CLASS 10 MATHS · 2026-27

Trigonometry

Trigonometry

29	35	3
QUESTIONS	MINUTES	EXERCISES

This belongs to _____ **Date** _____

WHAT YOU'LL GET GOOD AT

- Recalls the standard values without hesitation
- Evaluates an expression in standard angles
- Proves an identity by converting everything to sine and cosine
- Uses complementary angles to simplify
- Solves a height and distance problem from a labelled diagram

Take your time, and have a go at every one. If you get stuck, look at the orange box — Ollie has already done one for you.

Trigonometry

Trigonometry · 29 questions · tick each box as you finish

Exercise 1 of 3 · 10 questions Evaluate.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

In the last one, note that sec 30° = 2/3, so sec² 30° = 4/3 rather than 2/3. Squaring the whole ratio - not just part of it - is where this question is usually lost. Writing sec 30° as its value on a separate line before squaring takes two seconds and prevents it.

1) $\sin 30° \cos 60° + \cos 30° \sin 60°$

2) $2 \tan^2 45° + \cos^2 30° - \sin^2 60°$

3) $(\sin 30° + \cos 60°) \div \tan 45°$

4) $\cos^2 45° + \sin^2 45°$

5) $(5 \cos^2 60° + 4 \sec^2 30° - \tan^2 45°) \div (\sin^2 30° + \cos^2 30°)$

6) $2 \sin 30° + 3 \cos 60°$

7) $\sin 60° \cos 30° - \cos 60° \sin 30°$

8) $\tan 45° + \cot 45°$

9) $\sin^2 30° + \cos^2 30°$

10) $(\tan 60° - \tan 30°) \div (1 + \tan 60° \tan 30°)$

Exercise 2 of 3 · 8 questions Prove each identity. Work on one side only.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

The fourth proof is the model for the whole chapter. Convert everything to sine and cosine, then simplify - $(1 - \sin\theta)(1 + \sin\theta)$ becomes $1 - \sin^2\theta$, which is $\cos^2\theta$, which cancels. When an identity looks impossible, converting to sine and cosine is almost always the move, and 'almost always' is close enough to always in a board paper.

1) $(1 - \cos^2\theta)\operatorname{cosec}^2\theta = 1$

2) $(1 + \tan^2 A) \div (1 + \cot^2 A) = \tan^2 A$

3) $(\sin A + \cos A)^2 + (\sin A - \cos A)^2 = 2$

4) $\sec\theta(1 - \sin\theta)(\sec\theta + \tan\theta) = 1$

5) Prove $(1 + \cot^2 A) \sin^2 A = 1$.

6) Prove $(\sec A - \tan A)(\sec A + \tan A) = 1$.

7) Prove $(1 - \sin^2\theta)\sec^2\theta = 1$.

8) Prove $\tan\theta + \cot\theta = \sec\theta \operatorname{cosec}\theta$

Exercise 3 of 3 · 11 questions Draw the diagram first, then solve. Use complementary angles where they help.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

For the kite, the height is opposite the angle and the string is the hypotenuse, so sine is the ratio to use - 60 = L sin 60°. Choosing the wrong ratio is the main way these questions go wrong, and a labelled diagram prevents it: mark which side is opposite, which is adjacent and which is the hypotenuse before writing anything. Thirty seconds of diagram saves the whole question.

1) Evaluate sin 18° ÷ cos 72°.

2) Evaluate tan 26° ÷ cot 64°.

3) Evaluate sin 25° cos 65° + cos 25° sin 65°.

4) The shadow of a tower is 3 times its height. Find the sun's angle of elevation.

5) A ladder 10 m long leans against a wall at 60° to the ground. How high up the wall does it reach?

6) A kite is flying at a height of 60 m with the string making 60° with the horizontal. Find the length of the string.

7) Evaluate cos 40° ÷ sin 50°.

8) Evaluate tan 15° tan 75°.

9) Evaluate sec 70° ÷ cosec 20°.

10) A pole 12 m high casts a shadow 12 m long. Find the sun's angle of elevation.

