

Trigonometric graphs and exact values

AS Pure Mathematics | Edexcel 8MA0 | 12 questions, 47 marks

A-level Maths topic practice



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Name: _____ **Date:** _____ **Score:** _____ / 47

- 1** Without using a calculator, find the exact value of
 $\sin 60^\circ \cos 30^\circ + \tan 45^\circ$

(2 marks)

Answer _____

- 2** Without using a calculator, find the exact value of
a. $\cos 150^\circ$
b. $\tan 225^\circ$
c. $\sin 300^\circ$

(3 marks)

Answer _____

- 3** The point $P(90^\circ, 1)$ lies on the curve with equation $y = \sin x$
Write down the coordinates of the point to which P is mapped on the curve with equation
a. $y = 3 \sin x$
b. $y = \sin(x - 60^\circ)$
c. $y = \sin 2x$
d. $y = \sin x - 2$

(4 marks)

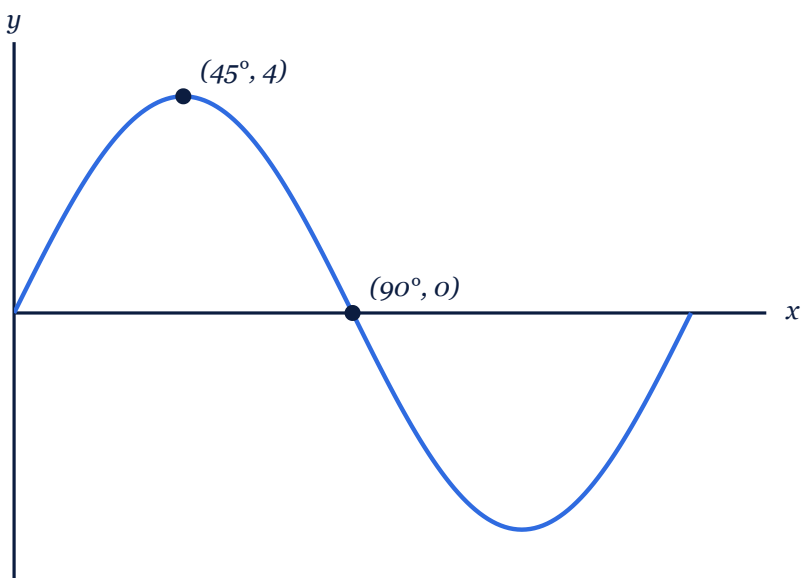
Answer _____

4

The diagram shows part of the curve with equation $y = a \sin bx$, where a and b are positive constants and x is in degrees.

The curve has a maximum point at $(45^\circ, 4)$ and crosses the positive x -axis for the first time at $(90^\circ, 0)$.

Find the value of a and the value of b .



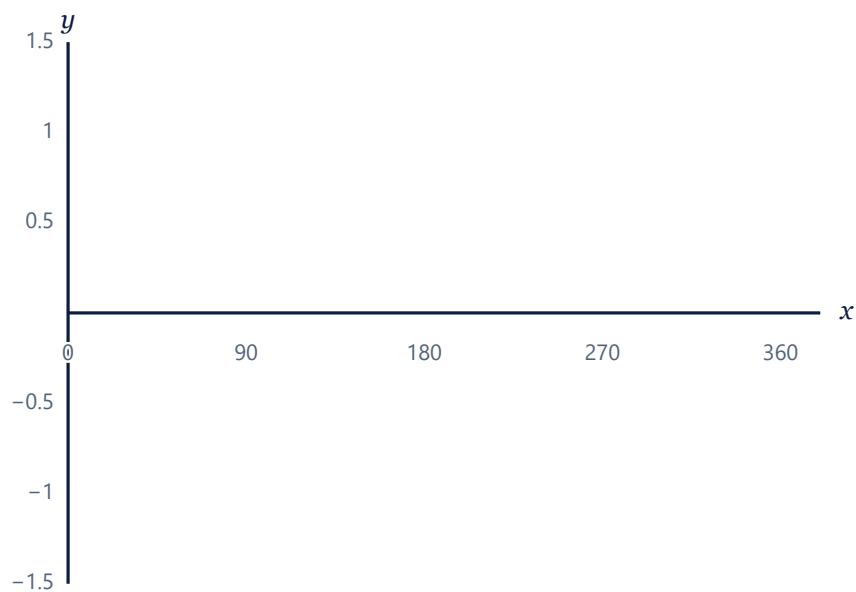
(3 marks)

