

GCSE Maths: Trigonometry: finding sides (SOH CAH TOA) (Foundation): answers

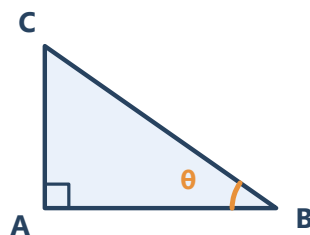
GCSE Maths - Pythagoras and Trigonometry - Foundation - Lesson 20.4

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch20-pythagoras-trigonometry/foundation/trigonometry-finding-sides-soh-cah-toa/

Exercise 20E Labelling sides and choosing the ratio Non-calculator

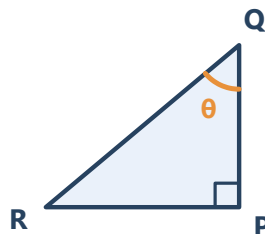
- 1 The angle θ is marked in each right-angled triangle. Name the hypotenuse, the opposite side and the adjacent side.

(a)



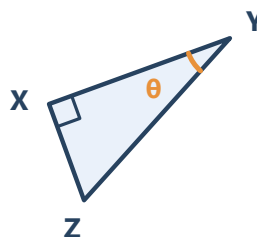
Answer: hypotenuse BC, opposite AC, adjacent AB

(b)



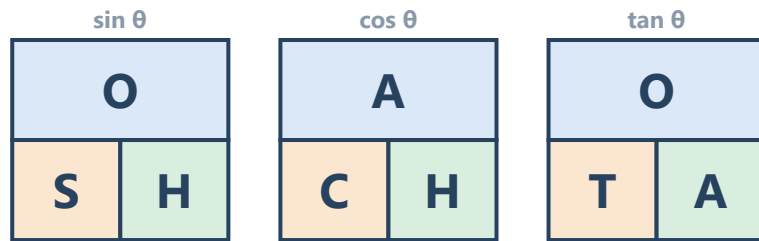
Answer: hypotenuse QR, opposite PR, adjacent PQ

(c)



Answer: hypotenuse YZ, opposite XZ, adjacent XY

- 2 Write down what each of S, O, H, C, A, T stands for, and then complete each ratio.



(a) $\sin \theta =$

Answer: $\frac{O}{H}$ (Opposite over Hypotenuse)

(b) $\cos \theta =$

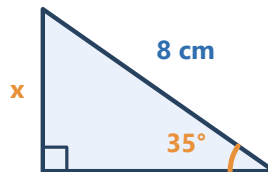
Answer: $\frac{A}{H}$ (Adjacent over Hypotenuse)

(c) $\tan \theta =$

Answer: $\frac{O}{A}$ (Opposite over Adjacent)

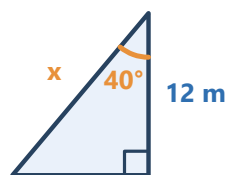
3 Which ratio, sin, cos or tan, would you use to find x ? Write down the ratio only.

(a)



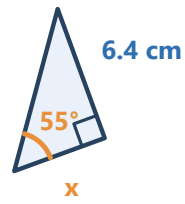
Answer: sin

(b)



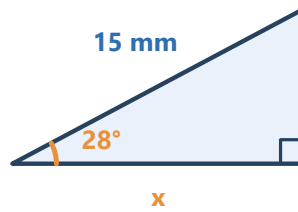
Answer: cos

(c)



Answer: tan

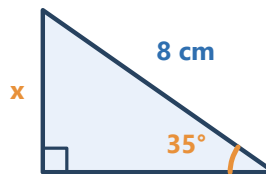
(d)



Answer: cos

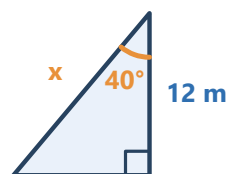
4 Write down an equation that you could use to find x. Do **not** solve it.

