

Using trigonometric ratios to find angles

Year 8 About 75 minutes Calculator allowed 45 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/ks3-year-8-using-trigonometric-ratios-to-find-angles/

Date _____

A Do Now

Quick questions to start.

- A1** [1 mark] **Needed today** Round 52.456 to 1 decimal place.

Answer

- A2** [1 mark] **Needed today** Two angles of a right-angled triangle are 90° and 34.6° . Work out the third angle.

Answer

- A3** [1 mark] **Last lesson** For angle x , the opposite is 9 cm and the adjacent is 12 cm. Write $\tan x$ as a fraction in its simplest form.

Answer

- A4** [1 mark] **From chapter 9** Write 2.08×10^3 as an ordinary number.

Answer

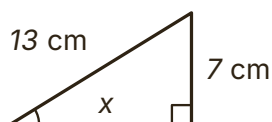
B Example, then your turn

Year 8

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

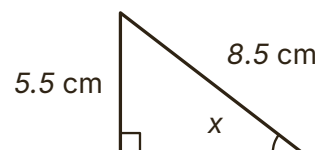
Work out the size of angle x . Give your answer correct to 1 decimal place.



Not drawn accurately

Hint The 7 cm side is opposite x and the 13 cm side is the hypotenuse: SOH. Use the $\sin^{-1}$ button.

- B1** [2 marks] Work out the size of angle x . Give your answer correct to 1 decimal place.

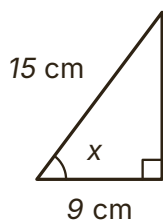


Not drawn accurately

Answer $x = \dots\dots^\circ$

EXAMPLE 2

Work out the size of angle x . Give your answer correct to 1 decimal place.

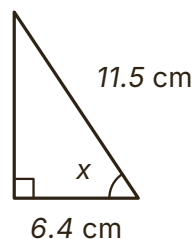


Not drawn accurately

Hint The 9 cm side touches x and the right angle, so it is the adjacent. Adjacent and hypotenuse: CAH. Use $\cos^{-1}$.

B2 Work out the size of angle x . [2 marks]

Give your answer correct to 1 decimal place.

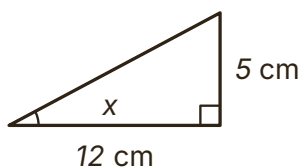


Not drawn accurately

Answer $x = \dots\dots^\circ$

EXAMPLE 3

Work out the size of angle x . Give your answer correct to 1 decimal place.

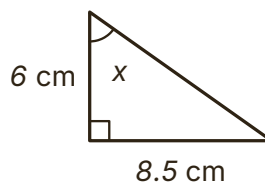


Not drawn accurately

Hint No hypotenuse is given. Opposite and adjacent: TOA. Use $\tan^{-1}$.

B3 Work out the size of angle x . [2 marks]

Give your answer correct to 1 decimal place.

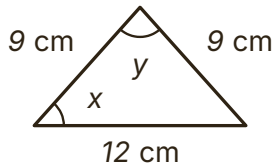


Not drawn accurately

Answer $x = \dots\dots^\circ$

EXAMPLE 4

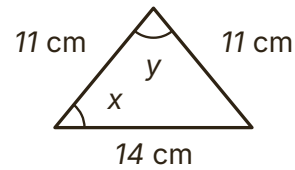
The triangle is isosceles. Work out the size of angle x and angle y . Give your answers correct to 1 decimal place.



Not drawn accurately

Hint The line of symmetry cuts the triangle into two right-angled triangles. Each has hypotenuse 9 cm and half the base, 6 cm.

B4 The triangle is isosceles. Work out the size of angle x and angle y . Give your answers correct to 1 decimal place. [3 marks]



Not drawn accurately

Answer $x = \dots\dots^\circ$ $y = \dots\dots^\circ$

c Practice

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C1 Use your calculator to find each angle x , correct to 1 decimal place. [3 marks]

(a) $\sin x = 0.358$

(b) $\cos x = 0.917$

(c) $\tan x = 1.64$

Answer (a) $\dots^\circ$ (b) $\dots^\circ$ (c) $\dots^\circ$

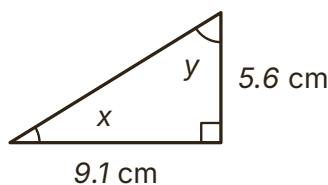
C2 Use your calculator to find each angle x , correct to 1 decimal place. [3 marks]

(a) $\sin x = \frac{3}{8}$ (b) $\tan x = \frac{11}{4}$

(c) $\cos x = \frac{7}{12}$

Answer (a) $\dots^\circ$ (b) $\dots^\circ$ (c) $\dots^\circ$

C3 Work out the size of angle y . Give your answer correct to 1 decimal place. [3 marks]



Not drawn accurately

C5 Leo works out $\sin x = \frac{13}{9}$ for an angle in a right-angled triangle. His calculator shows an error when he presses $\sin^{-1}$. Explain why his value of $\sin x$ cannot be right. [2 marks]

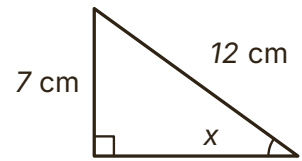
Answer $y = \dots\dots^\circ$

D1

Amir works out the size of angle x . He writes " $\tan x = \frac{7}{12}$ ", so $x = 30.3^\circ$ ".

