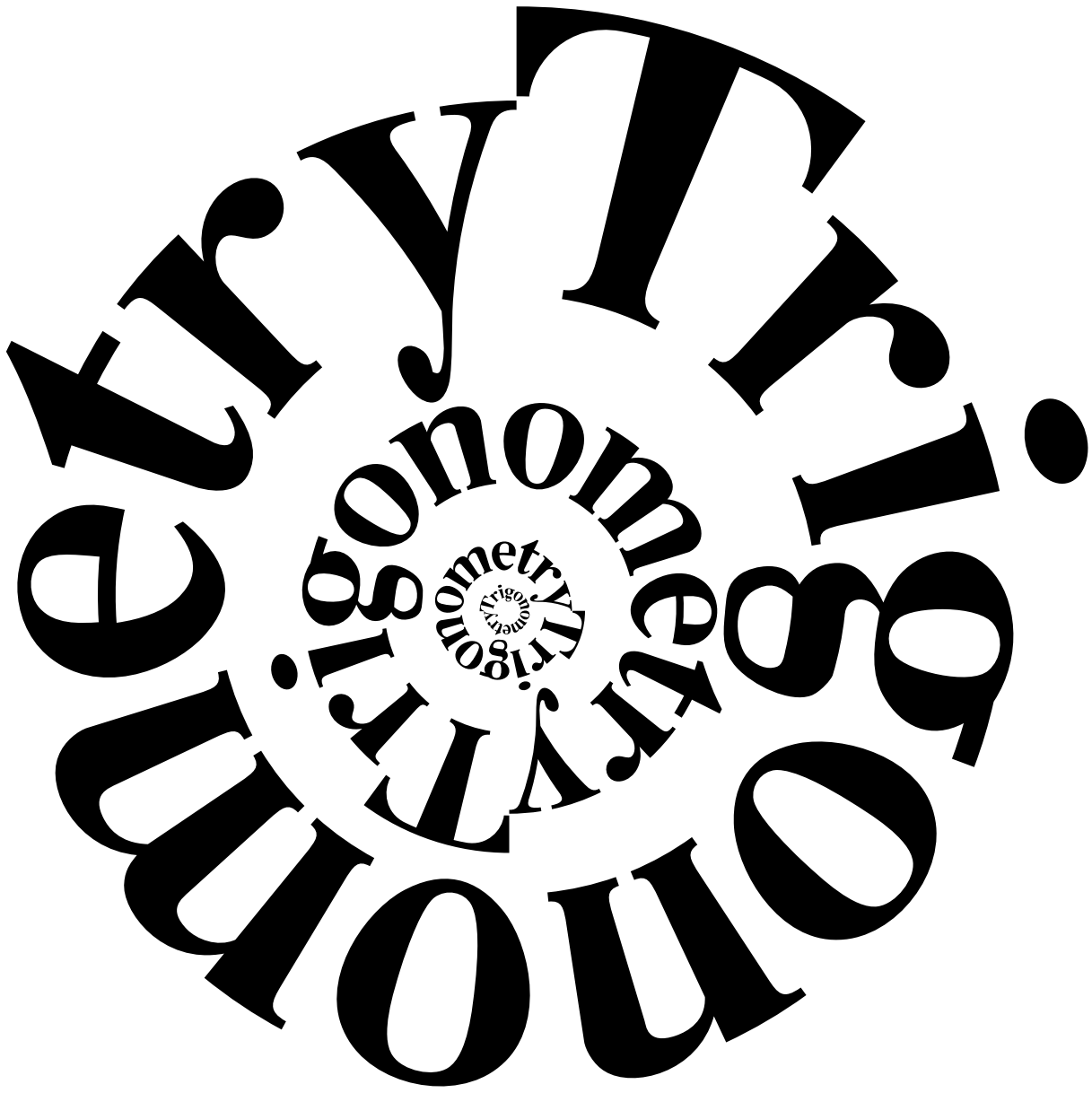
GCSE Mathematics

Non Right Angled

TRIGONOMETRY III



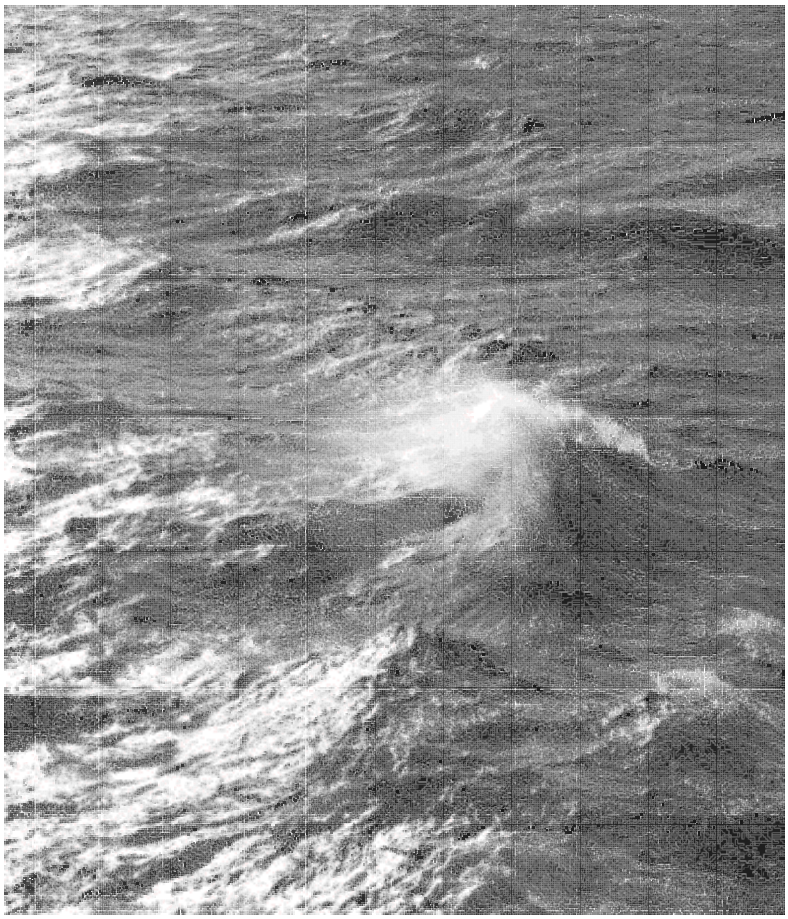
Lesson 1

GCSE Mathematics