Answer

5

On the axes provided, sketch the graph of $y = \sin(x + 30^\circ)$ for $0 \leq x \leq 360^\circ$

Give the coordinates of each point where the graph meets the coordinate axes.

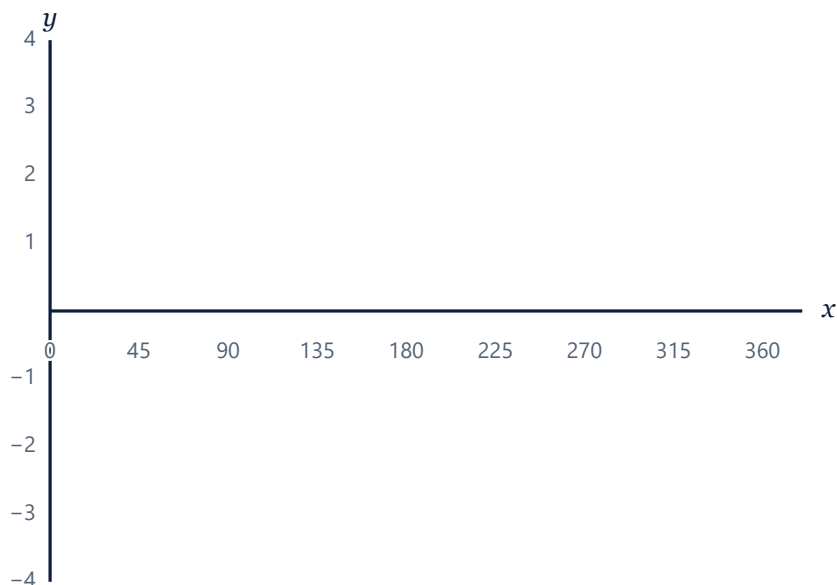


(4 marks)

Answer

6

- a. Describe fully the single transformation that maps the graph of $y = \tan x$ onto the graph of $y = \tan(x - 45^\circ)$
- b. Sketch the graph of $y = \tan(x - 45^\circ)$ for $0 \leq x \leq 360^\circ$, showing the equations of any asymptotes and the coordinates of the points where the graph meets the coordinate axes.



(4 marks)

Answer _____

7

The curve with equation $y = a + b \cos x$, where a and b are constants and $b > 0$, has a maximum value of 7 and a minimum value of -1

- a. Find the value of a and the value of b .
- b. Write down the coordinates of the minimum point of the curve for $0 \leq x \leq 360^\circ$

(4 marks)

Answer _____

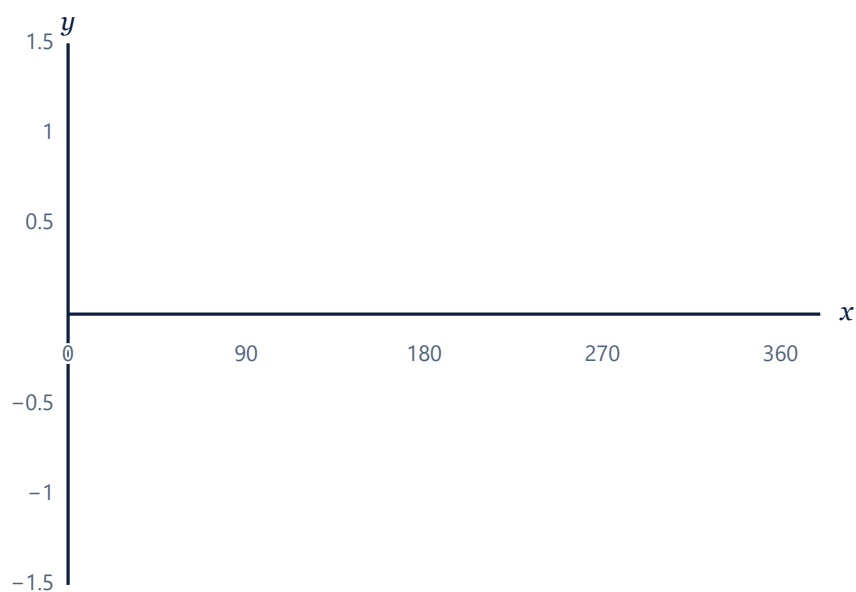
- 8 Without using a calculator, show that

