MATHEMATICS · GRADES 10-12

Applications of trigonometry

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you measure a height or distance you cannot reach directly, like the height of a flagpole or the width of a river. One angle and one known side are enough to work out the rest of the triangle. Surveyors, builders, and navigators use this every day instead of climbing the flagpole or swimming the river.

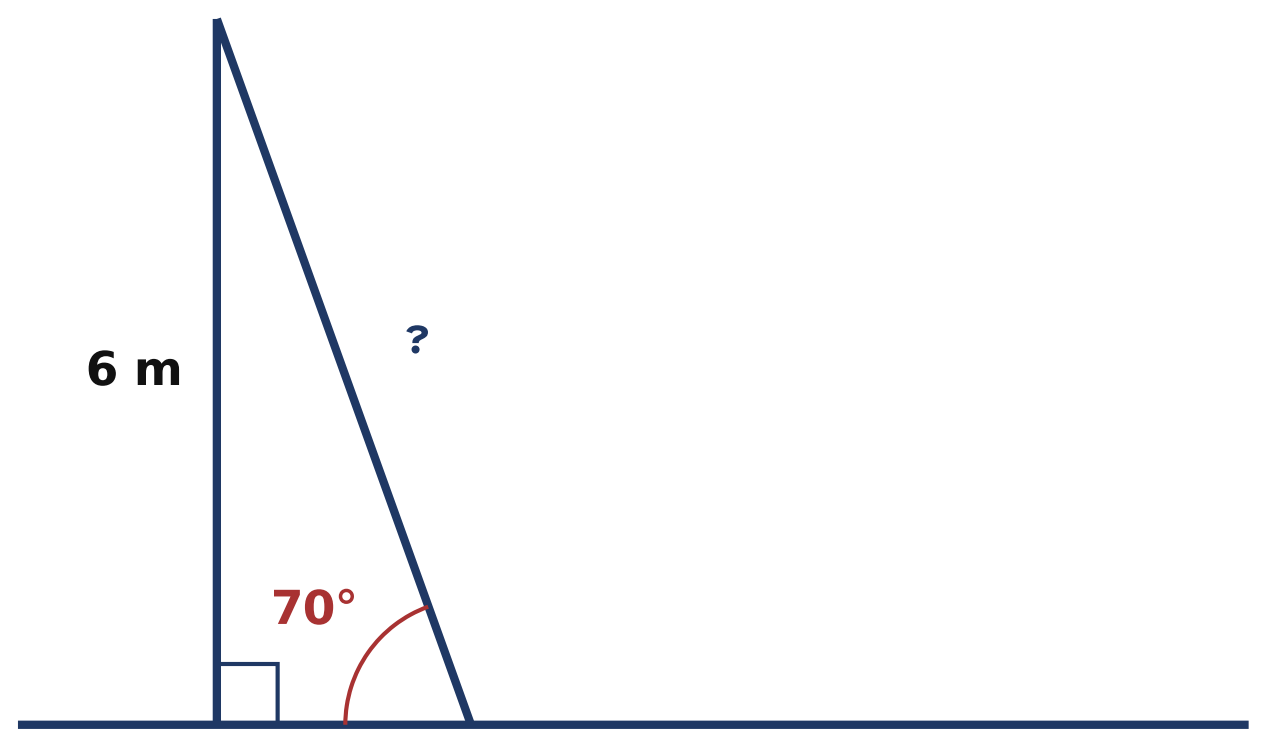


© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q A ladder leans against a wall at 70 degrees to the ground and reaches 6 metres up. How long is the ladder?



SOLUTION

Sin 70 degrees = $\frac{\text{height}}{\text{ladder length}}$, so ladder = $\frac{6}{\sin 70}$ metres.

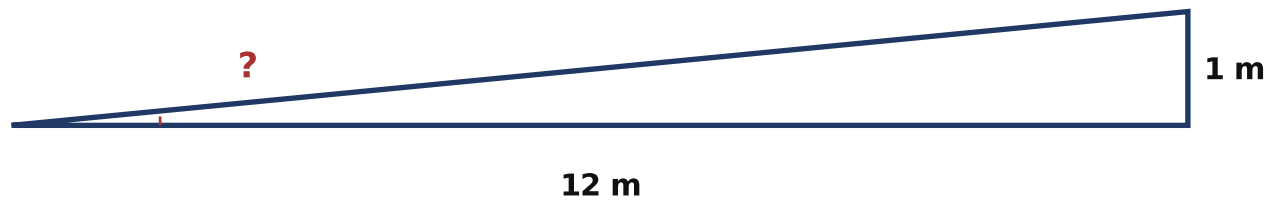
Sin 70 degrees is about 0.940, so ladder = $\frac{6}{0.940}$

The ladder is about 6.38 metres long.

© 2026 Brett Robbins. All Rights Reserved.

EXAMPLE 2

Q A ramp rises 1 metre over a horizontal run of 12 metres. Find the ramp angle.



SOLUTION

Tan of the angle = $\frac{\text{rise}}{\text{run}} = \frac{1}{12}$, about 0.0833

Undo tangent: angle = tan inverse of 0.0833

The angle is about 4.76 degrees.

Practice questions

1 A tree casts a shadow 10 metres long and the sun angle is 45 degrees. How tall is the tree?

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

2 A kite string is 50 metres long at 30 degrees to the ground. How high is the kite?

Understand It with Pulse Flag a mistake

3 A slide rises 3 metres over a run of 4 metres. Find the slide angle, to two decimal places.

Understand It with Pulse Flag a mistake

4 A ladder 8 metres long leans against a wall at 70 degrees to the ground. How far is the foot of the ladder from the wall, to two decimal places?

Understand It with Pulse Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 From the top of a 20 metre cliff, the angle of depression to a boat is 30 degrees. How far is the boat from the base of the cliff, to two decimal places?

Understand It with Pulse | Flag a mistake

6 A ladder 5 metres long leans against a wall with its foot 3 metres from the wall. Find the angle it makes with the ground, to two decimal places.

Understand It with Pulse | Flag a mistake

7 A ladder leans against a wall at 65 degrees to the ground with its foot 4 metres from the wall. How long is the ladder, to two decimal places?

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

8 A kite string is 40 metres long and the kite is 25 metres high. Find the angle the string makes with the ground, to two decimal places.

Understand It with Pulse | Flag a mistake

9 A ladder leans against a wall at 65 degrees to the ground and reaches 8 metres up. How long is the ladder, to two decimal places?

Understand It with Pulse | Flag a mistake

10 The angle of elevation to the top of a 12 metre tower is 35 degrees. How far are you from the base of the tower, to two decimal places?

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. 10 metres

2. 25 metres

3. 36.87 degrees

4. 2.74 metres

5. 34.64 metres

6. 53.13 degrees

7. 9.46 metres

8. 38.68 degrees

9. 8.83 metres

10. 17.14 metres

© 2026 Brett Robbins. All Rights Reserved.