

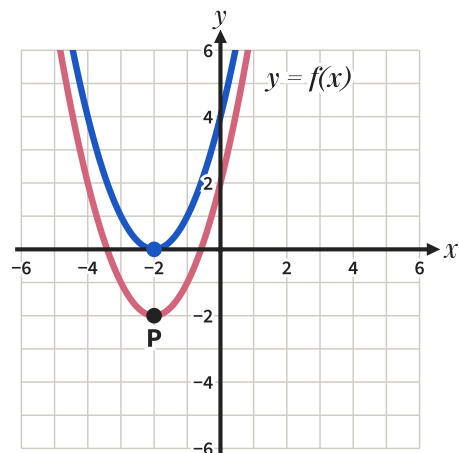
Graph Transformations

ANSWERS

1

outside the bracket: up or down. Inside: left or right, the opposite way.

Sketch the graph of $y = f(x) + 2$



The graph moves

up

down

left

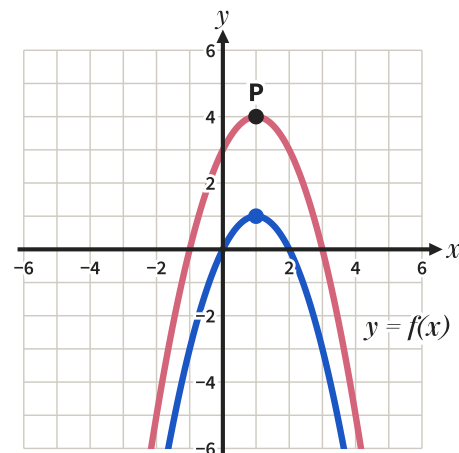
right

by squares

P goes to (,)

2

Sketch the graph of $y = f(x) - 3$



The graph moves

up

down

left

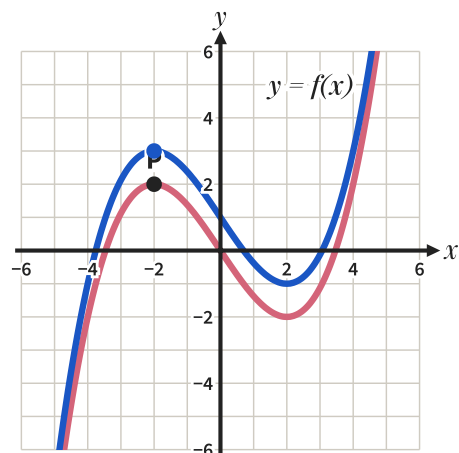
right

by squares

P goes to (,)

3

Sketch the graph of $y = f(x) + 1$



The graph moves

up

down

left

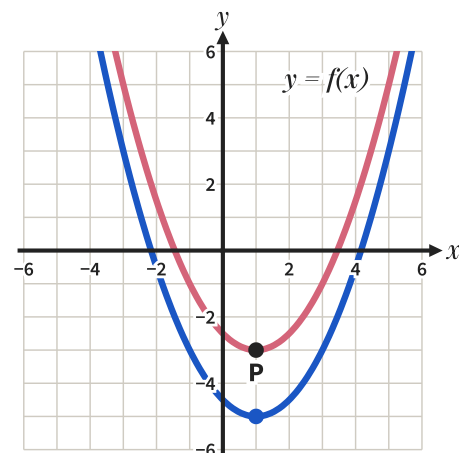
right

by squares

P goes to (,)

4

Sketch the graph of $y = f(x) - 2$



The graph moves

up

down

left

right

by squares

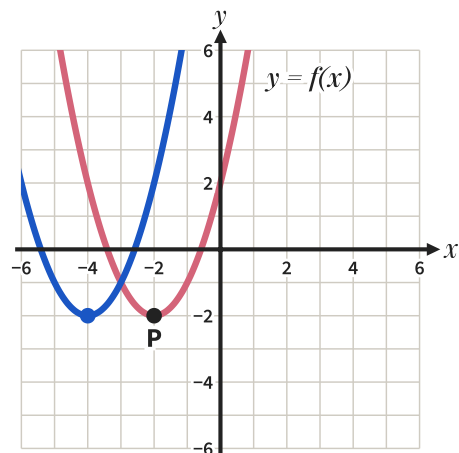
P goes to (,)