$$\frac{1 + \tan 60^\circ}{1 - \tan 60^\circ} = -2 - \sqrt{3}$$

(4 marks)

Answer _____

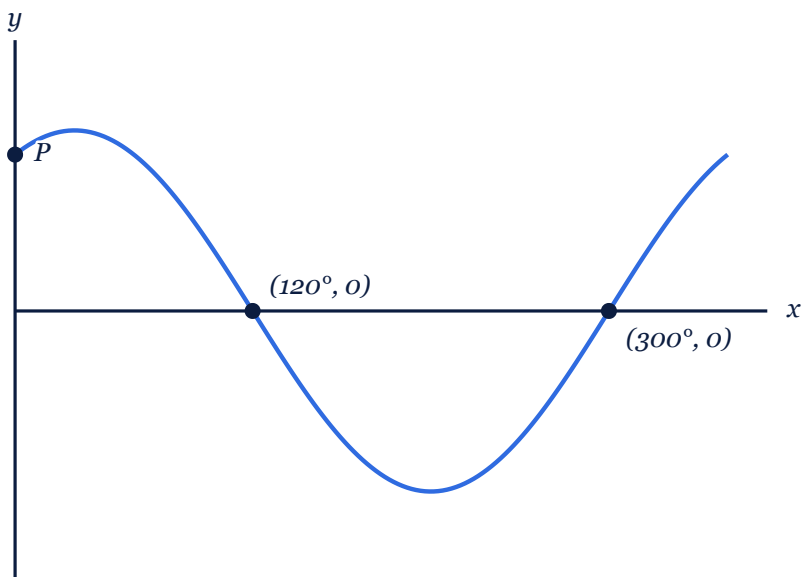
- 9
- On the same axes, sketch the graphs of $y = \sin 2x$ and $y = \cos x$ for $0 \leq x \leq 360^\circ$
 - Hence state the number of solutions of the equation $\sin 2x = \cos x$ in the interval $0 \leq x \leq 360^\circ$, giving a reason for your answer.



(4 marks)

Answer _____

- 10** The diagram shows part of the curve with equation $y = \sin(x + \alpha)$, where $0 < \alpha < 90^\circ$. The curve crosses the x -axis at $(120^\circ, 0)$ and $(300^\circ, 0)$ and crosses the y -axis at the point P .
- Find the value of α .
 - Find the exact y -coordinate of P .



(4 marks)

Answer _____

- 11** Given that $\sin 20^\circ = p$, find, in terms of p
- $\sin 160^\circ$
 - $\sin 340^\circ$
 - $\cos 70^\circ$
 - $\tan 20^\circ$

(5 marks)

Answer _____

12

The depth of water, D metres, at the entrance to a harbour in Cornwall is modelled by

$$D = 6 + 2.5 \sin(30t)^\circ, \quad 0 \leq t < 24$$

where t is the time in hours after midnight.

- Find the maximum depth of the water and the first time after midnight at which it occurs.
- State the time, in hours, between one high tide and the next.
- A fishing boat can only pass the entrance when the depth is at least 7.25 m. Find the first period of time after midnight during which the boat can pass.

(6 marks)

Answer _____

End of questions | Total 47 marks