

Transforming Graphs Mastery

Practice Worksheet

I DO

The curve with equation $y = f(x)$ has a single turning point at $(-2, 5)$.

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = -f(x + 3)$$

(..... , ...)
(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = 3f\left(\frac{1}{2}x\right)$$

(..... , ...)
(2 marks)

WE DO

The curve with equation $y = f(x)$ has a single turning point at $(4, -3)$.

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(x - 2) + 5$$

(..... , ...)
(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = -2f(3x)$$

(..... , ...)
(2 marks)

YOU DO 1

The curve with equation $y = f(x)$ has a single turning point at (3, 7).

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(-x)$$

(..... , ...)
(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = \frac{1}{2}f(x) - 4$$

(..... , ...)
(2 marks)

YOU DO 2

The curve with equation $y = f(x)$ has a single turning point at (-6, 2).

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(x + 5) - 1$$

(..... , ...)
(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = -f\left(\frac{1}{3}x\right)$$

(..... , ...)
(2 marks)

CHALLENGE

(a) The curve with equation $y = f(x)$ has a turning point at $(2, -5)$.

The curve is transformed to $y = af(x + b)$.

The new turning point is at $(7, 15)$.

Find the values of a and b .

(b) The curve with equation $y = g(x)$ has a turning point at $(-3, 8)$.

The curve is transformed to $y = g(-2x) + k$.

The new turning point is at $(m, 2)$.

Find the values of m and k .

ANSWERS & WORKED SOLUTIONS

I Do

(a) Step 1: The transformation $f(x + 3)$ shifts the graph 3 units to the left. The x-coordinate becomes $-2 - 3 = -5$.

(a) Step 2: The transformation $-f(\dots)$ reflects the graph in the x-axis. The y-coordinate becomes -5 .

Answer: $(-5, -5)$

(b) Step 1: The transformation $f(\frac{1}{2}x)$ stretches the graph horizontally by a factor of 2. The x-coordinate becomes $-2 \times 2 = -4$.

(b) Step 2: The transformation $3f(\dots)$ stretches the graph vertically by a factor of 3. The y-coordinate becomes $5 \times 3 = 15$. **Answer:** $(-4, 15)$

We Do

(a) Step 1: The transformation $f(x - 2)$ shifts the graph 2 units right. The x-coordinate becomes $4 + 2 = 6$.

(a) Step 2: The transformation $+ 5$ shifts the graph 5 units up. The y-coordinate becomes $-3 + 5 = 2$.

Answer: (6, 2)

(b) Step 1: The transformation $f(3x)$ compresses the graph horizontally by a factor of 3. The x-coordinate becomes $4 \div 3 = 4/3$.

(b) Step 2: The transformation $-2f(\dots)$ stretches vertically by 2 and reflects in the x-axis. The y-coordinate becomes $-3 \times -2 = 6$. **Answer: (4/3, 6)**

ANSWERS & WORKED SOLUTIONS (CONTINUED)

You Do 1

(a) Step 1: The transformation $f(-x)$ reflects the graph in the y-axis. The x-coordinate changes sign: -3 .

(a) Step 2: The y-coordinate is unaffected. **Answer: $(-3, 7)$**

(b) Step 1: The x-coordinate is unaffected: 3 .

(b) Step 2: The transformation $\frac{1}{2}f(x)$ halves the y-coordinate: $7 \times \frac{1}{2} = 3.5$.

(b) Step 3: The -4 shifts it down 4 units: $3.5 - 4 = -0.5$. **Answer: $(3, -0.5)$**

You Do 2

(a) Step 1: The transformation $f(x + 5)$ shifts the graph 5 units left. The x-coordinate becomes $-6 - 5 = -11$.

(a) Step 2: The -1 shifts the graph down 1 unit. The y-coordinate becomes $2 - 1 = 1$. **Answer: $(-11, 1)$**

(b) Step 1: The transformation $f(1/3x)$ stretches horizontally by a factor of 3. x-coordinate: $-6 \times 3 = -18$.

(b) Step 2: The $-f(\dots)$ reflects the graph in the x-axis. y-coordinate: -2 . **Answer: $(-18, -2)$**

ANSWERS & WORKED SOLUTIONS (CONTINUED)

Challenge

(a) Step 1: The horizontal transformation $f(x + b)$ shifts the x-coordinate from 2 to $2 - b$. We are given the new x-coordinate is 7. Therefore, $2 - b = 7 \rightarrow b = -5$.

(a) Step 2: The vertical transformation $a \times f(\dots)$ stretches the y-coordinate from -5 to $-5a$. We are given the new y-coordinate is 15. Therefore, $-5a = 15 \rightarrow a = -3$. **Answer: $a = -3$, $b = -5$**

(b) Step 1: The horizontal transformation $g(-2x)$ compresses by 2 and reflects in the y-axis. The new x-coordinate is $-3 \div -2 = 1.5$. Therefore, $m = 1.5$.

(b) Step 2: The vertical transformation $+k$ shifts the y-coordinate from 8 to $8 + k$. We are given the new y-coordinate is 2. Therefore, $8 + k = 2 \rightarrow k = -6$. **Answer: $m = 1.5$, $k = -6$**