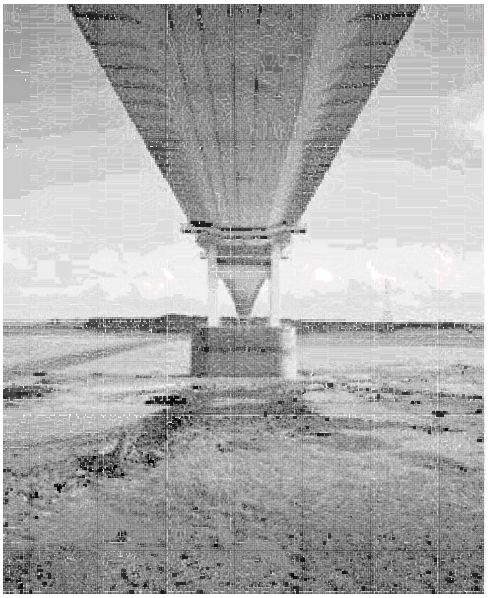
Non-Right Angled Trigonometry

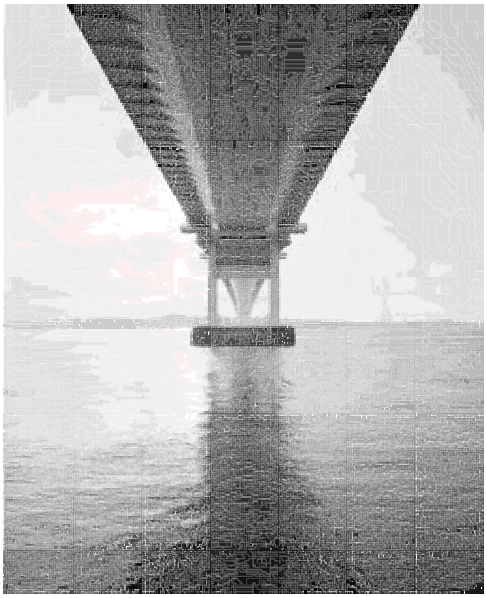
1.1 Waves

If asked to think of the Atlantic Ocean, amongst your thoughts would be 'waves'.