Graph Transformations

ANSWERS

5 Notice the change!

Sketch the graph of $y = f(x + 2)$



The graph moves

up

down

left

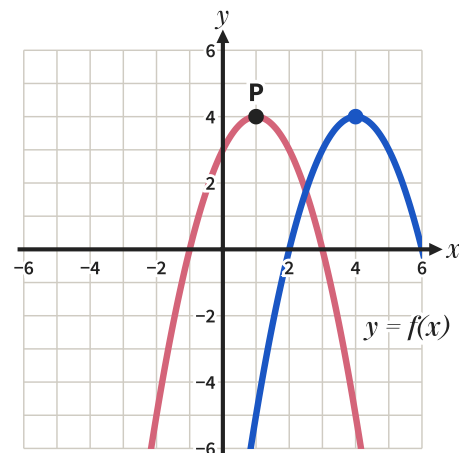
right

by squares

P goes to (,)

6

Sketch the graph of $y = f(x - 3)$



The graph moves

up

down

left

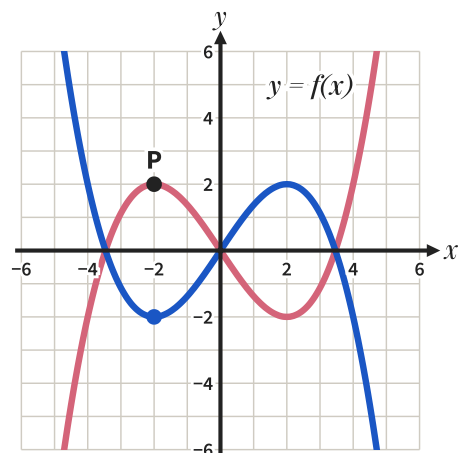
right

by squares

P goes to (,)

7 Notice the change!

Sketch the graph of $y = -f(x)$



The graph is reflected in the

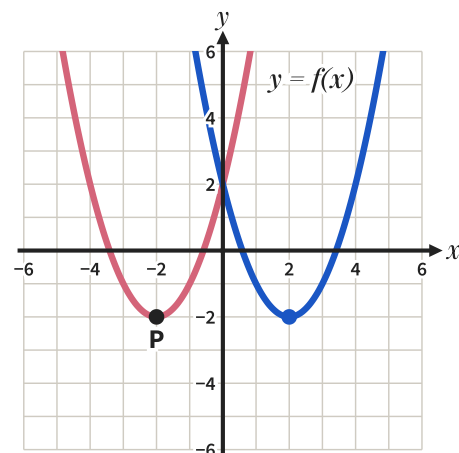
x-axis

y-axis

P goes to (,)

8

Sketch the graph of $y = f(-x)$



The graph is reflected in the

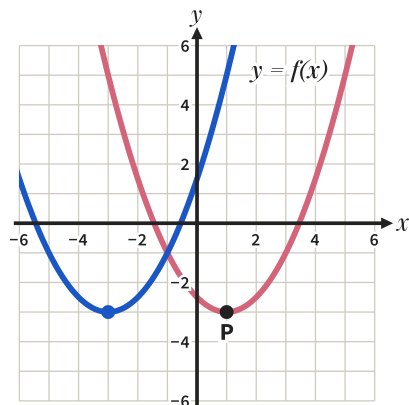
x-axis

y-axis

P goes to (,)

9

Sketch the graph of $y = f(x + 4)$



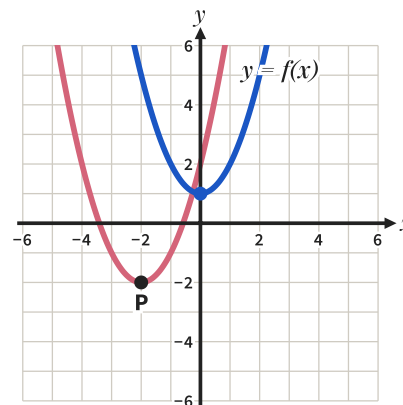
Describe the movement

4 squares left

P goes to (,)

10

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



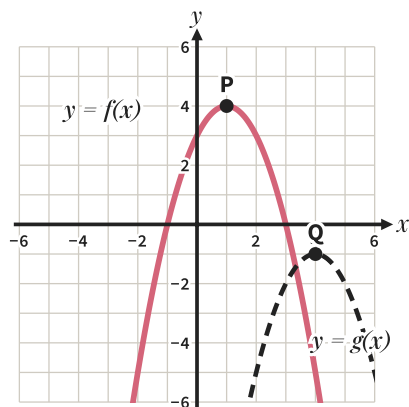
Describe the movement

2 squares right and 3 squares up

P goes to (,)

11

The dashed graph $y = g(x)$ is a translation of $y = f(x)$. P goes to Q.



