

Name: _____

GCSE (1 – 9)

Trig and Exponential Graphs

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

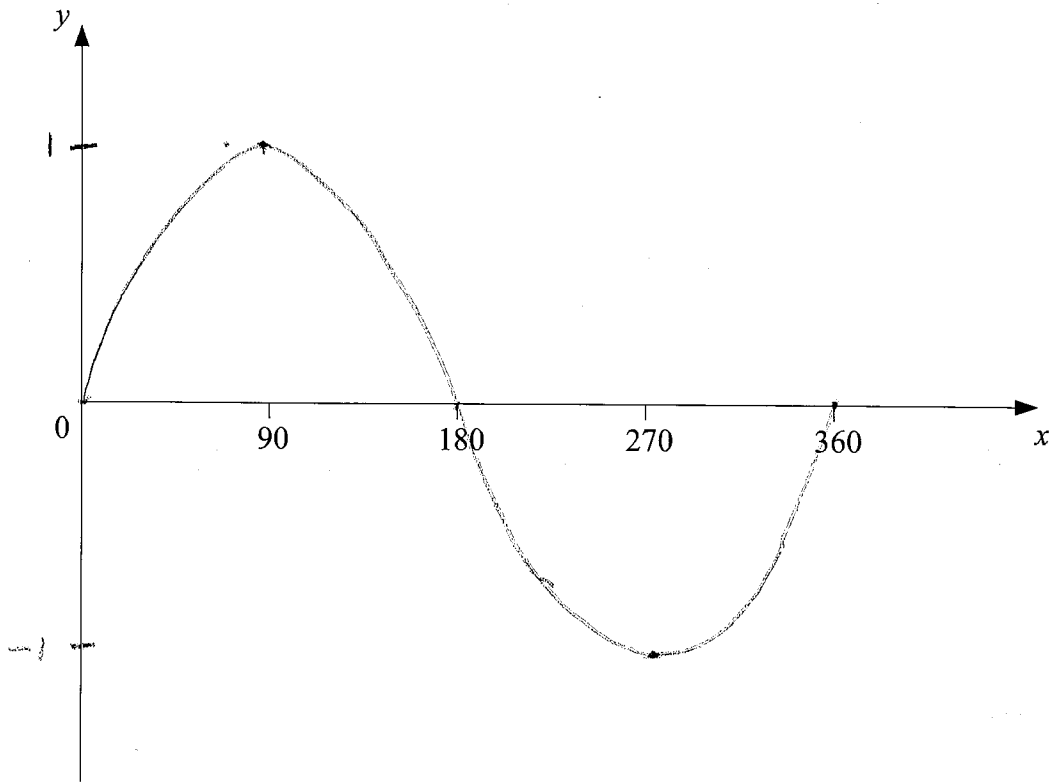
Information

- The marks for each question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

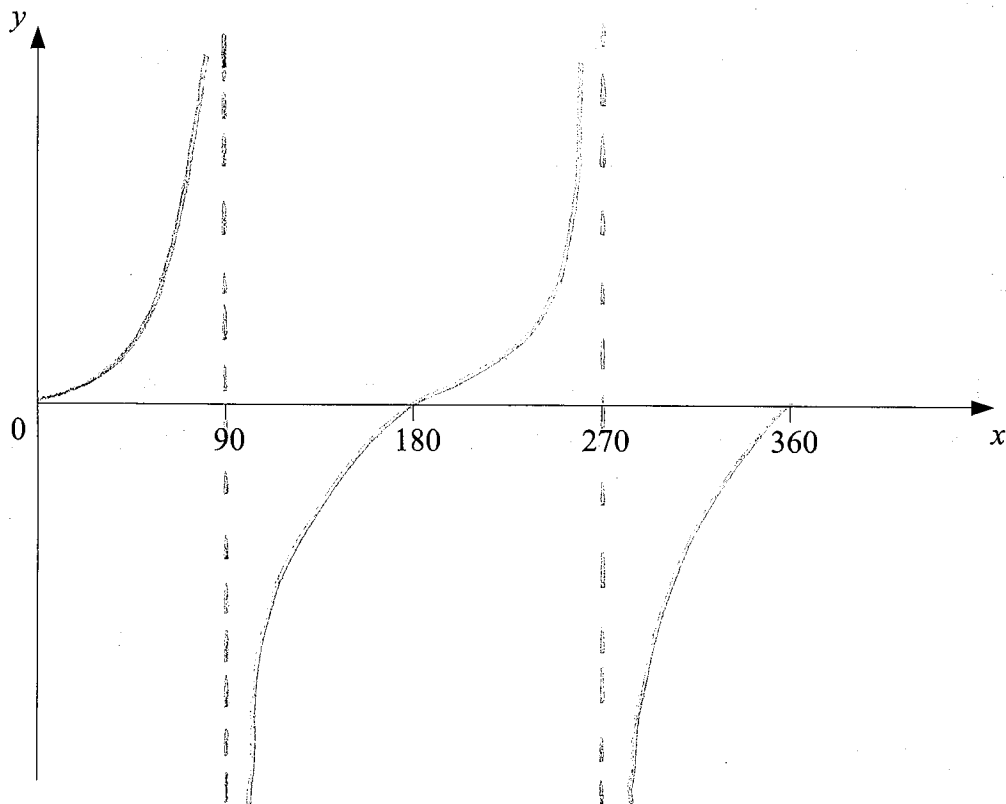
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 Sketch the graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$