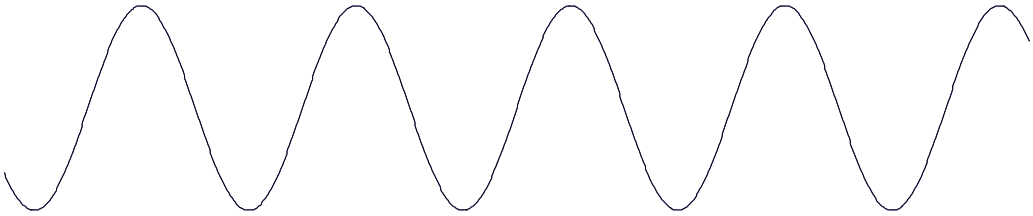


The tide is another 'wave' on the ocean that peaks and troughs about twice a day. Below, the left photo was taken at 8.30am, the right at 2.45pm, both of the same place below the Severn Bridge across the Bristol Channel.





Mathematically, a very pure and simple wave that is very useful at capturing many aspects of real-world waves is the sine wave.



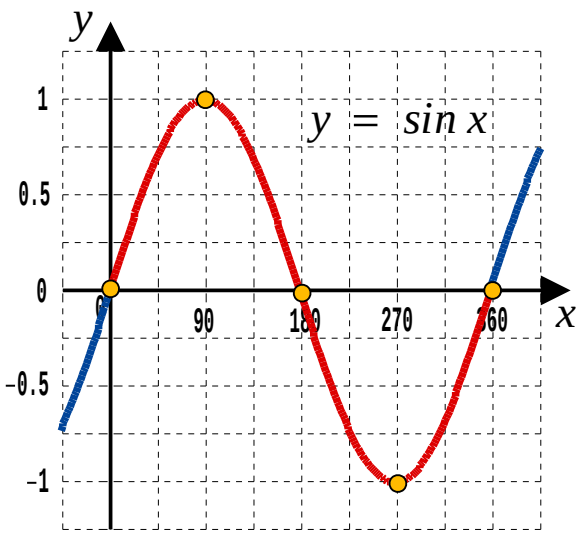
1.2 Mathematics Involving Waves

Example

(i) Use your calculator to find a solution to the equation;

$$y = \sin 30°$$

(ii) A section of the graph of $y = \sin x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \sin 270°$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

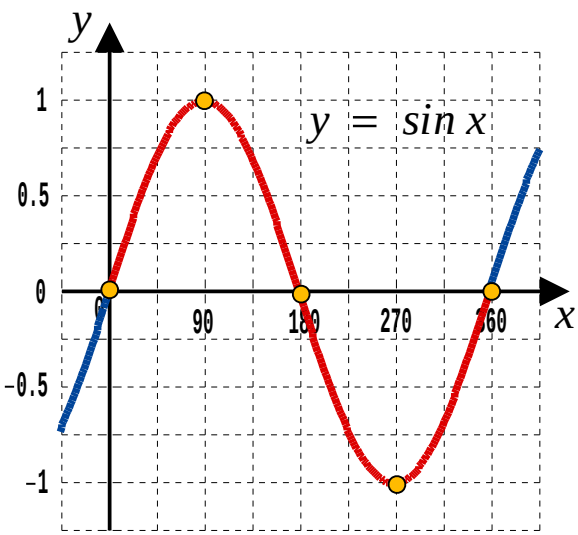
1.3 Exercise

Question 1

(i) Use your calculator to find a solution to the equation;

$$y = \sin 45°$$

(ii) A section of the graph of $y = \sin x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \sin 90°$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Question 2

Use your calculator to calculate in one go, the value of the following;

$$(\sin 30° + \sin 90°)^2$$

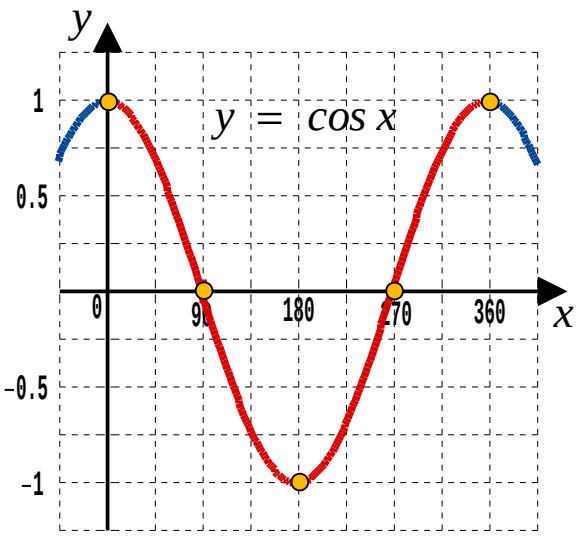
Give the exact answer.

