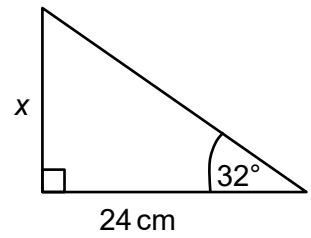
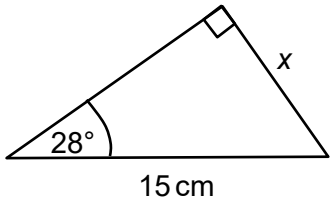
Foundation Check In - 10.05b & 10.05c
Trigonometry in right-angled triangles

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

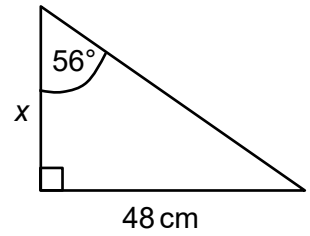
1.



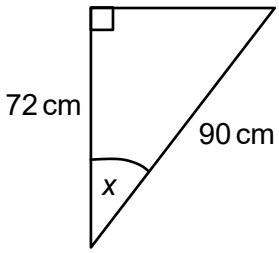
2.



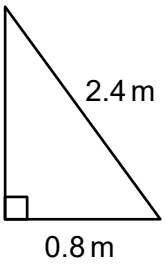
3.



4.

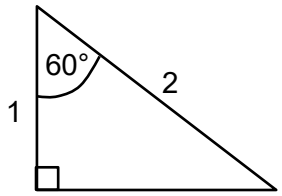


5. The diagram opposite shows a ladder of length 2.4 m leaning against a vertical wall. Calculate the angle the ladder makes with the horizontal.



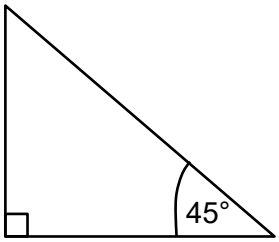
Do not use a calculator in questions 6, 7 and 8.

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

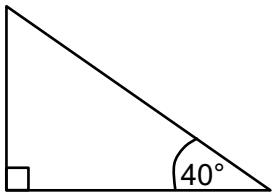


7. Using the diagram in question 6, show that $\tan 60°$ is equal to $\sqrt{3}$.

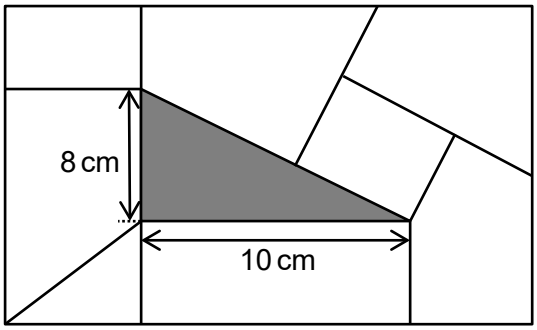
8. Using the diagram below, explain why tan 45° is equal to 1.



9. Here is a triangular piece of jigsaw.



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



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.

   $\cos 60° = \frac{a}{h} = \frac{1}{2}$ and $\sin 30° = \frac{o}{h} = \frac{1}{2}$.

7. The missing side in the triangle is $\sqrt{2^2 - 1^2} = \sqrt{3}$.

   $\tan 60° = \frac{o}{a} = \frac{\sqrt{3}}{1} = \sqrt{3}$.

8. 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 $\tan 45° = \frac{o}{a} = 1$ oe.

9. $\tan 40 = \frac{x}{10}$

   $x = 10 \tan 40 = 8.4$ cm so no it won't fit.

10. $\tan^{-1}\left(\frac{30}{20}\right) = 56.3$

    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
AO1	1	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	4	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	7	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	10	Apply trigonometry to solve a problem			

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