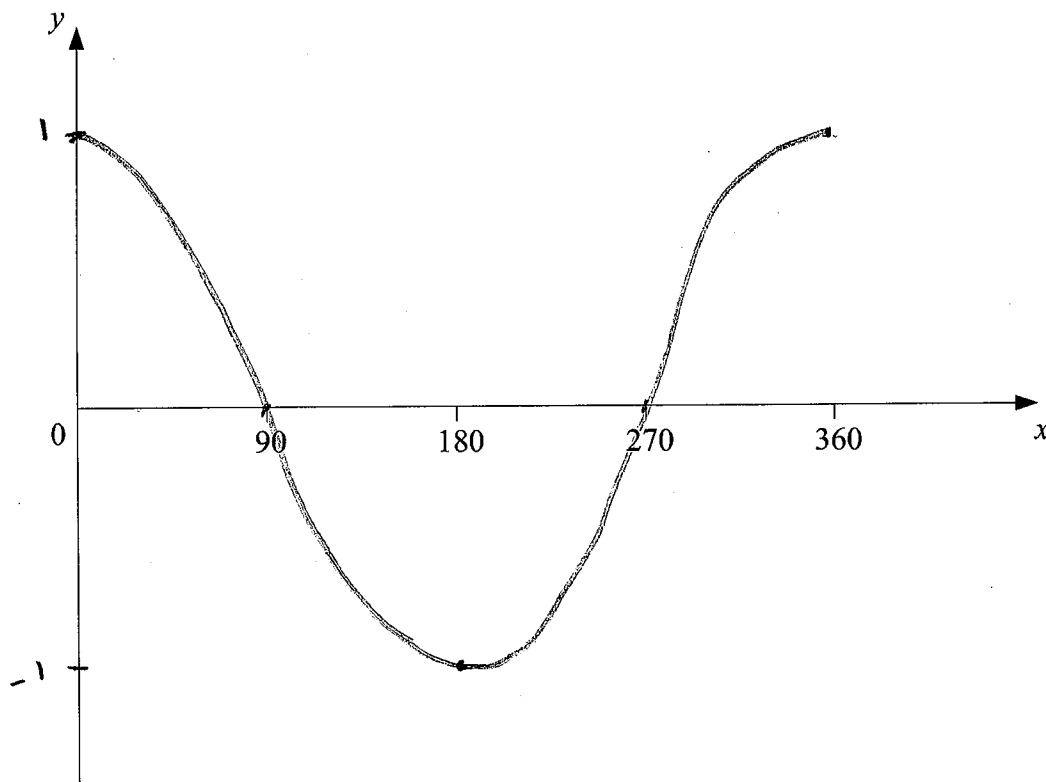
(Total for Question 1 is 2 marks)

