STEM SMART Single Maths 3 - Trigonometry

Applications of Trigonometry 7

Essential GCSE Maths 50.7

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** GCSE P3, A Level P1

A garden designer is planning to build a semi-circular patio on one side of a triangular lawn.

The plans are shown in the diagram.

In this exercise give your answers to 3 sf.

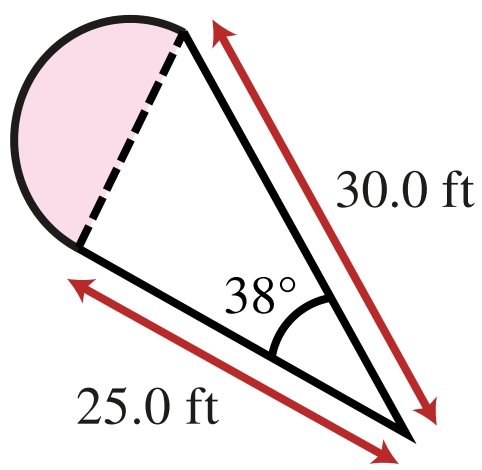

Figure 1: A plan of the garden with a triangular lawn and a semi-circular patio.

Part A

What will the area of the lawn be?

What will the area of the lawn be?

Part B

What will the area of the patio be?

What will the area of the patio be?

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Applications of Trigonometry 9

Essential GCSE Maths 50.9

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** GCSE C3, A Level P1

A landowner has a triangular piece of land. They are planning to build a path along the boundary of the land, and plant trees in the centre. Each tree will need $50\,\mathrm{m}^2$ of land when it is mature. The landowner knows that some trees will not survive to maturity. They plant 30% more trees than the maximum suggested by an area calculation.

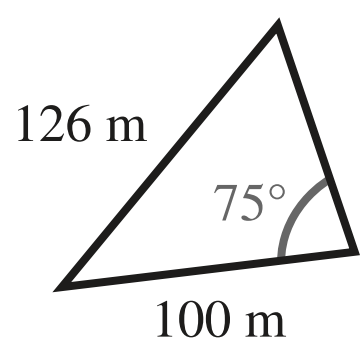

Figure 1: A plan of the piece of land that trees are going to be planted on.

Part A

How long is the path?

How long is the path? Give your answer to 3 sf.

Part B

How many trees will be planted?

Assuming that the landowner plants as many trees as possible, how many trees will be planted? Round your answer to the nearest whole tree.

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Sine and Cosine Rules and Area 3i

Subject & topics: Maths **Stage & difficulty:** A Level P1

A landmark L is observed by a surveyor from three points A, B and C on a straight horizontal road, where $AB = BC = 200\,\text{m}$. Angles LAB and LBA are $65\,^\circ$ and $80\,^\circ$ respectively (see **Figure 1**).

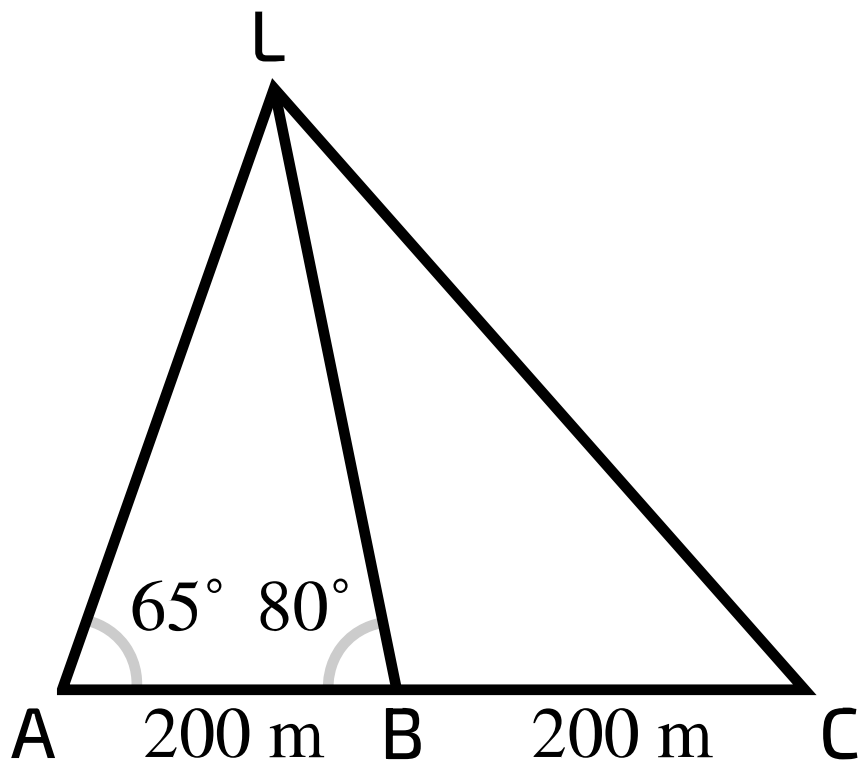

Figure 1: A triangle where $AB = BC$ and B connects to L

Part A

Shortest distance

Calculate the shortest direct distance from L to the road. Give your answer in metres, to the nearest metre.

