# 8.2 Transforming Graphs y=f(x): 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

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

**(Total for Question 1 is 1 mark)**

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**2** 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 2 is 2 marks)**

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**3** The curve y = p(x) has a maximum point at (4, 6).

**(a)** The curve y = p(x) + k has a maximum point at (4, -2). Find the value of k. **(2)**

**(b)** The curve y = p(x - a) has a maximum point at (10, 6). Find the value of a. **(2)**

**(Total for Question 3 is 4 marks)**

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**4** Describe fully the single transformation that maps the graph of y = f(x) onto the graph of y = f(3x).

**(Total for Question 4 is 2 marks)**


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**5** The function f is defined for whole number values of x from -3 to 3 by f(-3) = -8, f(-2) = -2, f(-1) = -3, f(0) = -7, f(1) = -8, f(2) = 9, f(3) = 0. Work out the values of y on the graph of y = -f(x) when x = -3, -2, -1. Give the three values in order, separated by commas.

**(Total for Question 5 is 3 marks)**

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**6** $f(x) = x^2 - 2$. The graph of y = f(x) is transformed to give the graph of y = f(x - 3) + 5. Write the equation of the new graph in the form $y = ax^2 + bx + c$.

**(Total for Question 6 is 3 marks)**


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**7** The graph of $y = \sin(x)$ for $0 \leq x \leq 360$ has a maximum point at (90, 1), a minimum point at (270, -1), and passes through (0, 0), (180, 0) and (360, 0).

**(a)** State the coordinates of the maximum point of $y = \sin(x) + 2$. **(1)**

**(b)** State the coordinates of the minimum point of $y = \sin(x) + 2$. **(1)**

**(c)** Write down the range of $y = \sin(x) + 2$. **(2)**

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**(Total for Question 7 is 4 marks)**

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**8** The curve $y = 1/x$ has asymptotes $x = 0$ and $y = 0$.

**(a)** State the equations of the asymptotes of the curve $y = 1/(x - 3) + 2$. **(3)**

**(b)** Hence write down the coordinates of the point on $y = 1/(x - 3) + 2$ that corresponds to the point (1, 1) on $y = 1/x$. **(2)**

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**(Total for Question 8 is 5 marks)**


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# Mark scheme · 8.2 Transforming Graphs y=f(x): 30-minute Pack

## Question 1

y = -f(x) cao **B1**

**Answer: y = -f(x)**

## Question 2

correctly apply x shift: point (a,b) -> (a - 2, b) for f(x+2) or equivalent reasoning **M1**

(-7, -7) cao after reflection in x-axis **A1**

**Answer: (-7, -7)**

## Question 3

(a) 6 + k = -2 oe **M1**

(a) k = -8 cao **A1**

**(a) Answer: k = -8**

(b) 4 + a = 10 oe **M1**

(b) a = 6 cao **A1**

**(b) Answer: a = 6**

## Question 4

correct type of transformation **B1**

fully correct detail (vector, line or scale factor) **B1**

**Answer: stretch parallel to the x-axis with scale factor 1/3**

## Question 5

first value correct **B1**

second value correct **B1**

third value correct **B1**

**Answer: 8, 2, 3**

## Question 6

correct substitution into f, expands $(x - 3)^2$ and $0(x - 3)$ **M1**

expands brackets **M1**

$y = x^2 - 6x + 12$ **A1**

**Answer: $y = x^2 - 6x + 12$**

## Question 7

(a) (90, 3) cao **B1**

**(a) Answer: (90, 3)**

(b) (270, 1) cao **B1**

**(b) Answer: (270, 1)**

(c) $-1 \leq \sin(x) \leq 1$ shifted by 2 oe **M1**

(c) $1 \leq y \leq 3$ oe **A1**

**(c) Answer: $1 \leq y \leq 3$**

## Question 8

(a) vertical asymptote shifts right 3: x = 3 **M1**

(a) horizontal asymptote shifts up 2: y = 2 **M1**

(a) x = 3 and y = 2 both stated cao **A1**

**(a) Answer: x = 3 and y = 2**

(b) x = 1 + 3 oe **M1**

(b) (4, 3) cao **A1**

**(b) Answer: (4, 3)**


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