Applications of Trigonometry 7

GCSE P P P A Level P P P

Essential GCSE Maths 50.7

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.

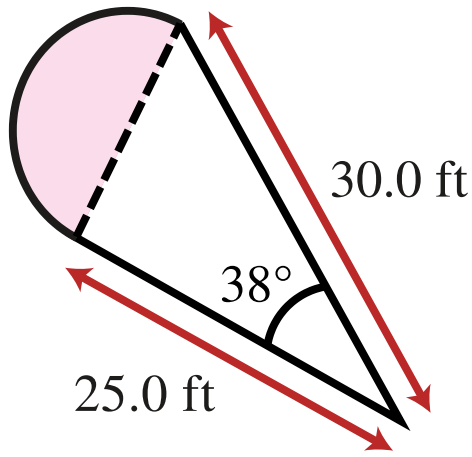

Figure 1: A plan of the garden with a triangular lawn and a semi-circular patio.

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?

Applications of Trigonometry 9

GCSE C C C A Level P P P

Essential GCSE Maths 50.9

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.

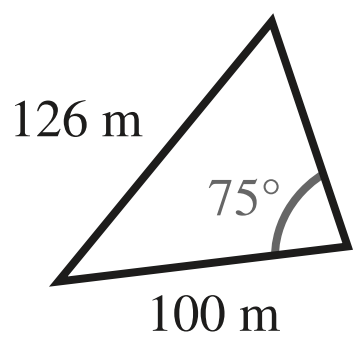

Figure 1: A plan of the piece of land that trees are going to be planted on.

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.

Gameboard:
STEM SMART Single Maths 3 - Trigonometry

Sine and Cosine Rules and Area 3i

A Level

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**).

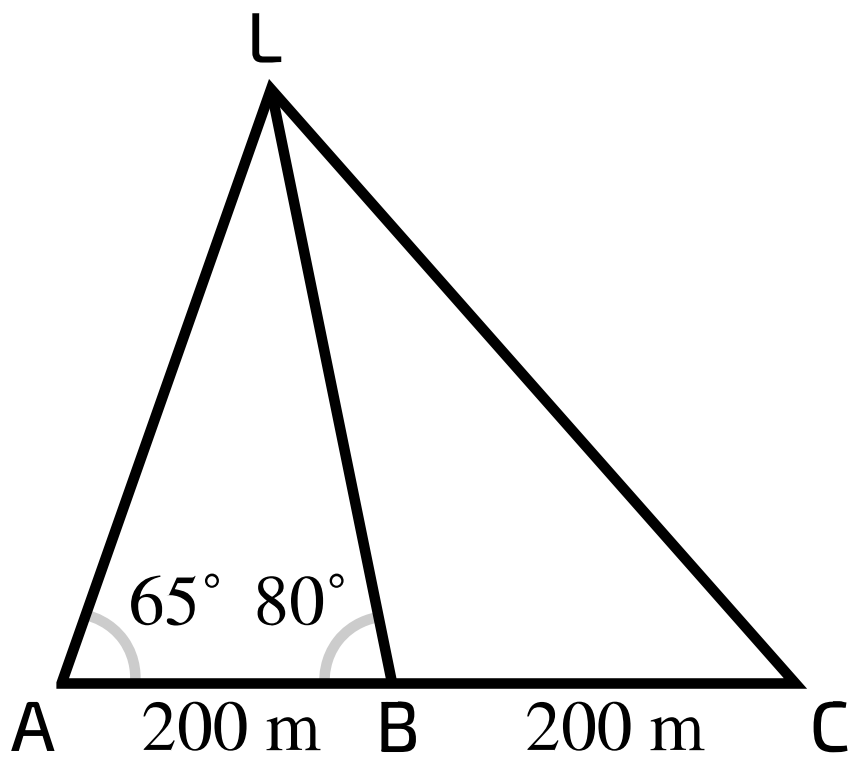

Figure 1: A triangle where $AB = BC$ and B connects to L

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

Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Trigonometry 9

Essential GCSE Maths 41.9

GCSE C C C A Level C C C

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.