11) From the top of a 30 m building the angle of depression of a car is 30°. Find the distance of the car from the foot of the building.

All done? How did that feel?

Colour in a star. Three stars means you could teach it to someone else.

☆ ☆ ☆ Tricky · Getting there · Easy now

Answer key

For grown-ups

Trigonometry · keep this page back until your child has finished.

1. Evaluate.

1) (1/2)(1/2) + (3/2)(3/2) = 1/4 + 3/4 = 1.
2) 2(1) + 3/4 - 3/4 = 2.
3) (1/2 + 1/2) ÷ 1 = 1.
4) 1/2 + 1/2 = 1, which is the identity sin²¸+ cos²¸= 1 at 45°.
5) The denominator is 1. The numerator is 5(1/4) + 4(4/3) - 1 = 5/4 + 16/3 - 1 = 67/12.
6) 2(1/2) + 3(1/2) = 1 + 1.5 = 2.5.
7) (3/2)(3/2) - (1/2)(1/2) = 3/4 - 1/4 = 1/2. It is sin(60° - 30°) = sin 30°.
8) 1 + 1 = 2.
9) 1, since sin²¸+ cos²¸= 1 for any angle.
10) (3 - 1/3) ÷ (1 + 1) = (2/3) ÷ 2 = 1/3. It is tan(60° - 30°) = tan 30°.

2. Prove each identity. Work on one side only.

1) LHS = sin²¸× (1/sin²¸) = 1 = RHS, using 1 - cos²¸= sin²¸
2) LHS = sec²A ÷ cosec²A = (1/cos²A) ÷ (1/sin²A) = sin²A/cos²A = tan²A = RHS.
3) Expanding gives sin²A + 2 sinA cosA + cos²A + sin²A - 2 sinA cosA + cos²A = 2(sin²A + cos²A) = 2.
4) LHS = (1/cos¸)(1 - sin¸)(1/cos¸+ sin¸/cos¸) = (1 - sin¸)(1 + sin¸)/cos²¸= (1 - sin²¸)/cos²¸= cos²¸/cos²¸= 1.
5) 1 + cot²A = cosec²A, and cosec²A × sin²A = (1/sin²A) × sin²A = 1.
6) The left side is sec²A - tan²A, and sec²A - tan²A = 1 is a standard identity.
7) 1 - sin²¸= cos²¸ and cos²¸× sec²¸= cos²¸× (1/cos²¸) = 1.
8) tan ¸+ cot ¸= sin/cos + cos/sin = (sin² + cos²)/(sin cos) = 1/(sin cos) = sec ¸cosec ¸

3. Draw the diagram first, then solve. Use complementary angles where they help.

1) 1. Since cos 72° = cos(90° - 18°) = sin 18°.
2) 1. Since cot 64° = cot(90° - 26°) = tan 26°.
3) 1. Since cos 65° = sin 25° and sin 65° = cos 25°, the expression becomes sin² 25° + cos² 25° = 1.
4) 30°. If the height is h, the shadow is 3h, so tan ¸= h/(3h) = 1/3, giving ¸= 30°.
5) 53 m, about 8.66 m. The height is 10 sin 60° = 10 × 3/2.
6) 403 m, about 69.3 m. The height is opposite the 60° angle, so 60 = L sin 60°, giving L = 60 ÷ (3/2) = 120/3.
7) 1. cos 40° = sin 50°, because they are complementary.
8) 1. tan 75° = cot 15°, and tan 15° cot 15° = 1.
9) 1. sec 70° = cosec 20°, because 70° and 20° are complementary.
10) tan ¸= 12/12 = 1, so ¸= 45°.
11) tan 30° = 30/d, so d = 30 ÷ (1/3) = 303 m, about 51.96 m.

WHILE YOUR CHILD WORKS

- The standard values table must be automatic. Everything else in the chapter depends on it, and hesitation there slows every question.
- When an identity looks impossible, convert everything to sine and cosine. It works nearly every time.
- For heights and distances, draw and label the diagram before writing any equation. Choosing the wrong ratio is the main error.