2 Sketch the graph of $y = \tan x^\circ$ for $0 \leq x \leq 360$



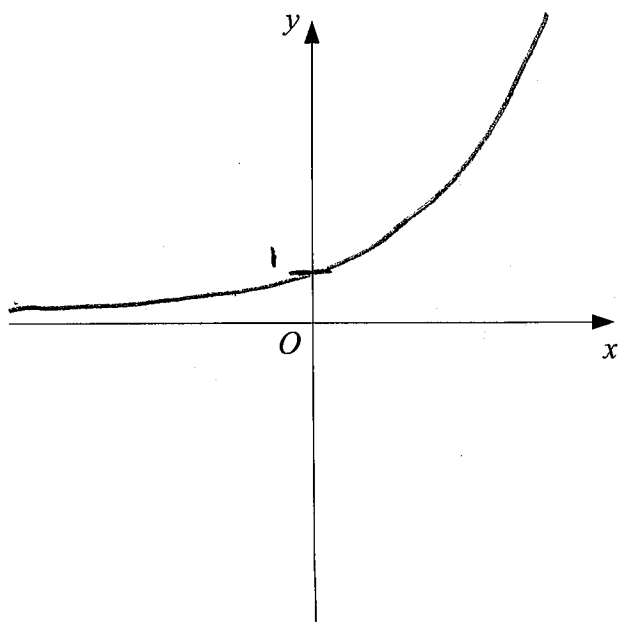
(Total for Question 2 is 2 marks)

3 Sketch the graph of $y = \cos x^\circ$ for $0 \leq x \leq 360$



(Total for Question 3 is 2 marks)

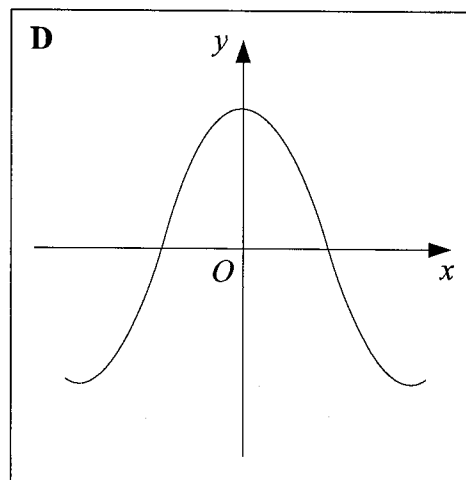
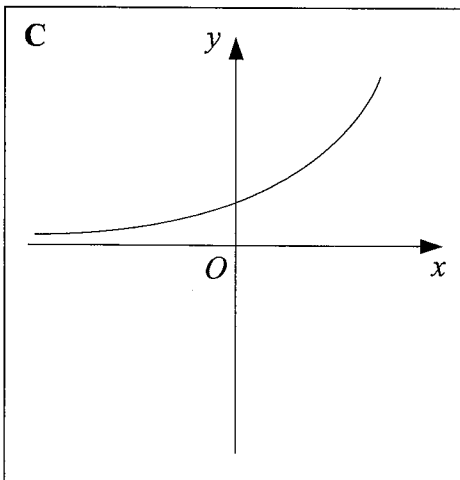
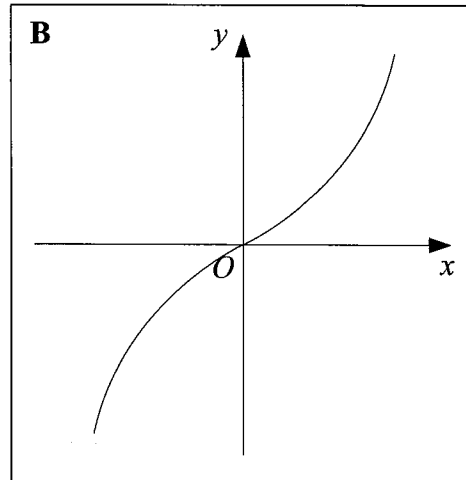
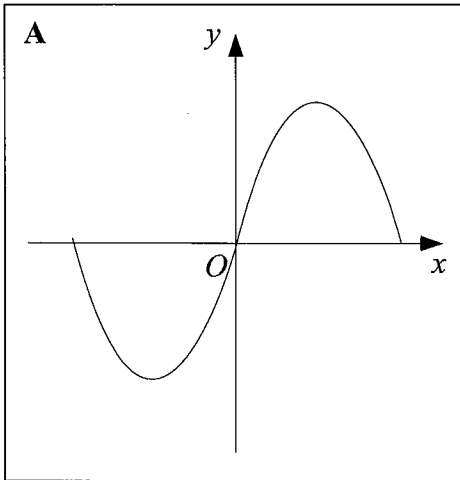
4 On the grid, sketch the curve with equation $y = 2^x$
Give the coordinates of any points of intersection with the axes.