Question 3

(i) Use your calculator to find a solution to the equation;

$$y = \cos 50°$$

(ii) A section of the graph of $y = \cos x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \cos 120°$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Question 4

Use your calculator to calculate in one go, the value of the following;

$$\sqrt{\cos 50°} + \cos 120°$$

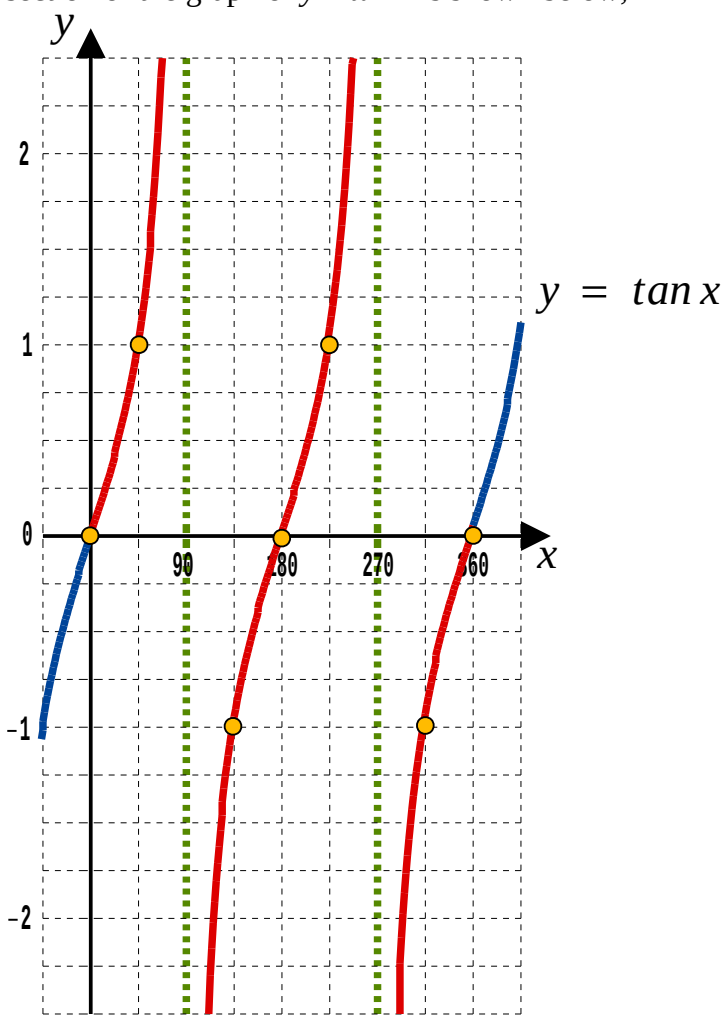
Give your answer accurate to 3 decimal places.

Question 5

(i) Use your calculator to find a solution to the equation;

$$y = \tan 60°$$

(ii) A section of the graph of $y = \tan x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \tan 315°$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Question 6

Use your calculator to calculate in one go, the value of the following;

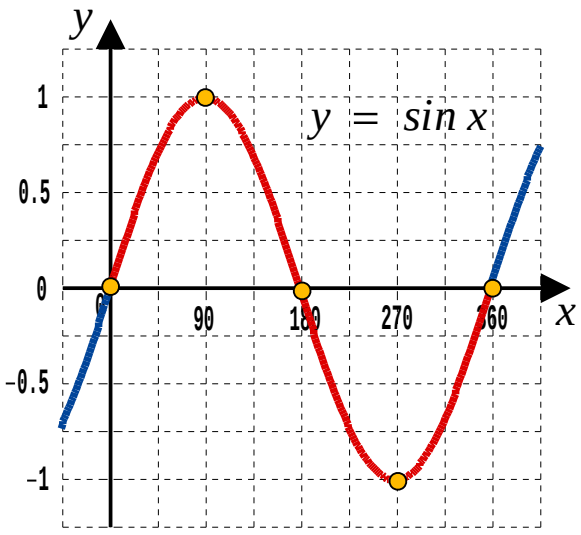
$$\sqrt{(\tan 60)^2 + (\tan 315)^2}$$

Question 7

(i) Use your calculator to find a solution to the equation;

$$y = \arcsin 0.75$$

(ii) A section of the graph of $y = \sin x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \arcsin(-0.6)$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Question 8