Part B

Distance LC

Calculate the distance LC. Give your answer in metres, to the nearest metre.

Used with permission from UCLES, A Level Maths, January 2005, OCR C2, Question 3

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isaac You work it out.

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Trigonometry 9

Essential GCSE Maths 41.9

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** GCSE C3, A Level C1

The diagram shows a ship near the coast. The ship is at point A, $200\,\mathrm{m}$ from a buoy at B. On the cliff top there is a lighthouse. The tip of the lighthouse (point C) is a distance y above the level of the sea at D.

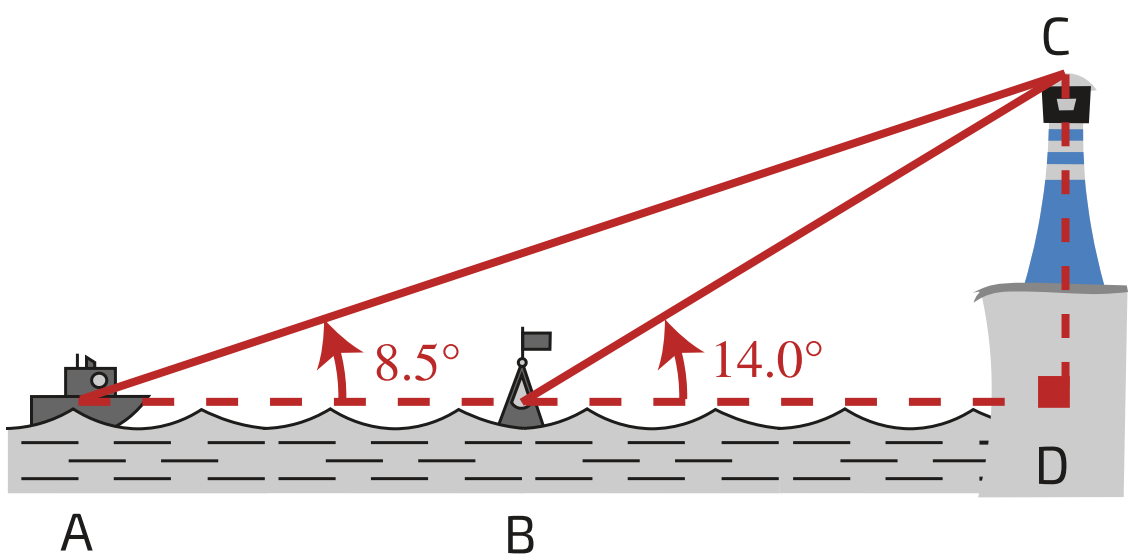

Figure 1: A diagram of the lighthouse, the ship and the buoy.

The angle of elevation of the top of the lighthouse is $8.5°$ at A and $14.0°$ at B.

What is the value of y?

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isaac You work it out.

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Exact Values of Angles 1

Pre-Uni Maths for Sciences H2.2

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** GCSE C3, A Level P1

For the range $0 \leq \theta \leq 360°$, write down all the values of θ for which: (a) $\sin\theta = \frac{\sqrt{3}}{2}$, (b) $\sin\theta = -\frac{1}{2}$.

- If $\sin\theta = \frac{\sqrt{3}}{2}$, then $\theta =$ ☐ or $\theta =$ ☐.
- If $\sin\theta = -\frac{1}{2}$, then $\theta =$ ☐ or $\theta =$ ☐.

Items:

$30°$ $45°$ $60°$ $90°$ $120°$ $150°$ $180°$ $210°$ $240°$ $270°$ $300°$ $315°$ $330°$ $360°$

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Values of Angles 1

Pre-Uni Maths for Sciences H2.7

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** A Level P1

It is given that $\sin\alpha = 0.2$, where $-180^\circ \leq \alpha \leq 180^\circ$.

Part A

Values of α

Deduce the number of values of α, satisfying the equation, in this range.

Part B

Largest value of α

Find the largest positive value of α satisfying the equation in this range. Give your answer to 3 sf.

