Q1.   The diagram shows a sketch of the curve $y = \sin x°$ for $0 \le x \le 360$
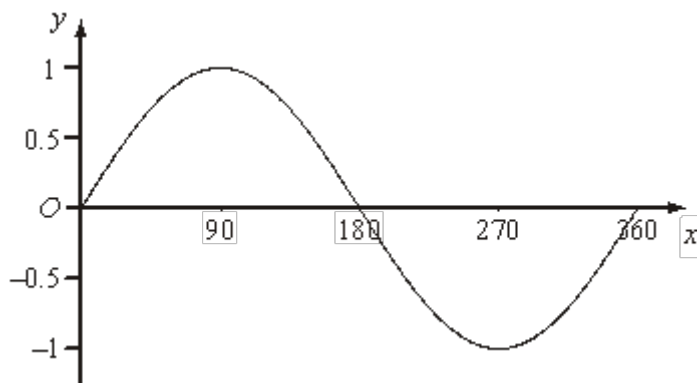

The exact value of $\sin 60° = \dfrac{\sqrt{3}}{2}$

(a)   Write down the exact value of
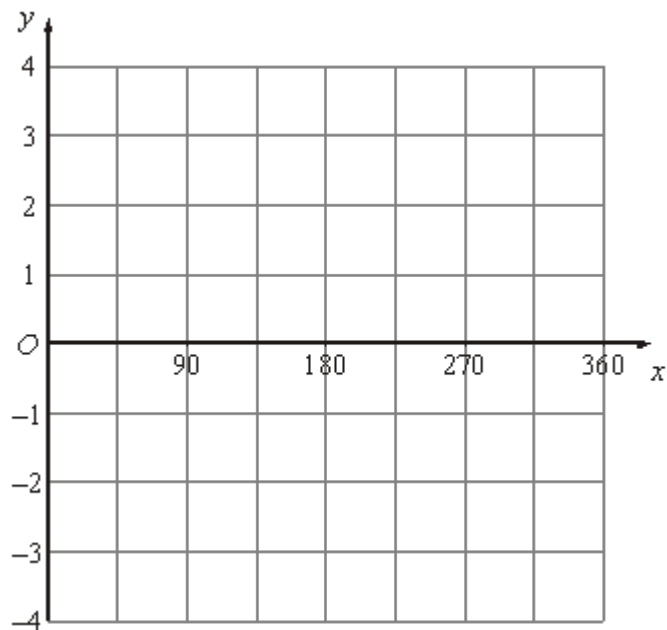
    (i) $\sin 120°$,

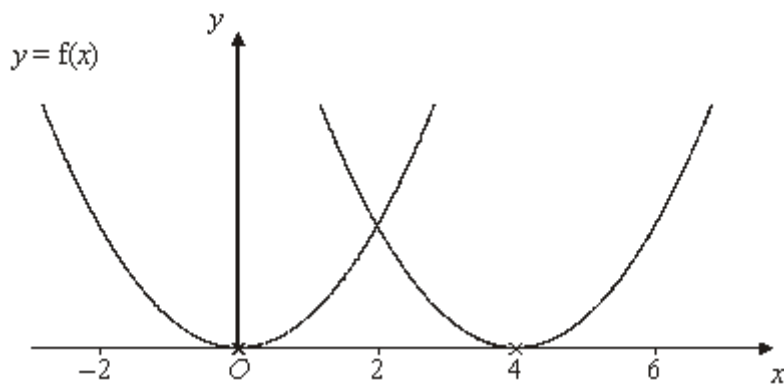   ....

    (ii) $\sin 240°$.

                                 ....

(2)

(b)   On the grid below, sketch the graph of $y = 4 \sin 2x°$ for $0 \le x \le 360$

(2)
(Total 4 marks)

Q2.

