Year 10 trigonometry worksheet

Year 10 · 10 questions · www.tuterly.com.au

Name: _____ Date: _____

Question 1

In triangle PQR, angle Q = 90°. The side opposite angle θ at P is QR = 5 cm, the side adjacent to θ is PQ = 12 cm and the hypotenuse is PR = 13 cm.

Write, as fractions:

(a) cos θ

(b) tan θ

Answer: _____

Question 2

Use a calculator. In a right-angled triangle, the side opposite angle θ is 7 cm and the hypotenuse is 12 cm. Find θ, correct to one decimal place.

Answer: _____

Question 3

A lifeguard sits in a tower 8 m above the ground and looks down at a swimmer on the beach. The swimmer is 15 m from the base of the tower along flat ground. Find the angle of depression from the lifeguard to the swimmer, correct to one decimal place.

Answer: _____

Question 4

A ship sails 40 km due east, then turns and sails 30 km due north. Find the bearing of the ship from its starting point, correct to the nearest degree.

Answer: _____

Question 5

In a right-angled triangle, the hypotenuse is 15 cm long and one angle is 28°. Find the length of the side opposite the 28° angle, correct to 2 decimal places.

Answer: _____

Question 6

Use a calculator. In a right-angled triangle, the side opposite angle α is 8.6 m and the side adjacent to α is 15.2 m. Find α, correct to one decimal place.

Answer: _____

Question 7

A person stands 45 m from the base of a vertical tower. The angle of elevation to the top of the tower is 32°. Find the height of the tower in metres, correct to 2 decimal places.

Answer: _____

Question 8

Use a calculator. A hiker walks 8 km from camp on a bearing of 130°T.

(a) How far east and how far south of camp is the hiker? Give answers correct to two decimal places.

(b) On what bearing must the hiker walk to return directly to camp?

Answer: _____

Question 9

Triangle ABC has a right angle at C. The side lengths are AC = 4 cm, BC = 3 cm and AB = 5 cm.

Write down, as fractions, the values of:

(a) sin A

(b) cos A

(c) tan A

Answer: _____

Question 10

Use a calculator. A wheelchair ramp rises 1.2 m vertically over a horizontal distance of 9 m.

(a) Find the angle the ramp makes with the horizontal, correct to one decimal place.

(b) Find the length of the sloping surface of the ramp, correct to two decimal places.

(c) A building guideline says a ramp's gradient must be no steeper than 1 in 14 (a rise of 1 m for every 14 m horizontally). Does this ramp meet the guideline? If not, find the horizontal distance needed for a 1.2 m rise.

Answer: _____

Year 10 trigonometry: answers and worked solutions

Year 10 · 10 questions · www.tuterly.com.au

Question 1

Key idea: cos θ = adjacent/hypotenuse and tan θ = opposite/adjacent.

1. cos θ = 12/13 2. tan θ = 5/12

Answer: (a) 12/13 (b) 5/12

Question 2

Key idea: Opposite and hypotenuse are known, so use sine, then the inverse sine function.

1. sinθ = 7/12 2. θ = $\sin^{-1}(7/12)$ = 35.685…° ≈ 35.7°

Answer: θ ≈ 35.7°

Question 3

Key idea: The angle of depression equals the angle inside the right-angled triangle at the top (alternate angles with the horizontal). Use the tangent ratio because you have the opposite side (8 m) and the adjacent side (15 m).

1. Label the triangle: opposite = 8 m, adjacent = 15 m. 2. Write the trig equation:\ $\tan(\theta) = 8/15$ 3. Solve for θ:\ $\theta = \tan^{-1}!(8/15)$ 4. Calculate:\ θ ≈ 28.1°

Answer: The angle of depression is approximately 28.1°.

Question 4

Key idea: Draw the right-angled triangle formed by the two legs of the journey. The bearing is measured clockwise from north at the starting point, so find the angle the direct path makes with north, then convert to a three-figure bearing.

1. Identify the right-angled triangle: the eastward leg is 40 km (opposite the required angle from north) and the northward leg is 30 km (adjacent to the required angle from north). 2. Find the angle east of north:\ $\tan(\theta) = 40/30$ 3. Solve:\ $\theta = \tan^{-1}!(40/30) \approx 53°$ 4 . Convert to a three-figure bearing (clockwise from north):\ Bearing = 053°

Answer: The bearing of the ship from its starting point is 053°.

Question 5

Key idea: Use sin θ = opposite/hypotenuse.

1. sin 28° = x/15 2. x = 15 sin 28° ≈ 7.042

Answer: 7.04 cm

Question 6

Key idea: Opposite and adjacent are known, so use tangent, then the inverse tangent function.

1. $\tan\alpha = (8.6)/(15.2)$ 2. $\alpha = \tan^{-1}((8.6)/(15.2)) = 29.500...° \approx 29.5°$

Answer: $\alpha \approx 29.5°$

Question 7

Key idea: In a right-angled triangle, $\tan(\theta)$ = opposite/adjacent, where the angle of elevation is measured from the horizontal.

1. Draw the situation: horizontal distance = 45 m, angle of elevation = 32°, height = h. 2. Identify the ratio: the height is opposite the 32° angle, and 45 m is adjacent, so use tangent. 3. Write the equation: $\tan(32°) = h/45$ 4. Solve for h: $h = 45 \times \tan(32°)$ 5. Calculate: $h = 45 \times 0.62487... = 28.119... \approx 28.12$ m

Answer: 28.12 m

Question 8

Key idea: Draw a right-angled triangle with the north-south line. A bearing of 130°T makes an angle of 180° - 130° = 50° with due south. The return bearing differs by 180°.

(a) 1. Angle between the path and due south: 180° - 130° = 50°. 2. Distance south (adjacent to 50°): $8\cos 50° = 5.142... \approx 5.14$ km. 3. Distance east (opposite 50°): $8\sin 50° = 6.128... \approx 6.13$ km.

(b) 1. Return bearing = 130° + 180° = 310°T.

Answer: (a) 6.13 km east and 5.14 km south (b) 310°T

Question 9

Answer: (a) ⅗ (b) ⅘ (c) ¾

Question 10

Key idea: The rise is opposite the angle and the horizontal run is adjacent, so use tangent. Pythagoras gives the sloping length.

(a) 1. $\tan\theta = (1.2)/(9)$ 2. $\theta = \tan^{-1}((1.2)/(9)) = 7.594...° \approx 7.6°$

(b) 1. $l = \sqrt{(9^2 + 1.2^2)} = \sqrt{(81 + 1.44)} = \sqrt{(82.44)} = 9.079... \approx 9.08$ m

(c) 1. The ramp's gradient is $(1.2)/(9) = (1)/(7.5)$, which is steeper than 1/14, so it does not meet the guideline. 2. For a gradient of 1/14: horizontal distance = $14 \times 1.2 = 16.8$ m.

Answer: (a) 7.6° (b) 9.08 m (c) No, it is too steep (1 in 7.5); it would need a horizontal distance of 16.8 m.