(a)



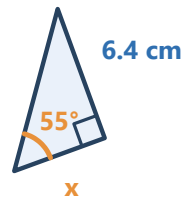
Answer: $\sin 35^\circ = \frac{x}{8}$

(b)



Answer: $\cos 40^\circ = \frac{12}{x}$

(c)



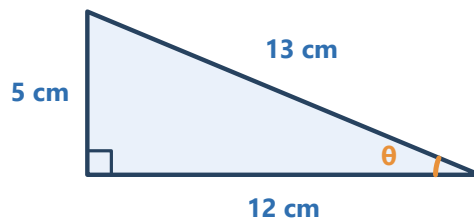
Answer: $\tan 55^\circ = \frac{6.4}{x}$

(d)



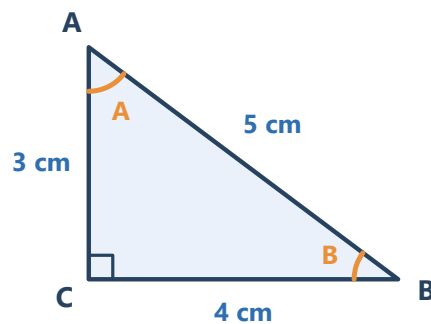
Answer: $\cos 62^\circ = \frac{x}{9.5}$

- 5 For the triangle shown, write down $\sin \theta$, $\cos \theta$ and $\tan \theta$ as fractions.



Answer: $\sin \theta = \frac{5}{13}$, $\cos \theta = \frac{12}{13}$, $\tan \theta = \frac{5}{12}$

- 6 The triangle ABC has a right angle at C. For angle A, write down the opposite and adjacent sides. Then do the same for angle B. What do you notice?

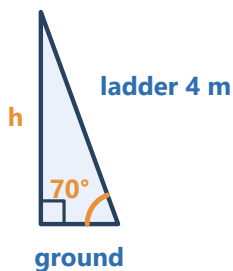


Answer: A: opposite BC, adjacent AC. B: opposite AC, adjacent BC. They swap.

7 For each situation, choose the ratio you would use. Label the sides of the sketch first.

(a)

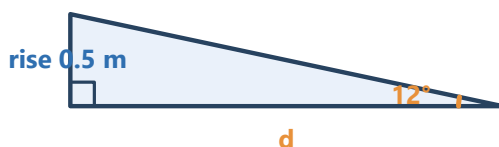
A 4 m ladder makes an angle of 70° with the ground. You want its height h up the wall. Which ratio (sin, cos or tan)?



Answer: sin

(b)

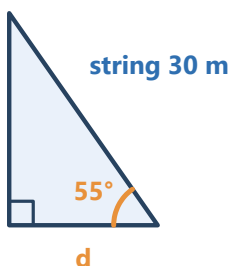
A ramp rises 0.5 m and makes an angle of 12° with the ground. You want the horizontal distance d . Which ratio?



Answer: tan

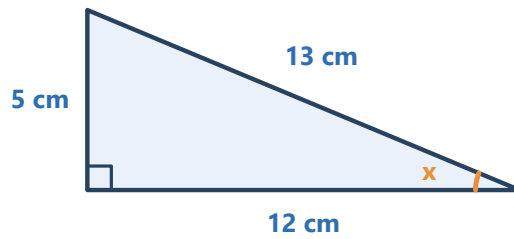
(c)

A kite string is 30 m long and makes an angle of 55° with the level ground. You want the horizontal distance d from the kite to the person. Which ratio?



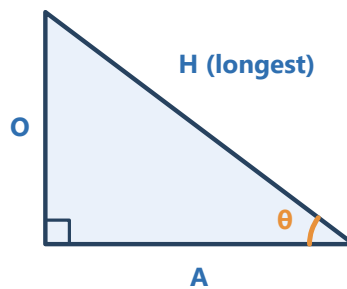
Answer: cos

8 Dev says that $\tan x = \frac{5}{13}$ for this triangle. Explain his mistake and write down the correct value of $\tan x$ as a fraction.



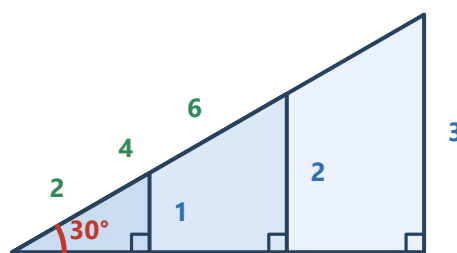
Answer: $\tan x = \frac{5}{12}$

- 9 Explain why $\sin \theta$ and $\cos \theta$ can never be bigger than 1 for an angle θ in a right-angled triangle.