(0, 1)

(Total for Question 4 is 2 marks)

5 Here are four graphs

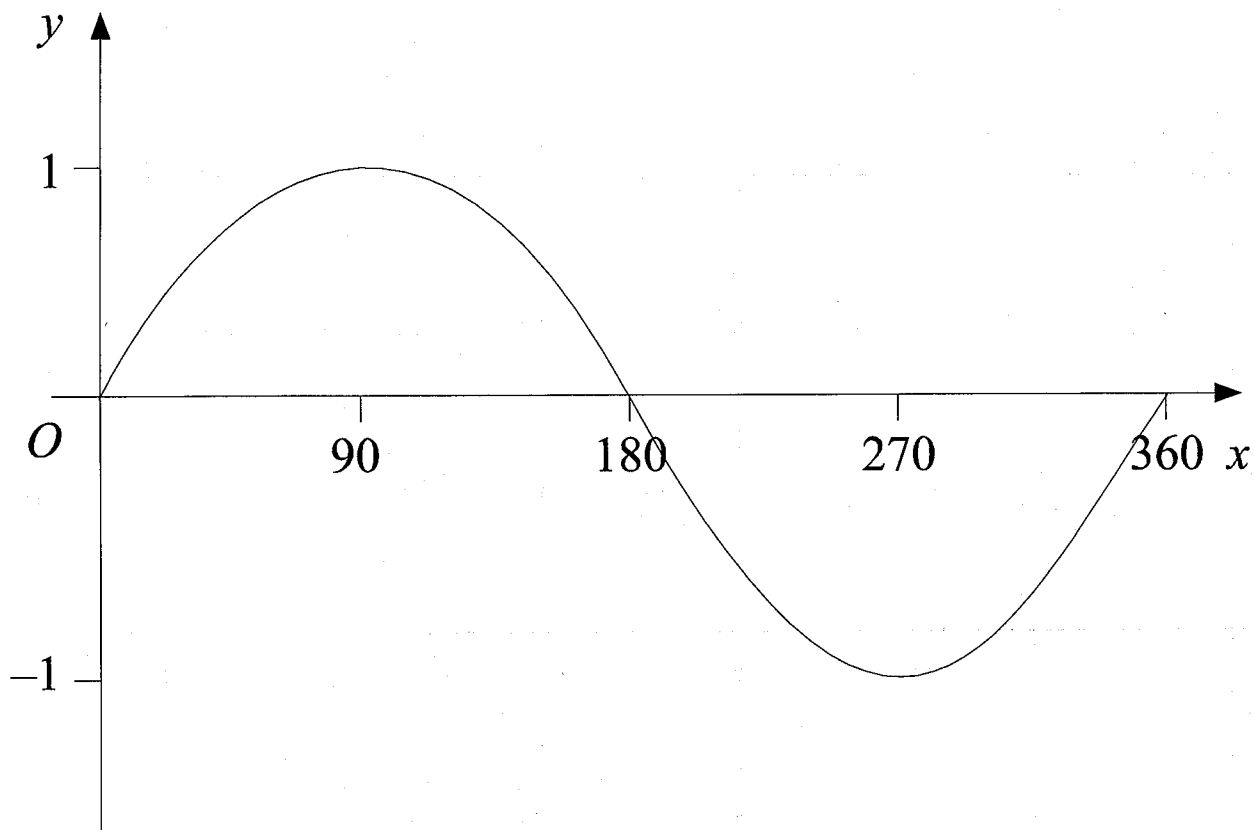


In the table below, match each equation with the letter of its graph.