Use your calculator to calculate in one go, the value of the following;

$$\frac{\arcsin 0.75}{\arcsin(-0.6)}$$

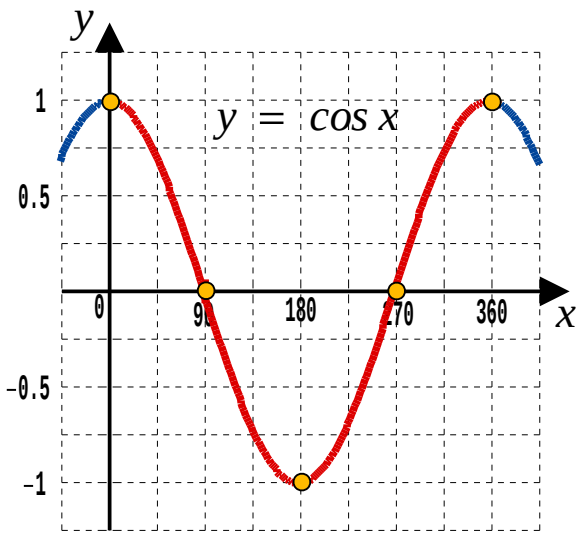
Give your answer correct to 3 decimal places.

Question 9

(i) Use your calculator to find a solution to the equation;

$$y = \arccos 0.4$$

(ii) A section of the graph of $y = \cos x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \arccos(-0.5)$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Question 10

Use your calculator to calculate in one go, the value of the following;

$$\sqrt{\arccos 0.4} + \sqrt{\arccos(-0.5)}$$

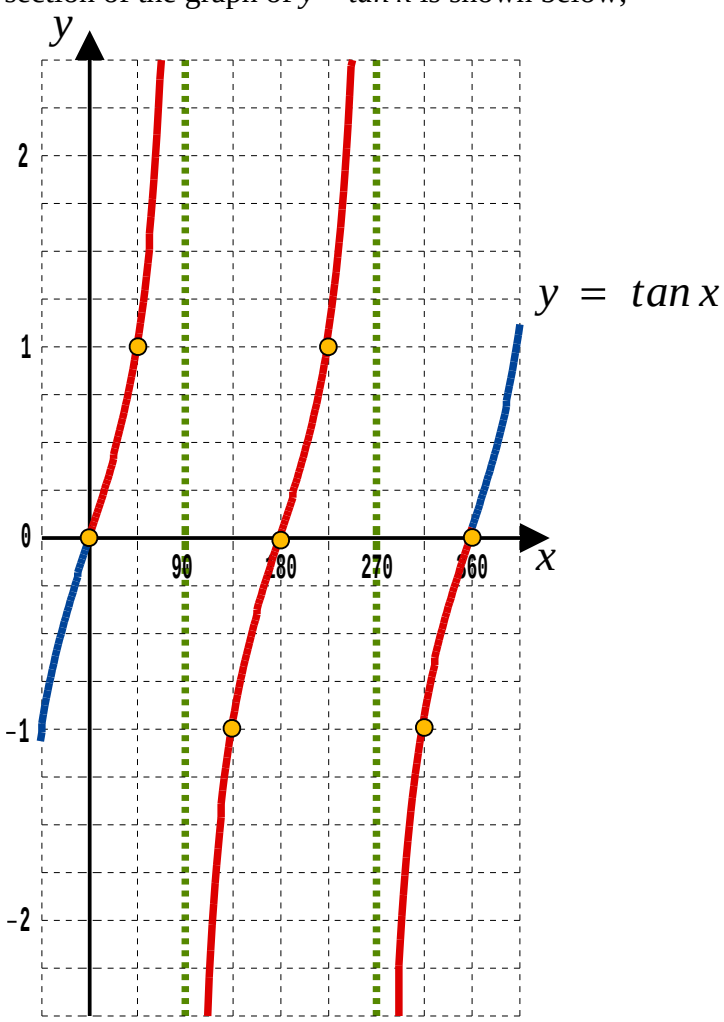
Give your answer accurate to 3 decimal places.

Question 11

(i) Use your calculator to find a solution to the equation;

$$y = \arctan 2$$

(ii) A section of the graph of $y = \tan x$ is shown below;



Show, by drawing on the graph, where your part **(i)** solution is.

(iii) Use your calculator to find a solution to the equation;

$$y = \arctan\left(\frac{1}{\sqrt{3}}\right)$$

(iv) Show, by drawing on the graph, where your part **(iii)** solution is.

Image : Storm Waves at Drake's Passage by Ralph Lee Hopkins
Image : Sea Change at the Severn Bridge by Michael Marten