Answer: The hypotenuse is the longest side, so $O \div H$ and $A \div H$ are less than 1.

- 10 The diagram shows three right-angled triangles that share a 30° angle. Work out (opposite) $\div$ (hypotenuse) for each triangle and say what you notice.

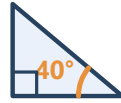


Answer: All give 0.5, so $\sin 30^\circ = 0.5$

Exercise 20F Finding sides with sin, cos and tan Calculator allowed

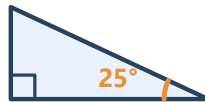
- 1 Use a calculator in degree mode to work out each value. Give each answer correct to 3 decimal places.

(a) $\sin 40^\circ$



Answer: 0.643

(b) $\cos 25^\circ$



Answer: 0.906

(c) $\tan 63^\circ$



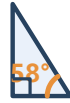
Answer: 1.963

(d) $\sin 72^\circ$



Answer: 0.951

(e) $\cos 58^\circ$



Answer: 0.530

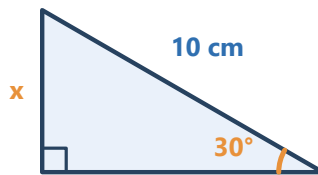
(f) $\tan 18^\circ$



Answer: 0.325

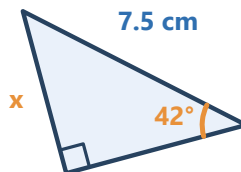
- 2 Work out the length of the side marked x in each triangle. Give your answers correct to 1 decimal place. All the lengths are in centimetres.

(a)



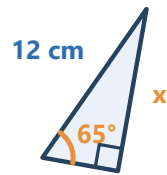
Answer: 5.0 cm

(b)



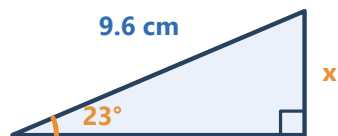
Answer: 5.0 cm

(c)



Answer: 10.9 cm

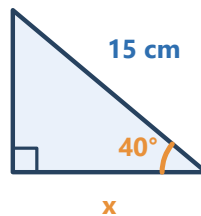
(d)



Answer: 3.8 cm

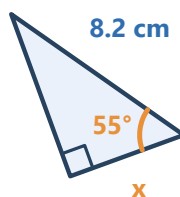
- 3** Work out the length of the side marked x in each triangle. Give your answers correct to 1 decimal place. All the lengths are in centimetres.

(a)



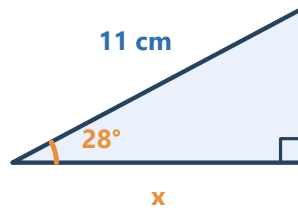
Answer: 11.5 cm

(b)



Answer: 4.7 cm

(c)



Answer: 9.7 cm

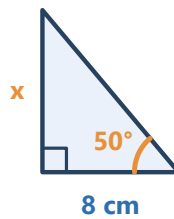
(d)



Answer: 2.1 cm

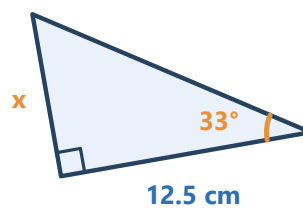
- 4 Work out the length of the side marked x in each triangle. Give your answers correct to 1 decimal place. All the lengths are in centimetres.

(a)



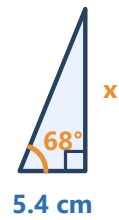
Answer: 9.5 cm

(b)



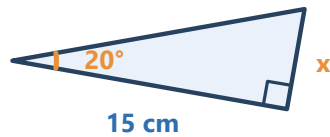
Answer: 8.1 cm

(c)



Answer: 13.4 cm

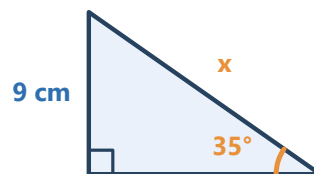
(d)



Answer: 5.5 cm

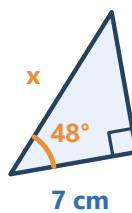
- 5 Work out the length of the side marked x in each triangle. Be careful: in some of them x will be on the bottom of the fraction. Give your answers correct to 1 decimal place. All the lengths are in centimetres.

