of a building 60 m high, the angle of depression of a car on the road is 60°. How far is the car from the foot of the building?

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Answer key

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Q	Answer	Working
1	**(a) 1/√2**	standard value: sin 45° = 1/√2
2	**(d) 11/61**	sin A = BC/AC = 11/61
3	**(c) 12/13**	sides in the ratio 5 : 12 : 13 (opposite : adjacent : hypotenuse)
4	**(b) 20/21**	cosec A = 29/20 gives sides 20 : 21 : 29; tan A = 20/21
5	**(c) 1**	for every acute angle A
6	**(c) −5/2**	$2\cos^2 60° = 1/2$, $3\cos^2 0° = 3$
7	**(a) 2**	3/2 + 1/2
8	**(d) A is false, but R is true.**	A is false: $\cos A = \sqrt{(1 - \sin^2 A)} = 12/37$, not 35/12. R is true.
9	**cos A = 3/5, tan A = 4/3**	adjacent = $\sqrt{(5^2 - 4^2)} = 3$
10	**2/3**	1/2 ÷ 3/4 = 2/3
11	**sin A = 60/61, cos A = 11/61**	hypotenuse = $\sqrt{(60^2 + 11^2)} = 61$
12	**A = 60°**	tan A = √3, so A = 60°
13	**A = 75°, B = 15°**	A − B = 60°, A + B = 90°
14	**1 − √3/2**	sin 60° = √3/2, cos 60° = 1/2, tan 60° = √3
15	**BC = 9√2 cm, AB = 9√2 cm**	BC = AC sin A, AB = AC cos A
16	**400/441**	$= (1 - \sin^2\theta)/(1 - \cos^2\theta) = \cos^2\theta/\sin^2\theta = \cot^2\theta = 400/441$
17	**5√3 m**	height = 15 × tan 30° = 15 × 1/√3
18	**61 m**	height = 122 × sin 30°
19	**10 m**	ladder = 5 ÷ cos 60° = 5 ÷ (1/2)
20	**20√3 m**	distance = 60 ÷ tan 60°

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