Heights and distances with trigonometry: Grade 10

Practice worksheet - Maths · Grade 10

Name: _____ Date: _____

Show your working. Answers and explanations follow on a separate page.

Unless stated otherwise, assume level horizontal ground, vertical objects and observation from ground level. Show a labelled triangle and give units.

Write an answer and your reason before opening the explanation. Check the reasoning as well as the final answer.

1. Which ratio connects opposite and adjacent sides?

2. Where is an elevation angle measured from?

3. From ground level, distance 8 m and elevation 45°. Height?

4. Distance 9 m and elevation 60° from ground level. Height?

5. Height 12 m and elevation 45°. Horizontal distance?

6. Height 10 m and elevation 30°. Horizontal distance?

7. Rise above eye is 7 m and eye height is 1.4 m. Total?

8. A 6 m ladder is at 30° to ground. Height reached?

Practice continued

9. At 60° to ground, what height does the same 6 m ladder reach?

10. A 15 m lookout sees a ground object at 45° depression. Horizontal distance?

11. At 30°, should rise exceed horizontal distance?

12. Can you combine a distance in metres and a height in centimetres directly in a ratio?

13. Does the line of sight represent the horizontal ground distance?

14. Why should level ground be stated?

Answers and explanations

Answer key - Maths · Grade 10

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1. Tangent.

tan θ = opposite/adjacent.

2. The observer's horizontal.

It is measured upward towards the line of sight.

3. 8 m.

tan 45° = 1.

4. 9√3 m.

Height = distance × tan 60°.

5. 12 m.

The two legs are equal.

6. 10√3 m.

10 divided by 1/√3.

7. 8.4 m.

Add the two vertical lengths.

8. 3 m.

6 × sin 30°.

9. 3√3 m.

6 × sin 60°.

10. 15 m.

The matching elevation is 45°.

11. No.

tan 30° is less than one.

12. Convert to matching units first.

A trigonometric ratio compares like units.

13. No.

It is the hypotenuse in this model.

14. It establishes the horizontal-vertical right-triangle model.

Sloping ground changes the geometry.