



Trigonometry in context

About 50 minutes Calculator allowed 41 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** From chapter 8 [2 marks]
- In a right-angled triangle, angle $\theta = 60^\circ$ and the side next to θ (not the hypotenuse) is 7 cm. Find the length of the hypotenuse.
- Answer

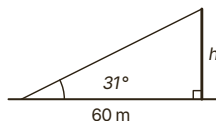
- Answer
- A3** From chapter 8 [2 marks] **A4** From chapter 3 [2 marks]
- Expand and simplify $(x - 3)(x - 2)(x - 4)$.
- Answer
- A pie chart shows how 180 people travel to school. The angle for car is 100° , the angle for walk is x° and the angle for bus is $(4x + 20)^\circ$. How many people chose bus?
- Answer

B Examples, then your turn

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

EXAMPLE 1

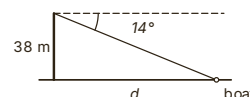
From 60 m away on level ground, the angle of elevation of the top of a tree is 31° . Work out its height h , to 1 d.p.



Not drawn accurately

Hint Measure up from the horizontal: h is opposite, 60 m adjacent.

- B1** [3 marks]
- From the top of a 38 m lighthouse, the angle of depression of a boat is 14° . Work out the distance d to the boat, to 1 d.p.

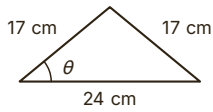


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Answer

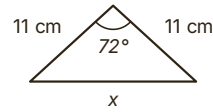
EXAMPLE 2

An isosceles triangle has two equal sides of 17 cm and a base of 24 cm. Work out the base angle θ , to 1 d.p.



Not drawn accurately

Hint The height cuts the base in half: hypotenuse 17 cm, base 12 cm.

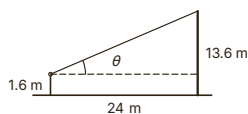
B2 An isosceles triangle has equal sides of 11 cm with 72° between them. Work out its base x , to 1 d.p. [3 marks]

Not drawn accurately

Answer

c Practice

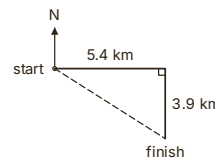
- C1** Ravi's eyes are 1.6 m above level ground. He stands 24 m from the foot of a flagpole 13.6 m tall. Work out the angle of elevation θ of the top of the flagpole from his eyes, to 1 decimal place. [3 marks]



Not drawn accurately

Answer

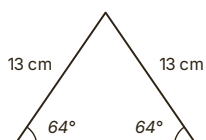
- C2** A walker goes 5.4 km due east from her start, then 3.9 km due south to her finish. Work out the bearing of her finish from her start, to the nearest degree. [3 marks]



Not drawn accurately

Answer

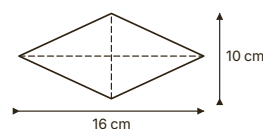
- C3** An isosceles triangle has two equal sides of 13 cm and two base angles of 64° . Work out the area of the triangle, to 3 significant figures. [4 marks]



Not drawn accurately

Answer

- C4** A rhombus has diagonals of 16 cm and 10 cm. Work out the size of each obtuse angle of the rhombus, to 1 decimal place. [3 marks]



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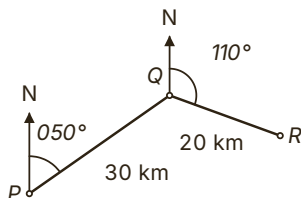
Answer

D Exam-style questions

- D1** From a boat, the angle of elevation of the top of a vertical cliff is 41° . Tom says, "So the angle of depression of the boat from the top of the cliff is 49° ." [2 marks]

Explain why Tom is wrong, and give the correct angle.

- D2** A ship leaves port P and sails 30 km on a bearing of 050° to Q . It then sails 20 km on a bearing of 110° to R .



Not drawn accurately

- (a) Show that R is 41.8 km east and 12.4 km north of P , each to 1 decimal place. [5 marks]
- (b) Work out the bearing of R from P . Give your answer to the nearest degree. [3 marks]

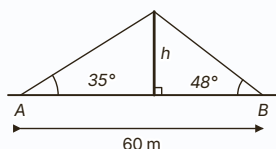
Answer

Total for D2: 8 marks

E Extension

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

- E1** A and B are 60 m apart on level ground, on opposite sides of a vertical tower and in line with its foot. From A and B the angles of elevation of its top are 35° and 48° . Work out its height h , to 1 d.p. [4 marks]



Not drawn accurately

Answer

Extension hints

Cover these with paper. Uncover one at a time.

E1 **Hint 1** Write the distance from A to the foot in terms of h .

Hint 2
$$\frac{h}{\tan 35^\circ} + \frac{h}{\tan 48^\circ} = 60.$$

Hint 3
$$h(1.428\dots + 0.900\dots) = 60.$$

How did it go?

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

I can use elevation and depression. ☐ ☐ ☐

I can solve bearing journeys. ☐ ☐ ☐

I can halve an isosceles triangle. ☐ ☐ ☐