[3 marks]

Amir is wrong. Explain his mistake and work out the correct size of angle x , correct to 1 decimal place.

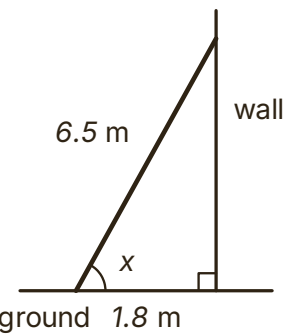


Answer $x = \dots\dots^\circ$

Not drawn accurately

D2 A ladder 6.5 m long leans against a vertical wall. The foot of the ladder is 1.8 m from the wall. A ladder is safe when the angle it makes with the ground is between 70° and 80° .

- (a) Work out the size of angle x . Give your answer correct to 1 decimal place. [2 marks]



Not drawn accurately

- (b) Work out how far up the wall the ladder reaches. Give your answer correct to 1 decimal place. [2 marks]

Answer

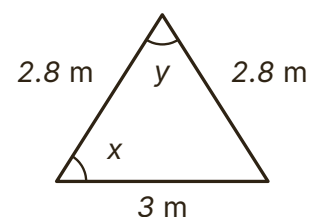
- (c) The foot of the ladder is moved 0.6 m closer to the wall. Is the ladder still safe? You must show your working. [2 marks]

Answer new angle = $\dots\dots^\circ$ safe: yes / no

Total for D2: 6 marks

D3 The front of a tent is an isosceles triangle. Its two sloping sides are 2.8 m long and it is 3 m wide at the ground.

- (a) Work out the angle x between a sloping side and the ground. Give your answer correct to 1 decimal place. [2 marks]



Not drawn accurately

Answer

(b) Work out the angle y at the top of the tent.

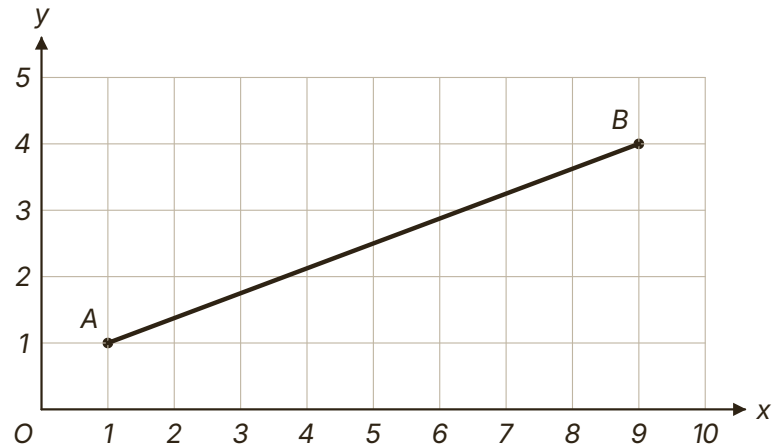
[2 marks]

Answer

Total for D3: 4 marks

- D4** A is the point $(1, 1)$ and B is the point $(9, 4)$. Work out the angle that the line AB makes with the x -axis. Give your answer correct to 1 decimal place. [3 marks]

Answer°

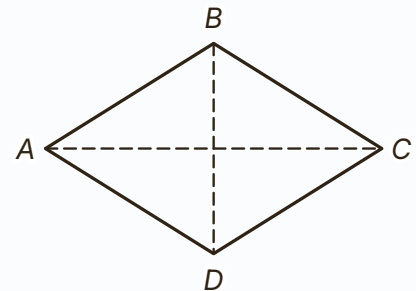


E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** $ABCD$ is a rhombus. Its diagonals are $AC = 16$ cm and $BD = 9$ cm. Work out the size of each angle of the rhombus. Give your answers correct to 1 decimal place. [5 marks]



Answer° and°

Not drawn accurately

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** The diagonals of a rhombus cut each other in half at right angles. This makes four right-angled triangles.
- Hint 2** Each right-angled triangle has shorter sides 8 cm and 4.5 cm. Call the angle at A in one of them a : $\tan a = \frac{4.5}{8}$.
- Hint 3** $a = 29.36^\circ$, so that angle of the rhombus is $2a = 58.7^\circ$. The other angle is $180 - 58.7 = 121.3^\circ$. Two angles are 58.7° and two are 121.3° .

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can choose sine, cosine or tangent from the two sides I know.



I can use the inverse buttons on my calculator to find an angle.



I can split an isosceles triangle into two right-angled triangles to find its angles.