Equation	Letter of Graph
$y = \sin x$	A
$y = 2^x$	C
$y = x^3$	B
$y = \cos x$	D

(Total for Question 5 is 2 marks)

6 Here is a sketch of the curve $y = \sin x^\circ$ for $0 \leq x \leq 360$



Given that $\sin 30^\circ = \frac{1}{2}$ write down the value of:

i) $\sin 150^\circ$

$$\frac{1}{2}$$

(1)

ii) $\sin 330^\circ$

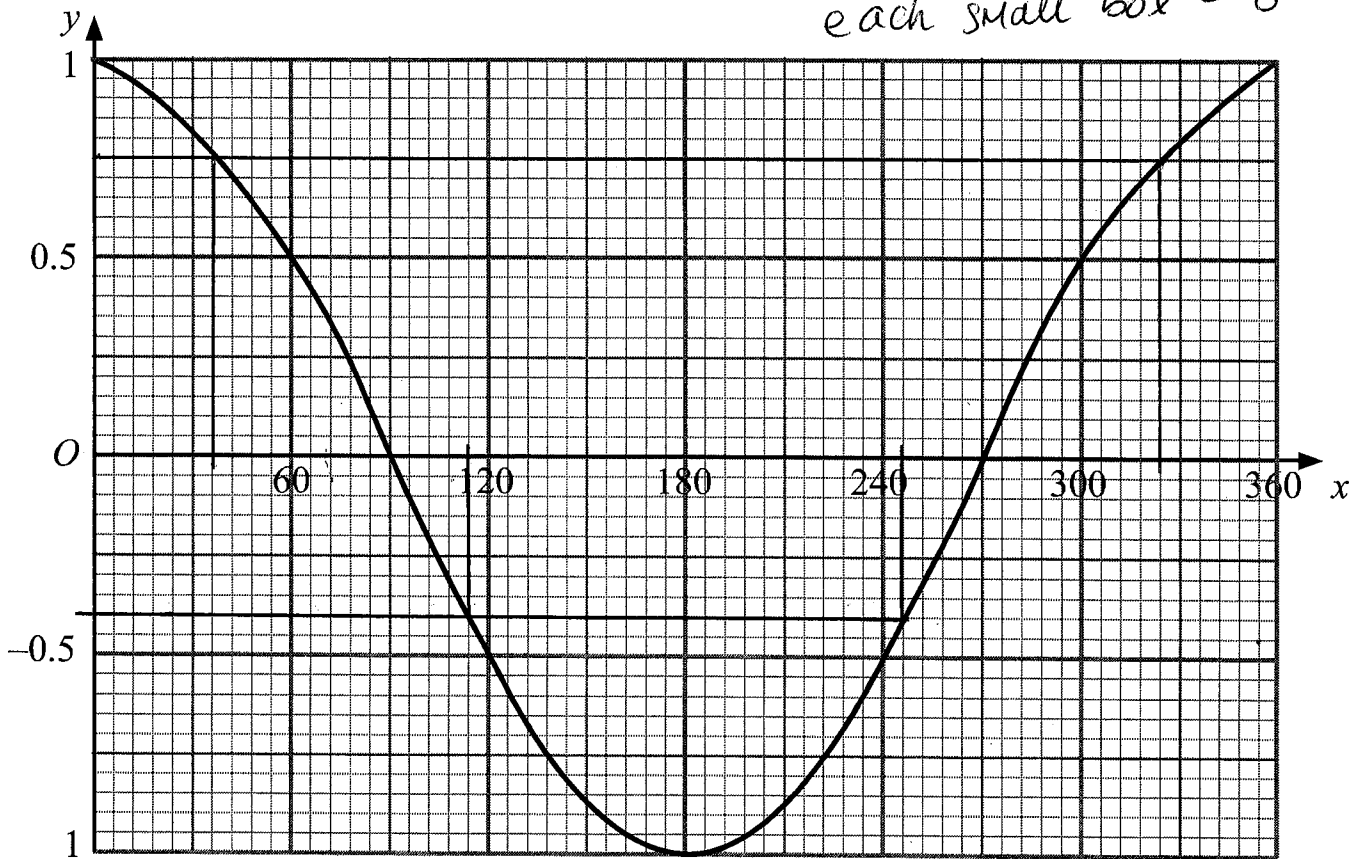
$$-\frac{1}{2}$$

(1)

