

# Essential GCSE Maths 50.7

GCSE

A Level

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 s.f..

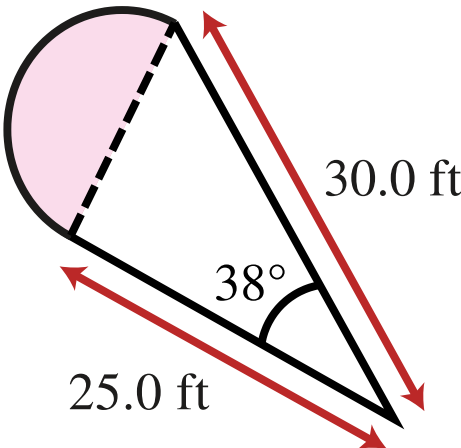


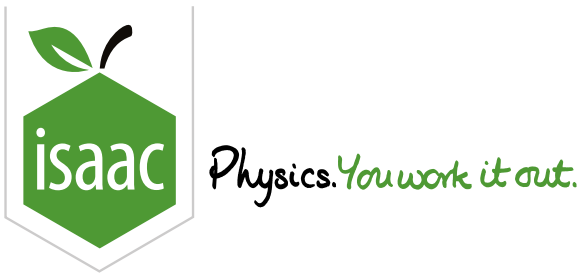
Figure 1: A plan of the garden with a triangular lawn and a semi-circular patio.

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?



# Essential GCSE Maths 50.9

GCSE

A Level

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  $50\text{ m}^2$  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.

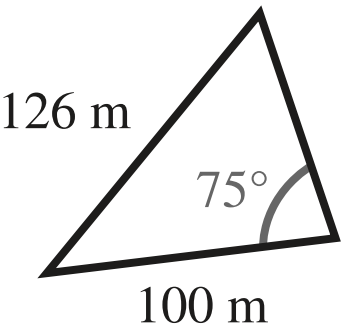


Figure 1: A plan of the piece of land that trees are going to be planted on.

## Part A   How long is the path?

How long is the path? Give your answers to 3 s.f..

## 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](#)



Physics. *You work it out.*

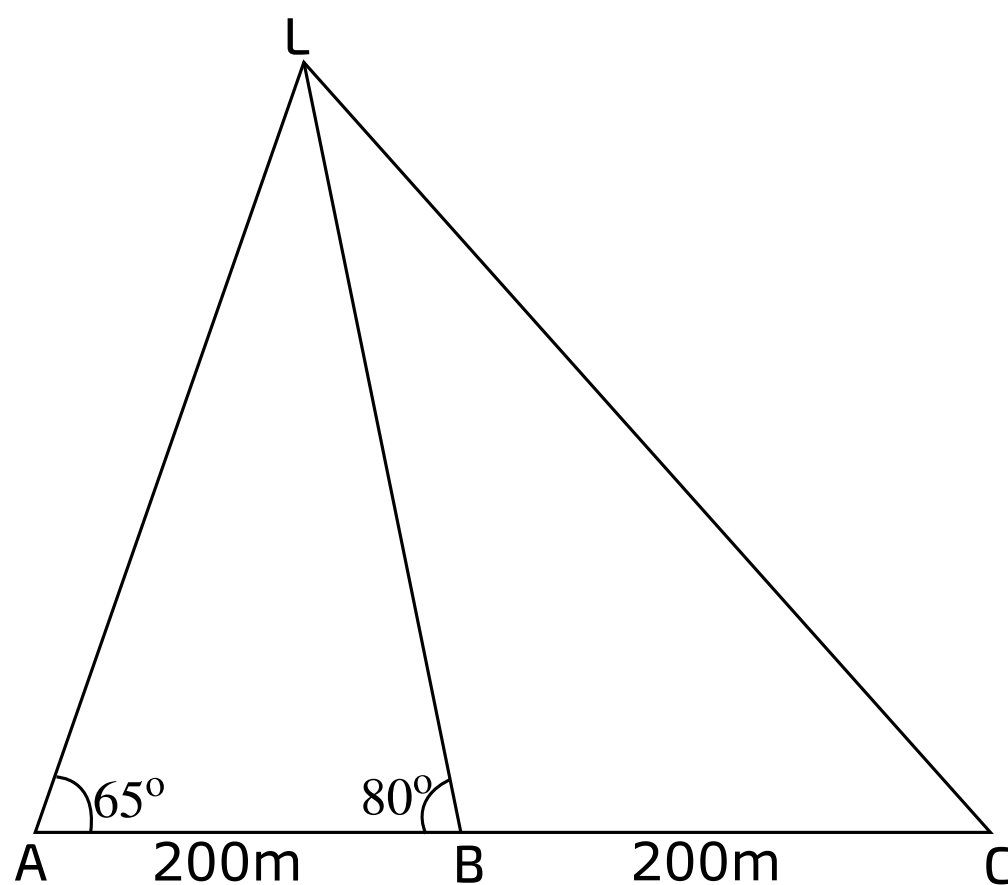
[Home](#) [Gameboard](#) [Maths](#) [Sine and Cosine Rules and Area 3i](#)

# 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  $AB = BC = 200$  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 distance from  $L$  to the road. Give your answer in metres, to the nearest metre.

