FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... **Class** .....

G24: Translation vectors

Reason with translations as column vectors

20 marks · 25 minutes · Non-calculator

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1) Explain what the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ means as a translation.

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[Question 1: 1 marks]

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2) Show that translating by $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ then $\begin{pmatrix} -4 \\ 1 \end{pmatrix}$ is a translation by $\begin{pmatrix} -2 \\ 6 \end{pmatrix}$

[Question 2: 2 marks]

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3) Kim says $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ moves a shape 3 right and 4 up. Explain her mistake.

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[Question 3: 1 marks]

4) Show that the translation $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ maps $(1, 2)$ onto $(4, -1)$

[Question 4: 2 marks]

5) Explain why a translation keeps a shape the same size and the same way round.

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[Question 5: 2 marks]

6) Explain why the reverse of a translation is given by the negative of its vector.

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[Question 6: 2 marks]

7) Show that the vector $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$ has magnitude 10

[Question 7: 2 marks]

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8) A translation maps $(2, 3)$ onto $(-1, 7)$. Where does it map $(5, -2)$? Explain.

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[Question 8: 2 marks]

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9) Is translating by $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ then $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ the same as not moving? Explain.

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[Question 9: 2 marks]

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10) Explain how to find the translation vector from a shape to its image.

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[Question 10: 2 marks]

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11) Show that $\begin{pmatrix}1\\2\end{pmatrix} + \begin{pmatrix}3\\4\end{pmatrix} = \begin{pmatrix}3\\4\end{pmatrix} + \begin{pmatrix}1\\2\end{pmatrix}$ and explain what this means for translations.

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[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	3 right and 2 down (C1).
2	Shown	Add components (M1); C1.
3	Explanation	Negative top number means 3 left (C1).
4	Shown	$(1+3, 2-3)$ (M1); C1.
5	Explanation	Every point moves the same distance in the same direction (C2).
6	Explanation	It moves the same distance in the opposite direction (C2).
7	Shown	$\sqrt{36+64}$ (M1); C1.
8	$(2, 2)$	Vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ (M1); C1.
9	Yes	Vectors add to zero (C2).
10	Explanation	Subtract the coordinates of a point from its image (C2).
11	Shown	Both $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$ (M1); order of translations does not matter (C1).