(Total for Question 6 is 2 marks)

7 Here is a sketch of the curve $y = \cos x^\circ$ for $0 \leq x \leq 360$

$\frac{60}{10} = 6$
each small box = 6°



Use the graph to find estimates of the solutions, in the interval $0 \leq x \leq 360$, of the equation:

i) $\cos(x) = -0.4$

114° and 246°
(2)

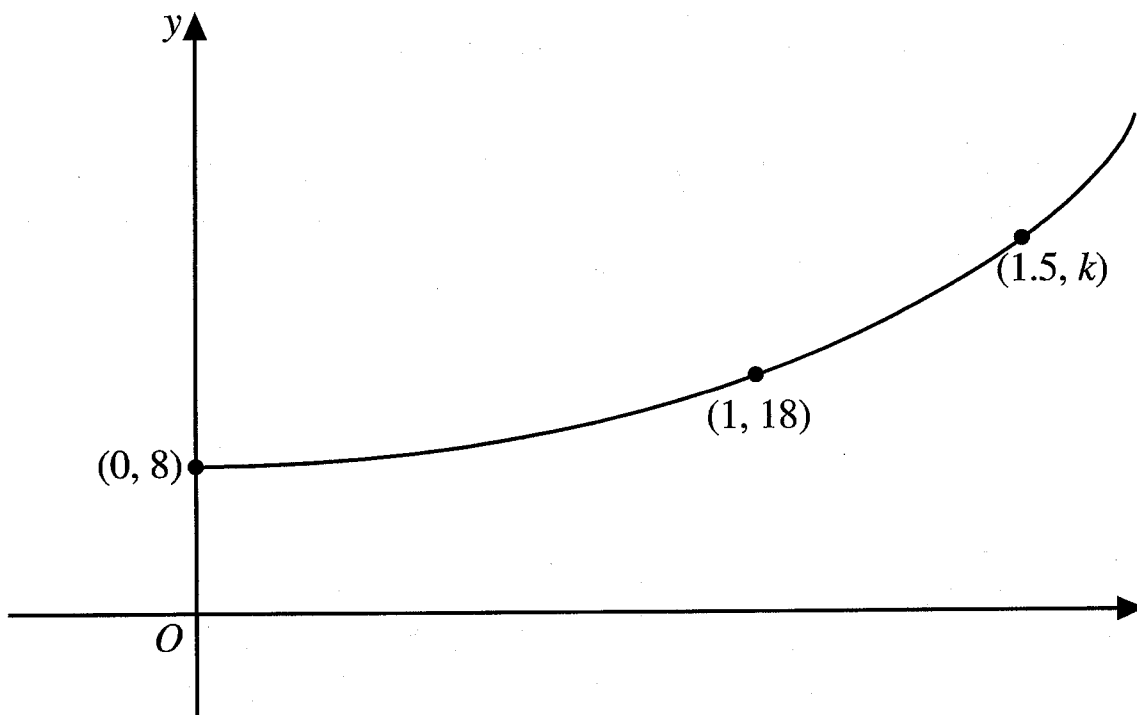
ii) $4 \cos(x) = 3$

$\cos(x) = \frac{3}{4}$

36° and 324°
(2)

(Total for Question 7 is 4 marks)

8 This sketch shows part of the graph with equation $y = pq^x$ where p and q are constants.



The points with coordinates $(0, 8)$, $(1, 18)$ and $(1.5, k)$ lie on the graph.