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Values of Angles 2

Pre-Uni Maths for Sciences H2.8

Subject & topics: Maths | Geometry | Trigonometry **Stage & difficulty:** A Level P1

It is given that $\sin(2\alpha) = -0.4$, where $-180° \leq \alpha \leq 180°$.

Part A
Values of α

Deduce the number of values of α, satisfying the equation, in this range.

Part B
Smallest positive value of α

Find the smallest positive value of α in this range. Give your answer to 3 sf.

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Question deck:

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isaac You work it out.

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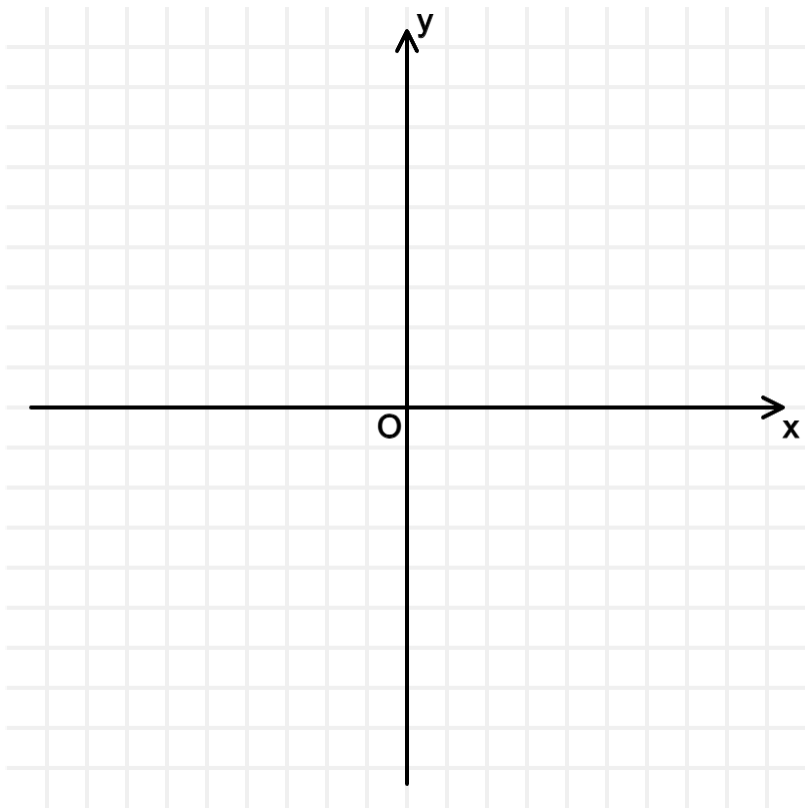
Trigonometry: Basic Functions 1i

Subject & topics: Maths **Stage & difficulty:** A Level P1

Part A
Sketch a trig function

Sketch the graph of $y = 2\cos x$ for $0° \leq x \leq 360°$.



Part B
A trig equation

Solve the equation $2\cos x = 0.8$, in the interval $0° \leq x \leq 360°$, to 3 significant figures.

Part C

Equating trig functions

Solve the equation $2\cos x = \sin x$, in the interval $-180^\circ \leq x \leq 180^\circ$, to 3 significant figures.

Question deck:

STEM SMART Single Maths 3 - Trigonometry

isaac You work it out.

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Trigonometry: Identities and Equations 3i

Subject & topics: Maths **Stage & difficulty:** A Level P1

Part A

Quadratic equation

Write $15\cos^2\theta = 13 + \sin\theta$ as a quadratic equation in $\sin\theta$.

The following symbols may be useful: `cos(), sin(), tan(), theta`

Part B

Solve equation

Solve the equation $15\cos^2\theta = 13 + \sin\theta$ in the interval $0^\circ \leq \theta \leq 360^\circ$, giving the solutions in degrees to 3 significant figures.

Used with permission from UCLES, A Level Maths, June 2012, OCR C2, Question 4

Question deck:
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isaac You work it out.

STEM SMART Single Maths 3 - Trigonometry

Trigonometry: Basic Functions 1ii

Subject & topics: Maths **Stage & difficulty:** A Level P1

Part A

$\sin\left(\frac{1}{2}x\right) = 0.8$

Solve $\sin\left(\frac{1}{2}x\right) = 0.8$, for $0° \leq x \leq 360°$. Give your answer in degrees, to 3 significant figures.

Enter your answers in order from lowest value of x to highest.

[ ] ° (lowest value)

[ ] ° (highest value)

Part B

$\sin x = 3\cos x$

Solve $\sin x = 3\cos x$, for $0° \leq x \leq 360°$. Give your answer in degrees, to 3 significant figures.

Enter your answers in order from lowest value of x to highest.

[ ] ° (lowest value)

[ ] ° (highest value)