



8.2D Transforming Graphs $y=f(x)$: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 45 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1 Write down the equation of the graph obtained by translating the graph $y = f(x)$ up by 3 units.

(Total for Question 1 is 1 mark)

- 2 Write down the equation of the graph obtained by translating $y = f(x)$ 2 units to the right.

(Total for Question 2 is 1 mark)

- 3 Write down the equation of the graph obtained by reflecting $y = f(x)$ in the x-axis.

(Total for Question 3 is 1 mark)

- 4 Write down the equation of the graph obtained by reflecting $y = f(x)$ in the y-axis.

(Total for Question 4 is 1 mark)

- 5 The point (2, -1) lies on the graph $y = f(x)$. Find the coordinates of the corresponding point on the graph $y = f(x) + 4$.

(Total for Question 5 is 1 mark)

- 6** The point $(-5, 7)$ lies on $y = f(x)$. Find the coordinates of the image of this point on the graph $y = -f(x+2)$.

(Total for Question 6 is 2 marks)

- 7** A point $(4, -2)$ lies on $y = f(x)$. Find the image of this point on the graph $y = f(x - 3) - 5$.

(Total for Question 7 is 2 marks)

- 8** The graph of $y = g(x)$ is obtained from $y = f(x)$ by first reflecting in the y -axis and then translating up by 6. Write $g(x)$ in terms of f .

(Total for Question 8 is 1 mark)

- 9** The graph $y = g(x)$ is defined by $g(x) = -f(x) - 3$. State the two transformations that map $y = f(x)$ to $y = g(x)$.

(Total for Question 9 is 2 marks)

- 10** The point $(1, 4)$ lies on $y = f(x)$. Describe the sequence of transformations and find the coordinates of the image of $(1, 4)$ on the graph $y = f(-(x - 2))$.

(Total for Question 10 is 3 marks)

- 11** A point (3, -2) lies on $y = f(x)$. Find the image of this point on the graph $y = -f(-(x + 1)) + 5$.
Show your working.

(Total for Question 11 is 3 marks)

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- 12** The graph $y = f(x)$ passes through points (0, 2) and (1, 5).
(a) Find the images of these points on the graph $y = f(-x) - 4$.
(b) Give both new coordinates.

(a) Find the image of (0, 2) on $y = f(-x) - 4$. (2)

(b) Find the image of (1, 5) on $y = f(-x) - 4$. (2)

(Total for Question 12 is 4 marks)

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- 13** Write the equation of the graph obtained by translating $y = f(x)$ left 4 units and then reflecting in the x-axis.

(Total for Question 13 is 1 mark)

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- 14** Let $g(x) = f(x + 3)$. Express $h(x) = -g(-x)$ in terms of $f(x)$.

(Total for Question 14 is 2 marks)

Mark scheme · 8.2D Transforming Graphs $y=f(x)$: Fluency and Exam Drill

Question 1

- **B1** $y = f(x) + 3$ cao
- **Answer:** $y = f(x) + 3$

Question 2

- **B1** $y = f(x - 2)$ cao
- **Answer:** $y = f(x - 2)$

Question 3

- **B1** $y = -f(x)$ cao
- **Answer:** $y = -f(x)$

Question 4

- **B1** $y = f(-x)$ cao
- **Answer:** $y = f(-x)$

Question 5

- **B1** (2, 3) cao
- **Answer:** (2, 3)

Question 6

- **M1** correctly apply x shift: point (a,b) $\rightarrow$ (a - 2, b) for $f(x+2)$ or equivalent reasoning
- **A1** (-7, -7) cao after reflection in x-axis
- **Answer:** (-7, -7)

Question 7

- **M1** apply right shift by 3 and down 5: (a,b) $\rightarrow$ (a + 3, b - 5) oe
- **A1** (7, -7) cao
- **Answer:** (7, -7)

Question 8

- **B1** $g(x) = f(-x) + 6$ cao
- **Answer:** $g(x) = f(-x) + 6$

Question 9

- **B1** reflection in the x-axis oe
- **B1** translation down 3 units oe
- **Answer:** Reflect in the x-axis; then translate down 3 units.

Question 10

- **M1** correct sequence: reflect in the y-axis, then translate right 2 oe
- **M1** apply sequence to x-coordinate: after reflect x $\rightarrow$ -1, then right 2 $\rightarrow$ -1 + 2 = 1
- **A1** final coordinates (1, 4) cao
- **Answer:** Sequence: reflect in the y-axis, then translate right 2. Image: (1, 4).

Question 11

- **M1** correct x mapping using $-(x + 1)$: solve $-(x' + 1) = a$ so $x' = -a - 1$ oe
- **M1** correct y mapping using outer - and +5: $y' = -b + 5$ oe
- **A1** (-4, 7) cao
- **Answer:** (-4, 7)

Question 12

- (a) **M1** apply reflection in y-axis: $(0, 2) \rightarrow (0, 2)$ and then translate down 4: $y \rightarrow 2 - 4$
- (a) **A1** $(0, -2)$ cao
- (a) **Answer: $(0, -2)$**
- (b) **M1** apply reflection in y-axis: $(1, 5) \rightarrow (-1, 5)$ and then translate down 4: $y \rightarrow 5 - 4$
- (b) **A1** $(-1, 1)$ cao
- (b) **Answer: $(-1, 1)$**

Question 13

- **B1** $y = -f(x + 4)$ cao
- **Answer: $y = -f(x + 4)$**

Question 14

- **M1** substitute $g(-x) = f(-x + 3)$ or show $-g(-x) = -f(-x + 3)$ oe
- **A1** $h(x) = -f(3 - x)$ cao (equivalent forms acceptable)
- **Answer: $h(x) = -f(3 - x)$**