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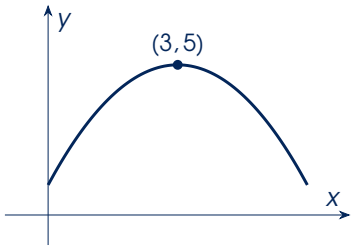
Name ..... Class .....

A13: Graph transformations

Translations and reflections of a given function

20 marks · 25 minutes · Non-calculator

1) This sketch shows the curve $y = f(x)$. It has a maximum point at $(3, 5)$.



State the coordinates of the maximum point of each curve.

(a) $y = f(x) + 2$

.....

(1)

(b) $y = f(x - 4)$

.....

(1)

(c) $y = -f(x)$ (this point is now a minimum)

.....

(1)

(d) $y = f(-x)$

.....

(1)

(e) $y = f(x + 1) - 3$

.....

(1)

[Question 1: 5 marks]

2) Fully describe the one transformation that takes the graph of $y = x^2$ to

(a) $y = (x - 5)^2$

.....

(1)

(b) $y = x^2 + 3$

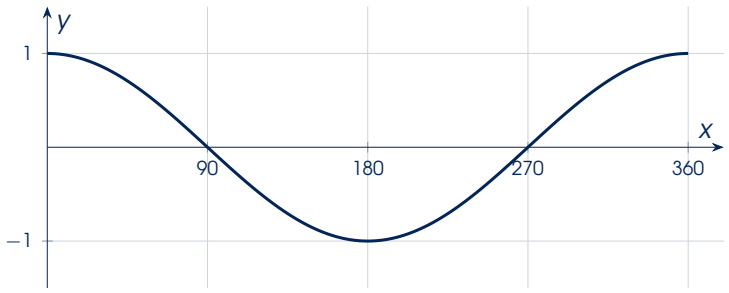
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(1)

[Question 2: 2 marks]

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3) This is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$



(a) On the same axes, sketch the graph of $y = -\cos x$

(2)

(b) State the coordinates of the maximum point of $y = \cos(x - 90°)$ for $0° \leqslant x \leqslant 360°$

.....

(1)

[Question 3: 3 marks]

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4) The curve $y = g(x)$ has a minimum point at $(-2, 1)$.
State the coordinates of the turning point of each curve.

(a) $y = g(x) - 4$

.....

(1)

(b) $y = g(x + 3)$

.....

(1)

(c) $y = g(-x)$

.....

(1)

(d) $y = -g(x)$

.....

(1)

[Question 4: 4 marks]

5) The graph of $y = x^2$ is translated by the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$. Write down the equation of the new graph.

.....

[Question 5: 2 marks]

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6) The graph of $y = \sin x$ is translated by the vector $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$.

(a) Write down the equation of the new graph.

.....

(1)

(b) State the coordinates of its maximum point for $0° \leqslant x \leqslant 360°$

.....

(1)

[Question 6: 2 marks]

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7) Describe the transformation that maps $y = f(x)$ onto

(a) $y = f(x) - 6$

.....

(1)

(b) $y = -f(x)$

.....

(1)

[Question 7: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	(a) (3, 7) (b) (7, 5) (c) (3, −5) (d) (−3, 5) (e) (2, 2)	B1 each.
2	(a) Translation $\begin{pmatrix} 5 \\ 0 \end{pmatrix}$ (b) Translation $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$	B1 each (word and vector both needed).
3	(a) Reflection of the curve in the x-axis (b) (90°, 1)	(a) Correct shape (M1); passes through (0, −1), (180, 1), (360, −1) (A1). (b) B1.
4	(a) (−2, −3) (b) (−5, 1) (c) (2, 1) (d) (−2, −1)	B1 each.
5	$y = (x + 3)^2 + 2$	One part correct (M1); A1 (accept expanded form).
6	(a) $y = \sin x + 2$ (b) (90°, 3)	B1 each.
7	(a) Translation $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$ (b) Reflection in the x-axis	B1 each.