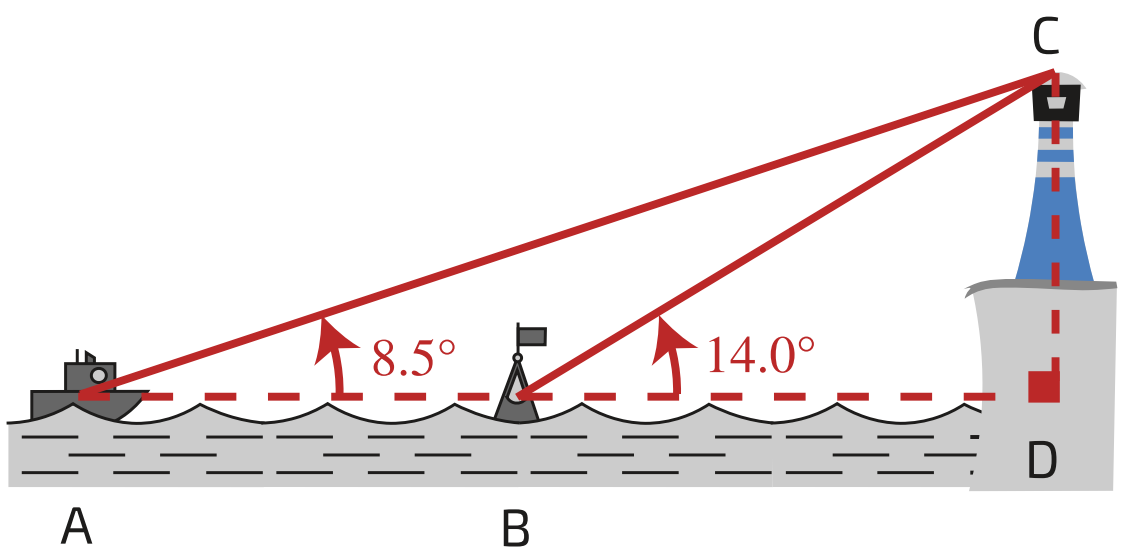

Figure 1: A diagram of the lighthouse, the ship and the buoy.

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?

Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Exact Values of Angles 1

GCSE C C C

A Level P P P

Pre-Uni Maths for Sciences H2.2

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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Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Physics. You work it out.

Values of Angles 1

A Level

P P P

Pre-Uni Maths for Sciences H2.7

It is given that $\sin\alpha = 0.2$, 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 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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Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Values of Angles 2

A Level

P P P

Pre-Uni Maths for Sciences H2.8

It is given that $\sin(2\alpha) = -0.4$, 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 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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Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Trigonometry: Basic Functions 1i

A Level

P P P

Part A Sketch a trig function

Sketch the graph of $y = 2\cos x$ for values of x such that $0° \leq x \leq 360°$, indicating the coordinates of any points where the curve meets the axes. You can check your sketch after giving the correct answer.

Give the value of the smallest root in degrees.

Part B A trig equation

Solve the equation $2\cos x = 0.8$, giving the highest value of x between $0°$ and $360°$ to 3 significant figures.

Part C Equating trig functions

Solve the equation $2\cos x = \sin x$, giving the value of x between $-180°$ and $180°$ that has the largest negative value. Give your answer to 3 significant figures.

Used with permission from UCLES, A Level Maths, January 2007, OCR C2, Question 7

Gameboard:
STEM SMART Single Maths 3 - Trigonometry

Trigonometry: Identities and Equations 3i

A Level

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 $15\cos^2\theta = 13 + \sin\theta$ giving the second largest value in the range $0^\circ \leqslant \theta \leqslant 360^\circ$, in degrees to 4 significant figures.

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Gameboard:

STEM SMART Single Maths 3 - Trigonometry

Trigonometry: Basic Functions 1ii

A Level

P P P

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.

$\square$ ° (lowest value)

$\square$ ° (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.

$\square$ ° (lowest value)

$\square$ ° (highest value)

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