## Part B Distance LC

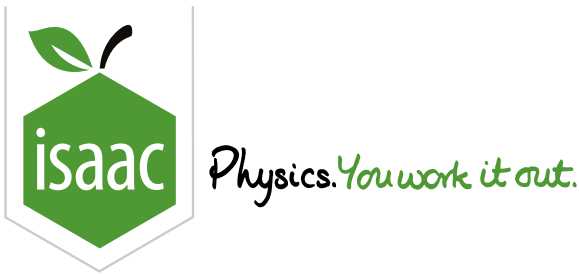
Calculate the distance  $LC$ . Give your answer in metres, to the nearest metre.

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

Gameboard:

**STEM SMART Single Maths 3 - Trigonometry**

All materials on this site are licensed under the **Creative Commons license**, unless stated otherwise.



# Essential GCSE Maths 41.9

GCSE

A Level

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

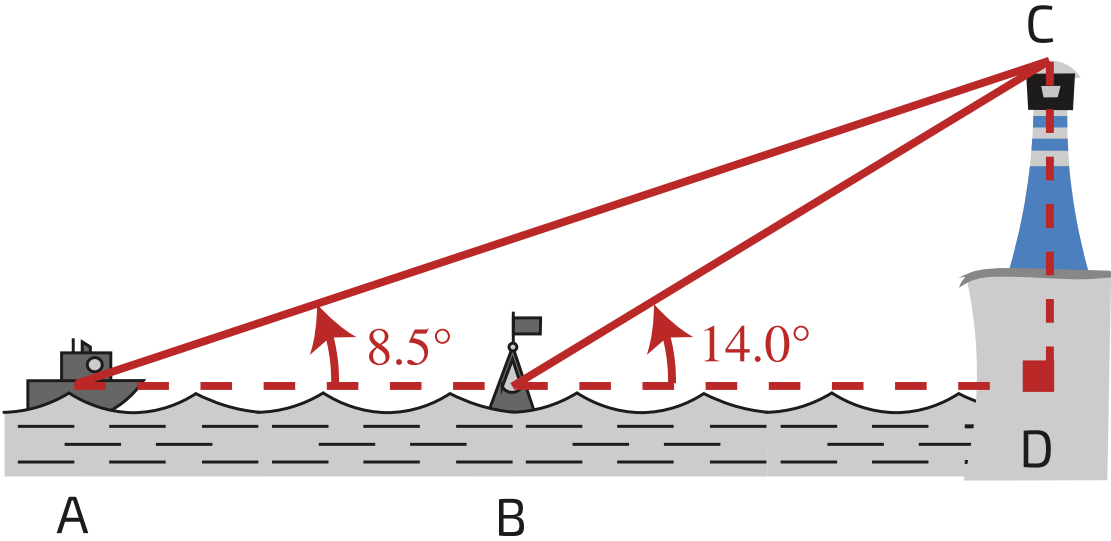


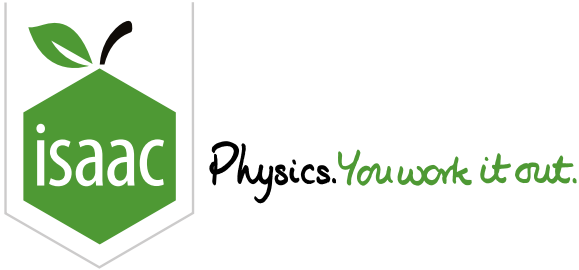
Figure 1: A diagram of the lighthouse, the ship and the buoy.

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

What is the value of  $y$ ?