(a)



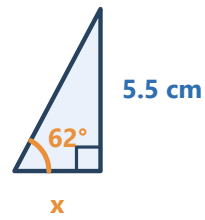
Answer: 15.7 cm

(b)



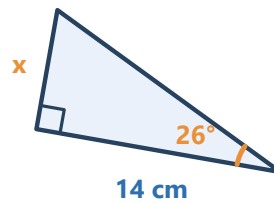
Answer: 10.5 cm

(c)



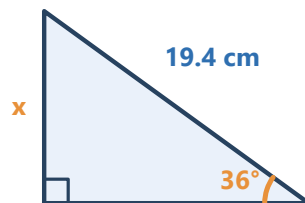
Answer: 2.9 cm

(d)



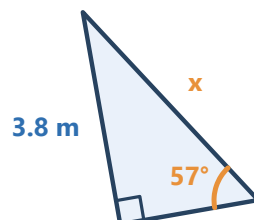
Answer: 6.8 cm

6 Work out the length x . Give your answer correct to 3 significant figures.



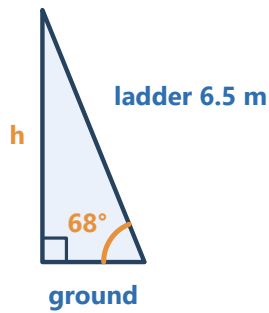
Answer: 11.4 cm

7 Work out the length x . Give your answer correct to 2 decimal places.



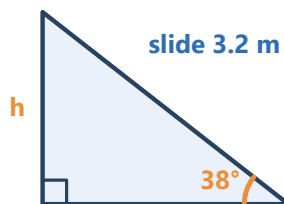
Answer: 4.53 m

8 A ladder 6.5 m long leans against a vertical wall. The ladder makes an angle of 68° with the horizontal ground. How high up the wall does the ladder reach? Give your answer correct to 2 decimal places.



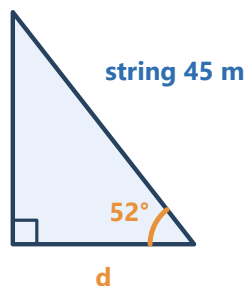
Answer: 6.03 m

- 9 A slide is 3.2 m long and slopes at 38° to the horizontal. Work out the vertical height of the top of the slide above the ground. Give your answer correct to 2 decimal places.



Answer: 1.97 m

- 10 A kite is flying on a string 45 m long. The string makes an angle of 52° with the level ground. Work out the horizontal distance from the person to the point on the ground below the kite. Give your answer correct to 1 decimal place.



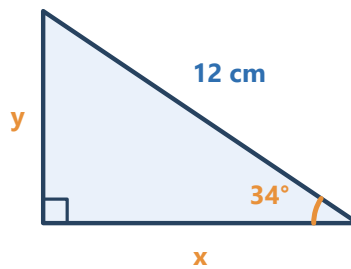
Answer: 27.7 m

- 11 A wheelchair ramp rises 0.6 m and makes an angle of 7° with the ground. How long is the ramp? Give your answer correct to 2 decimal places.



Answer: 4.92 m

- 12** In this right-angled triangle the hypotenuse is 12 cm and one angle is 34° . Find x and y , correct to 1 decimal place.



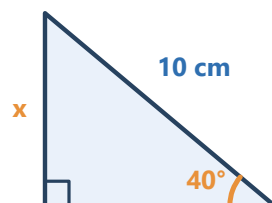
- (a) y (opposite the 34° angle)

Answer: 6.7 cm

- (b) x (next to the 34° angle)

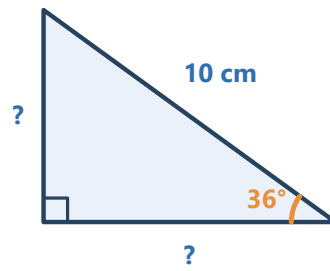
Answer: 9.9 cm

- 13** Anya works out x in this triangle as $10 \times \cos 40^\circ = 7.7$ cm. Explain her mistake and find the correct value of x , to 1 decimal place.



Answer: 6.4 cm (she should use sin)

- 14 Challenge.** A right-angled triangle has a hypotenuse of 10 cm and an angle of 36° . Work out the perimeter of the triangle, correct to 1 decimal place.



Answer: 24.0 cm