$y = f(x)$
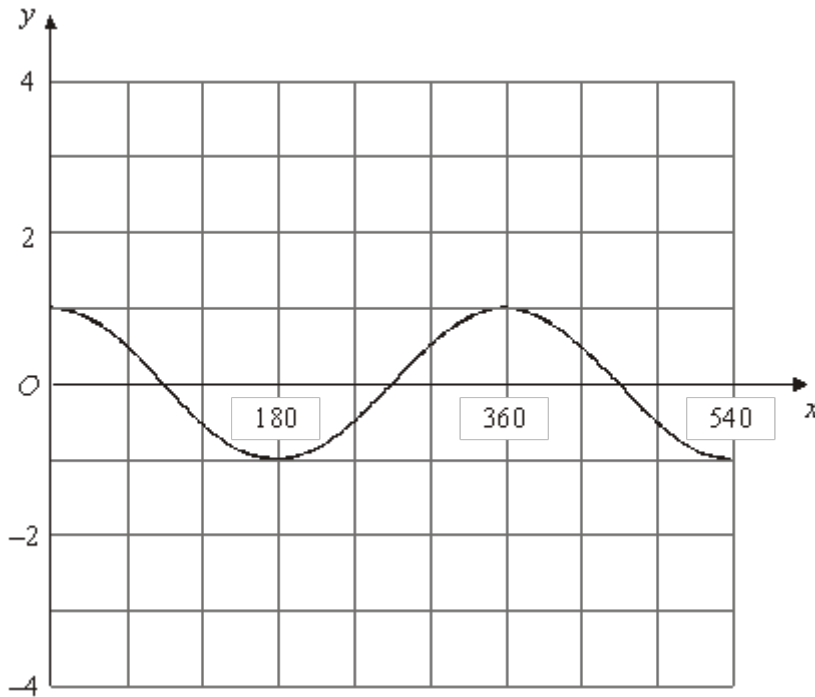

The curve with equation $y = f(x)$ is translated so that the point at (0, 0) is mapped onto the point (4, 0).

(a)　　Find an equation of the translated curve.

....
(2)

The grid shows the graph of $y = \cos x°$ for values of x from 0 to 540.

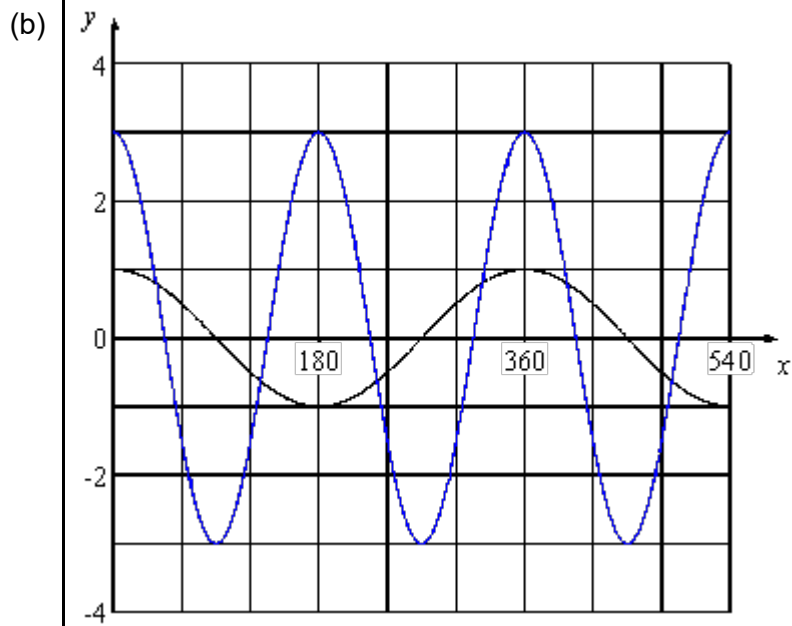(b)   On the grid, sketch the graph of $y = 3 \cos (2x°)$ for values of x from 0 to 540.

(2)
(Total 4 marks)

M1.

	Answer	**Mark**	**Additional Guidance**
(a)(i)	$\dfrac{\sqrt{3}}{2}$	2	**B1** cao
(ii)	$-\dfrac{\sqrt{3}}{2}$		**B1** cao
(b)		2	**B2** cao [**B1** for sine curve, starting from the origin with amplitude 4, **OR** **B1** cuts x axis at 90, 180, 270, 360 and starts from 0]
			Total for Question: 4 marks

M2.

	Answer	**Mark**	**Additional Guidance**
(a)	$y = f(x - 4)$	2	**B2** cao (**B1** for f(x – 4) or $y = f(x + a)$, $a \neq -4$, $a \neq 0$)

(b)

2   **B2** cao
(**B1** cosine curve with either correct amplitude or correct period, but not both)

Total for Question: 4 marks

E1.   This question was very poorly answered indeed. In part (a), the usual attempts made were to double $\dfrac{\sqrt{3}}{2}$ (since 120 = 2 × 60) in (i), sometimes inadvertently resulting in the correct answer, and quadruple (since 240 = 4 × 60) in (ii). A number of candidates ignored the information given and estimated the answers from the given graph; answers of (i) 0.8 and (ii) – 0.8 were not uncommon.

In part (b), some success was achieved if a candidate realised that the resulting graph was also a sine curve of amplitude 4 units, but this was not the norm.

E2.   Part (a) was answered quite well with a good proportion of candidates recognising the transformation and remembering how to write the equation down. Many candidates used a combination of f, x and 4 but opted for the wrong one so that $y = f(x + 4)$ and $y = 4f(x)$ were common incorrect answers. Relatively few fully correct answers were seen in part (b). Where one of the two marks was awarded, this was usually for drawing a graph with the correct amplitude. Graphs with the correct period but incorrect amplitude were much rarer.

Some candidates doubled the period rather than halving it. Marks were sometimes lost because the curve was not drawn accurately enough or only drawn for part of the given range. Not all candidates attempted this question but most of those who did tried to draw some sort of wave.