Gameboard:  
[STEM SMART Single Maths 3 - Trigonometry](#)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



# Exact Values of Angles 1

GCSE

A Level

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

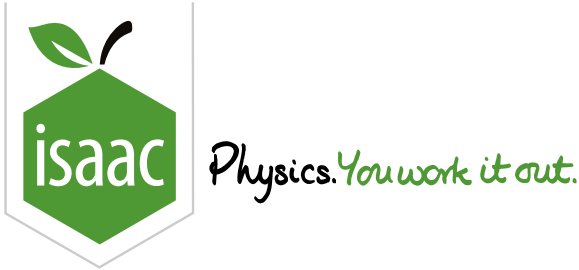
- ☐ (a)  $30^\circ$ ,  $150^\circ$ , (b)  $210^\circ$ ,  $330^\circ$
- ☐ (a)  $60^\circ$ ,  $120^\circ$ , (b)  $240^\circ$ ,  $300^\circ$
- ☐ (a)  $30^\circ$ ,  $150^\circ$ , (b)  $240^\circ$ ,  $300^\circ$
- ☐ (a)  $60^\circ$ ,  $300^\circ$ , (b)  $150^\circ$ ,  $330^\circ$
- ☐ (a)  $60^\circ$ ,  $120^\circ$ , (b)  $210^\circ$ ,  $330^\circ$

Created for isaacphysics.org by Julia Riley.

Gameboard:

**STEM SMART Single Maths 3 - Trigonometry**

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



# Values of Angles 1

GCSE

A Level

For the range  $-180^\circ \leq \alpha \leq 180^\circ$ , consider all the values of  $\alpha$  which satisfy  $\sin \alpha = 0.2$ .

Part A   Values of  $\alpha$

How many values of  $\alpha$ , satisfying the equation, are in this range?

Part B   Largest value of  $\alpha$

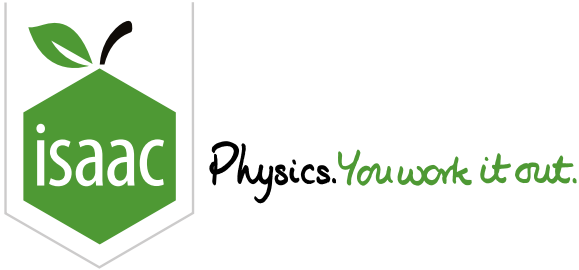
What is the largest positive value of  $\alpha$  satisfying the equation in this range? Give your answer to 3.s.f.

Created for isaacphysics.org by Julia Riley.

Gameboard:

**STEM SMART Single Maths 3 - Trigonometry**

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Values of Angles 2

GCSE

C

C

C

A Level

P

P

P

For the range  $-180^\circ \leq \beta \leq 180^\circ$ , consider all the values of  $\beta$  which satisfy  $\sin(2\beta) = -0.4$ .

Part A   Values of  $\beta$

How many values of  $\beta$ , satisfying the equation, are in this range?

Part B   Smalest positive value of  $\beta$

What is the smallest positive value of  $\beta$  in this range? Give your answer to 3.s.f.

Created for isaacphysics.org by Julia Riley.

Gameboard:  
[STEM SMART Single Maths 3 - Trigonometry](#)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.





Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Trigonometry: Basic Functions 1i](#)

# Trigonometry: Basic Functions 1i

A Level



## Part A Sketch a trig function

Sketch the graph of  $y = 2 \cos x$  for values of  $x$  such that  $0^\circ \leq x \leq 360^\circ$ , 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  $0^\circ$  and  $360^\circ$  to 3 significant figures.

## Part C Equating trig functions

Solve the equation  $2 \cos x = \sin x$ , giving the value of  $x$  between  $-180^\circ$  and  $180^\circ$  that has the largest negative value.

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

Gameboard:

[STEM SMART Single Maths 3 - Trigonometry](#)

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.



Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Trigonometry: Identities and Equations 3i](#)

# Trigonometry: Identities and Equations 3i



## 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  $0^\circ \leq \theta \leq 360^\circ$ , in degrees to 4 significant figures.

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

Gameboard:

**STEM SMART Single Maths 3 - Trigonometry**

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.

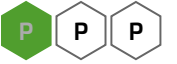


Physics. *You work it out.*

[Home](#) [Gameboard](#) [Maths](#) [Trigonometry: Basic Functions 1ii](#)

# Trigonometry: Basic Functions 1ii

A Level



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

Solve  $\sin\left(\frac{1}{2}x\right) = 0.8$ , for  $0^\circ \leq x \leq 360^\circ$ .

What is the lowest (smallest) solution? Give your answer in degrees, to 3 significant figures.

---

What is the highest (largest) solution? Give your answer in degrees, to 3 significant figures.

---

**Part B**  $\sin x = 3 \cos x$

Solve  $\sin x = 3 \cos x$ , for  $0^\circ \leq x \leq 360^\circ$ .

What is the lowest (smallest) solution? Give your answer in degrees, to 3 significant figures.

---

What is the highest (largest) solution? Give your answer in degrees, to 3 significant figures.

---

Used with permission from UCLES, A Level Maths, June 2013, OCR C2, Question 2

All materials on this site are licensed under the [Creative Commons license](#), unless stated otherwise.