Calculate the values of p , q and k .

$$y = pq^x \quad (0, 8)$$

$$8 = pq^0$$

$$\underline{\underline{8 = p}}$$

$$y = 8q^x \quad (1, 18)$$

$$18 = 8q$$

$$q = \frac{18}{8}$$

$$\underline{\underline{= \frac{9}{4}}}$$

$$y = 8\left(\frac{9}{4}\right)^x \quad (1.5, k)$$

$$k = 8\left(\frac{9}{4}\right)^{1.5}$$

$$= 8\left(\frac{9}{4}\right)^{\frac{3}{2}}$$

$$= 8\left(\frac{3}{2}\right)^3$$

$$= 8\left(\frac{27}{8}\right)$$

$$\underline{\underline{= 27}}$$

$$\underline{\underline{p = 8}}$$

$$\underline{\underline{q = \frac{9}{4}}}$$

$$\underline{\underline{k = 27}}$$

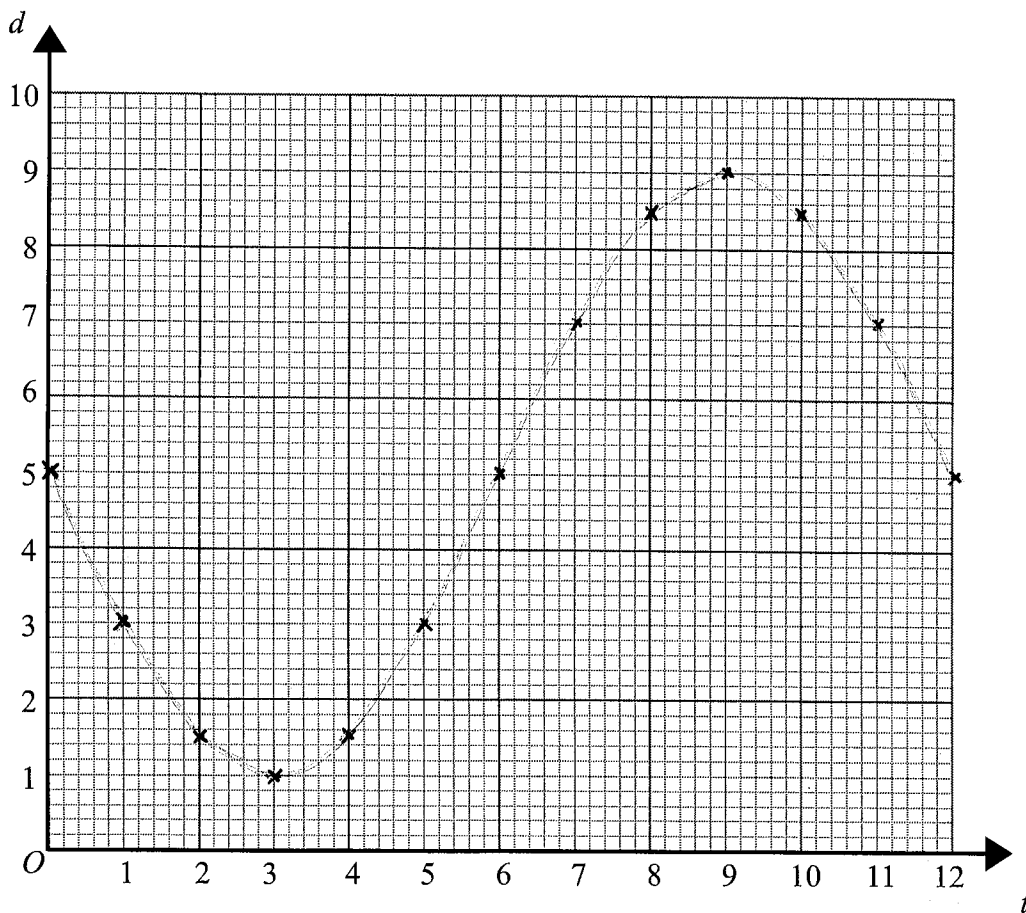
(Total for Question 8 is 6 marks)

- 9 The depth of water, d metres, at the entrance to a harbour is given by the formula:
 $d = 5 - 4\sin(30t)$, where t is the time in hours after midnight on one day.

(a) On the axes below, draw the graph of d against t for $0 \leq t \leq 12$

(4)

t	0	1	2	3	4	5	6	7	8	9	10	11	12
d	5	3	1.54	1	1.54	3	5	7	8.46	9	8.46	7	5



- (b) Find the two values of t , where $0 \leq t \leq 24$, when the depth is least.

..... 3 and 15

(2)

(Total for Question 9 is 6 marks)