HIGHER ONLY

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

A13: Graph transformations

Solve problems using translations and reflections of graphs

20 marks · 25 minutes · Non-calculator

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1) The graph of $y = x^2$ is translated so that its turning point is at $(3, -2)$. Find the equation of the new graph and where it crosses the x-axis.

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[Question 1: 3 marks]

2) $f(x) = x^2 - 4x + 1$. The graph of $y = f(x) + k$ touches the x-axis. Find k.

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[Question 2: 3 marks]

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3) $(4, 7)$ lies on $y = f(x)$. Find the corresponding point on $y = f(x - 2) + 3$

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[Question 3: 2 marks]

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4) Find the maximum point of $y = \sin(x - 30°)$ for $0° \leqslant x \leqslant 360°$

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[Question 4: 2 marks]

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5) $y = f(x)$ crosses the x-axis at $x = 1$ and $x = 5$. Where does $y = f(x + 2)$ cross the x-axis?

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[Question 5: 2 marks]

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6) $y = f(x)$ has a minimum point at $(2, -3)$. Find the turning point of $y = -f(x) + 1$ and say whether it is a maximum or minimum.

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[Question 6: 3 marks]

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7) The graph of $y = (x + 1)^2 - 5$ is reflected in the y-axis. Find the equation of the image and its turning point.

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[Question 7: 2 marks]

8) Find the translation vector that maps $y = x^2$ onto $y = x^2 + 6x + 5$

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[Question 8: 3 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	$y = (x-3)^2-2$; $x = 3\pm\sqrt{2}$	Equation (A1); $(x-3)^2 = 2$ (P1); A1.
2	3	$(x-2)^2-3$ (P1); minimum $-3+k=0$ (P1); A1.
3	(6, 10)	Right 2, up 3 (P1); A1.
4	(120°, 1)	Translation right 30 (P1); A1.
5	-1 and 3	Left 2 (P1); A1.
6	(2, 4) maximum	Reflection gives (2, 3) (P1); up 1 (P1); maximum (A1).
7	$y = (x-1)^2-5$; $(1,-5)$	Replace x with $-x$ (P1); A1.
8	$\begin{pmatrix}-3\\-4\end{pmatrix}$	$(x+3)^2-4$ (P1, P1); A1.