# Transformations

## January 2014

## Question 8                                                                        1 mark

Alex incorrectly explains to Rashid that the graph of $y = 2f(x) + 5$ means you first move the graph of $y = f(x)$ up 5 units and then multiply the $y$ values by 2.

Explain to Rashid the correct way to transform the graph.

### Solution

Alex explains the transformations correctly, but not in the correct order.
First multiply the $y$-values by 2, then move the graph up 5 units.
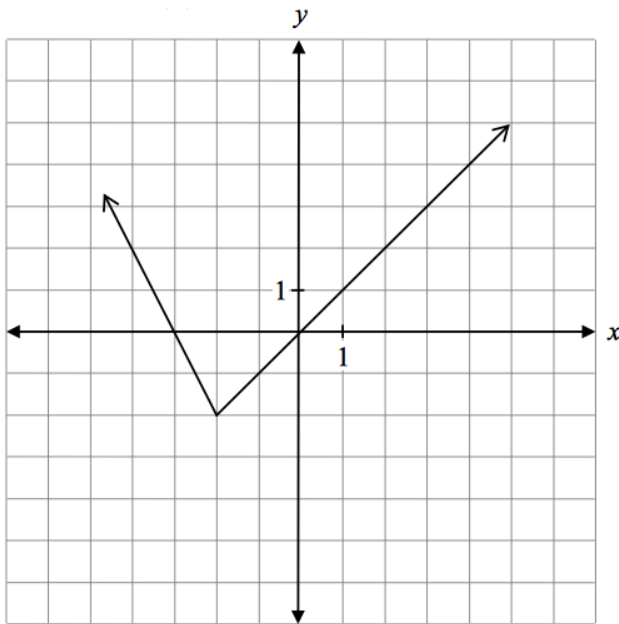
1 mark for explanation
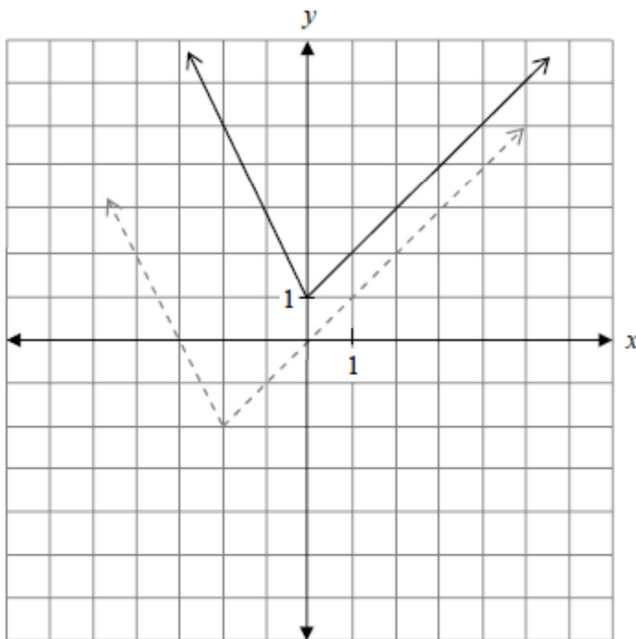
1 mark

## Question 13　　　　　　　　　　　　　　　　　　　　　2 marks

Given the graph of $f(x)$ below,



Sketch the graph of $g(x) = f(x - 2) + 3$

**Solution**



1 mark for horizontal shift
1 mark for vertical shift

**2 marks**

## Question 42                                                   2 marks

Given $f(x) = (x + 1)^2$ for $x \le -1$, write the equation of $y = f^{-1}(x)$.

**Solution**

**Method 1**

$$y = (x+1)^2$$
$$x = (y+1)^2 \qquad \text{1 mark for inverse}$$
$$y = \pm\sqrt{x} - 1 \qquad \text{½ mark for solving for } y$$

Since the domain of $f(x)$ is $x \le -1$,
the range of the inverse is $y \le -1$.

$$\therefore y = -\sqrt{x} - 1 \qquad \text{½ mark for rejecting } y = \sqrt{x}$$
$$f^{-1}(x) = -\sqrt{x} - 1$$

**2 marks**

# June 2013

## Question 11                                                   2 marks

Given the graph of $y = f(x)$, describe the transformations to obtain the graph of the function $y = f(2x - 6)$.

**Solution**

**Method 1**

Factor out the 2.
$$y = f(2(x-3))$$

Horizontally compress by a factor of 2.
Then shift 3 units to the right.

1 mark for starting with a horizontal compression by a factor of 2
1 mark for ending with a horizontal shift of 3 units to the right

## Question 12                                                                          1 mark

Given $f(x) = \{(-3, 4), (2, 7), (8, 6)\}$, state the domain of the resulting function after $f(x)$ is reflected through the line $y = x$.

**Solution**

Domain: $\{4, 6, 7\}$          1 mark for correct domain

[1 mark]

## Question 28                                                                          1 mark

Given $f(x) = 4 - x$, verify that $f^{-1}(x) = f(x)$

**Solution**

**Method 1**

$$y = 4 - x$$

To find $f^{-1}(x)$, switch $x$ and $y$ values.

$$x = 4 - y$$
$$-y = x - 4$$
$$y = 4 - x$$
$$f^{-1}(x) = 4 - x$$

1 mark for verifying $f^{-1}(x) = f(x)$

[1 mark]