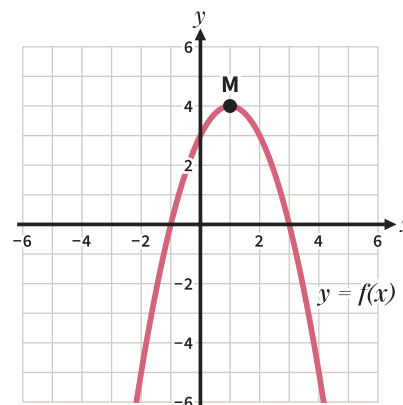
Write $g(x)$ in terms of f

$g(x) = f(x - 3) - 5$

3 right, 5 down

12

The graph of $y = f(x)$ has a maximum point at $M(1, 4)$. Write down the turning point of each graph.



(a) $y = f(x) - 6$ (,)

(b) $y = f(x + 2)$ (,)

(c) $y = -f(x)$ (,)

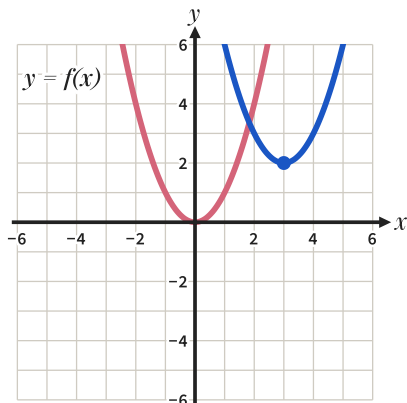
(c) is a minimum

Graph Transformations *further practice*

ANSWERS

13

Here is the graph of $y = f(x) = x^2$. Sketch $y = (x - 3)^2 + 2$.



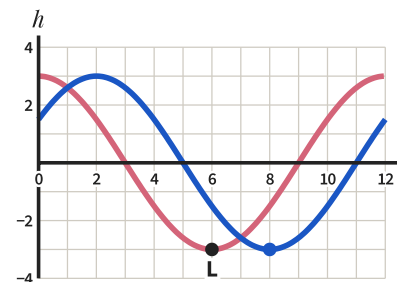
Write it in terms of f

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

Turning point (3 , 2)

14

The graph shows $h = f(t)$, the height of the sea in metres above its average level, t hours after midnight. Tomorrow every tide is 2 hours later. Sketch tomorrow's graph.



Tomorrow's equation

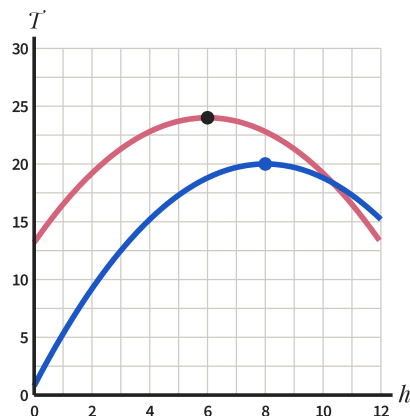
$$h = f(t - 2)$$

Tomorrow's low tide is at

8 am

15

The graph shows $T = f(h)$, the temperature in $^{\circ}\text{C}$ in a greenhouse h hours after 6 am. On a cloudy day it is 4°C cooler all day and the hottest time is 2 hours later. Sketch the cloudy day.



Equation for the cloudy day

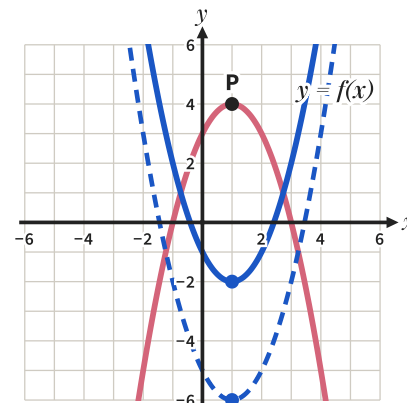
$$T = f(h - 2) - 4$$

Hottest on the cloudy day

20 $^{\circ}\text{C}$ at 2 pm

16

Sam says reflecting $y = f(x)$ in the x axis and then moving it 2 up gives the same graph as moving it 2 up and then reflecting it. Use P to show Sam is wrong.



Reflect, then up: (1 , -2)

Up, then reflect: (1 , -6)

Is Sam right?

No: one graph is 4 below the other