Foundation Check In - 10.05b & 10.05c Trigonometry in right-angled triangles

Calculate the value of x in each of these right-angled triangles.

1.

*x*

32°

24 cm

2.

*x*

28°

15 cm

72 cm

 90 cm

*x*

4.

3.

x

48 cm

56°

 2.4 m

0.8 m

1. The diagram opposite shows a ladder of length 2.4 m leaning against a vertical wall. Calculate the angle the ladder makes with the horizontal.

**Do not use a calculator in questions 6, 7 and 8.**

1. Using the diagram below, show that cos 60° is the same as sin 30°.

1

2

60°

1. Using the diagram in question 6, show that tan 60° is equal to .
2. Using the diagram below, explain why tan 45° is equal to 1.

45°

1. Here is a triangular piece of jigsaw.

40°

10 cm

Will it fit in the shaded part of the puzzle below? Show how you decide.

8 cm

10 cm

10. A ship sails 20 km west, and then changes direction and sails 30 km south. What

bearing will the ship need to take in order to then sail back to the start position?

**Extension**

Copy and complete the results table for sine values from 0° to 360° going up in 15° intervals.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Angle *x*° | 0 | 15 | 30 | 45 |  |  |  |  | . . .  |
| sin *x*° | 0 | 0.259 | 0.5 | 0.707 |  |  |  |  | . . .  |

Repeat for cos and tan and comment on your results.

Answer

1. 15.0 cm
2. 7.0 cm
3. 32.4 cm
4. 36.9°
5. 70.5°
6. The missing angle in the triangle is 30° because 180 – 90 – 60 = 30.

cos 60° =  and sin 30° = .

1. The missing side in the triangle is .

tan 60° = .

1. The missing angle in the triangle is 45° because 180 – 90 – 45 = 45, which means it is an isosceles triangle. Therefore, the opposite and adjacent sides are the same length so tan 45° =  oe.
2. 

8.4 cm so no it won’t fit.

1. 

Bearing is 056°.

**Extension**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Angle *x*°** | **0** | **15** | **30** | **45** | **60** | **75** | **90** | **105** | **120** |
| **sin *x*°** | 0 | 0.259 | 0.5 | 0.707 | 0.866 | 0.966 | 1 | 0.966 | 0.866 |
| **cos *x*°** | 1 | 0.966 | 0.866 | 0.707 | 0.5 | 0.259 | 0 | -0.259 | -0.5 |
| **tan *x*°** | 0 | 0.268 | 0.577 | 1 | 1.732 | 3.732 | ∞ | -3.732 | -1.732 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Angle *x*°** | **135** | **150** | **165** | **180** | **195** | **210** | **225** | **240** | **255** |
| **sin *x*°** | 0.707 | 0.5 | 0.259 | 0 | -0.259 | -0.5 | -0.707 | -0.866 | -0.966 |
| **cos *x*°** | -0.707 | -0.866 | -0.966 | -1 | -0.966 | -0.866 | -0.707 | -0.5 | -0.259 |
| **tan *x*°** | -1 | -0.577 | -0.268 | 0 | 0.268 | 0.577 | 1 | 1.732 | 3.732 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Angle *x*°** | **270** | **285** | **300** | **315** | **330** | **345** | **360** |
| **sin *x*°** | -1 | -0.966 | -0.866 | -0.707 | -0.5 | -0.259 | 0 |
| **cos *x*°** | 0 | 0.259 | 0.5 | 0.707 | 0.866 | 0.966 | 1 |
| **tan *x*°** | ∞ | -3.732 | -1.732 | -1 | -0.577 | -0.268 | 0 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Find side length using right-angled trigonometry |  |  |  |  | AO1 | 1 | Find side length using right-angled trigonometry |  |  |  |
| AO1 | 2 | Find side length using right-angled trigonometry |  |  |  |  | AO1 | 2 | Find side length using right-angled trigonometry |  |  |  |
| AO1 | 3 | Find side length using right-angled trigonometry |  |  |  |  | AO1 | 3 | Find side length using right-angled trigonometry |  |  |  |
| AO1 | 4 | Find angle using right-angled trigonometry |  |  |  |  | AO1 | 4 | Find angle using right-angled trigonometry |  |  |  |
| AO1 | 5 | Find angle using right-angled trigonometry |  |  |  |  | AO1 | 5 | Find angle using right-angled trigonometry |  |  |  |
| AO2 | 6 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 6 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO2 | 7 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 7 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO2 | 8 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 8 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO3 | 9 | Apply trigonometry to solve a problem |  |  |  |  | AO3 | 9 | Apply trigonometry to solve a problem |  |  |  |
| AO3 | 10 | Apply trigonometry to solve a problem |  |  |  |  | AO3 | 10 | Apply trigonometry to solve a problem |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| AO1 | 2 | Find side length using right-angled trigonometry |  |  |  |  | AO1 | 2 | Find side length using right-angled trigonometry |  |  |  |
| AO1 | 3 | Find side length using right-angled trigonometry |  |  |  |  | AO1 | 3 | Find side length using right-angled trigonometry |  |  |  |
| AO1 | 4 | Find angle using right-angled trigonometry |  |  |  |  | AO1 | 4 | Find angle using right-angled trigonometry |  |  |  |
| AO1 | 5 | Find angle using right-angled trigonometry |  |  |  |  | AO1 | 5 | Find angle using right-angled trigonometry |  |  |  |
| AO2 | 6 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 6 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO2 | 7 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 7 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO2 | 8 | Use knowledge of exact values of trigonometry ratios |  |  |  |  | AO2 | 8 | Use knowledge of exact values of trigonometry ratios |  |  |  |
| AO3 | 9 | Apply trigonometry to solve a problem |  |  |  |  | AO3 | 9 | Apply trigonometry to solve a problem |  |  |  |
| AO3 | 10 | Apply trigonometry to solve a problem |  |  |  |  | AO3 | 10 | Apply trigonometry to solve a problem |  |  |  |