Class Name : **Lacoste College Algebra Fall 2019**

Student Name : _____

Instructor Name : **Master Templates**
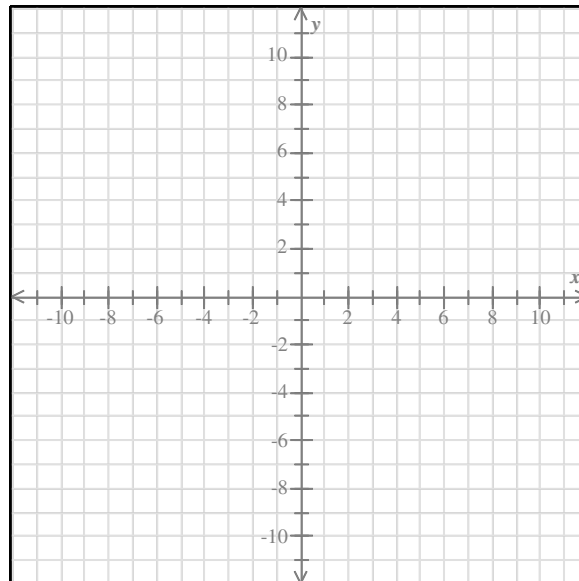
Instructor Note : **All practice problems for Exam 3. There are multiple versions so that you can try challenging problems more than once.**
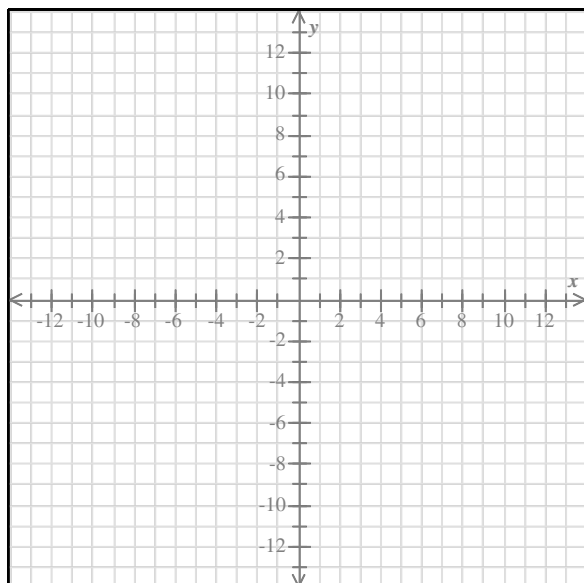
**Question 1 of 58**

Graph the equation.

$$y = 3\,|x|$$

Graph the parabola.
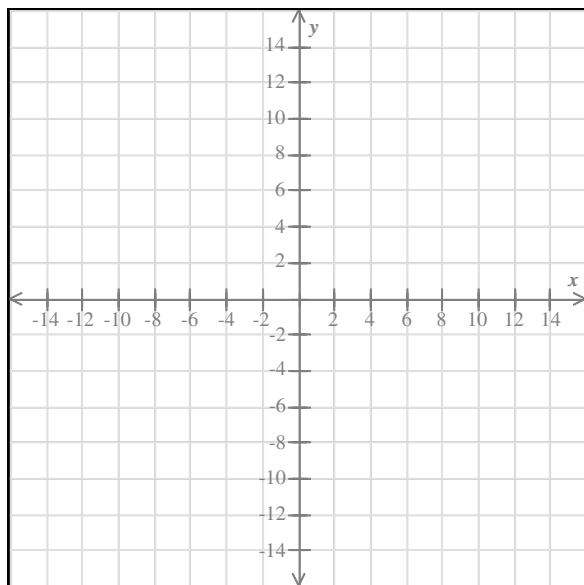
$$y = 3x^2$$

Graph

$$y = \frac{7}{4}x^3.$$

The function $f$ is defined as follows.
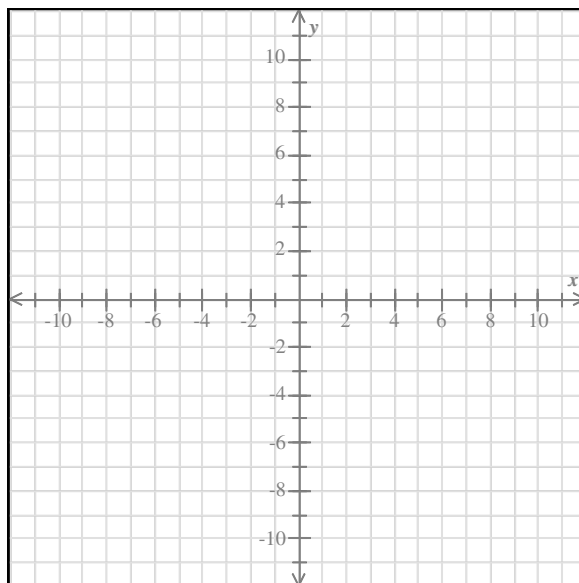
$$f(x) = \sqrt[3]{x} + 3$$

Find $f(125)$ and $f(-64)$.

$$f(125) = \boxed{\phantom{0}}$$

$$f(-64) = \boxed{\phantom{0}}$$

Graph the equation.

$$y = 2\left|x - 4\right| + 3$$
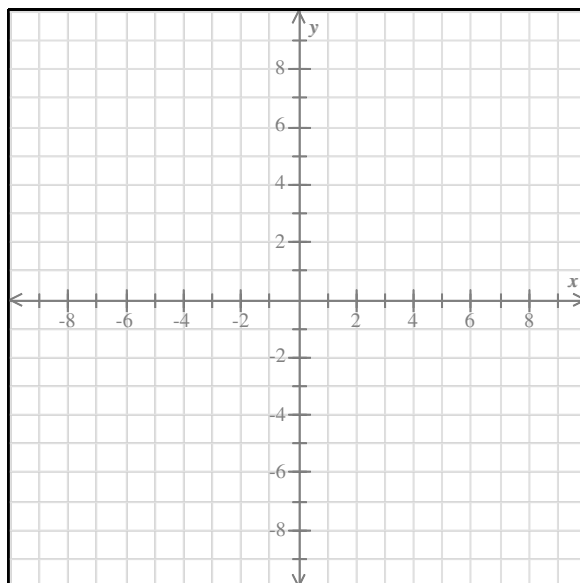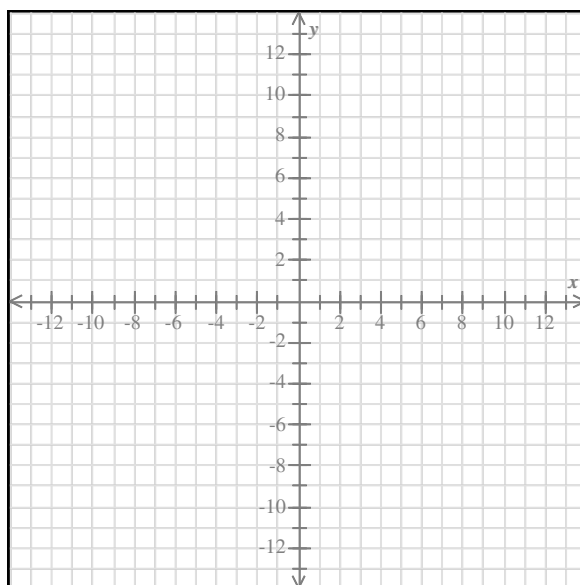
Graph the parabola.

$$y = (x+4)^2 - 1$$

Graph the function $f(x) = \sqrt{x} - 2$.
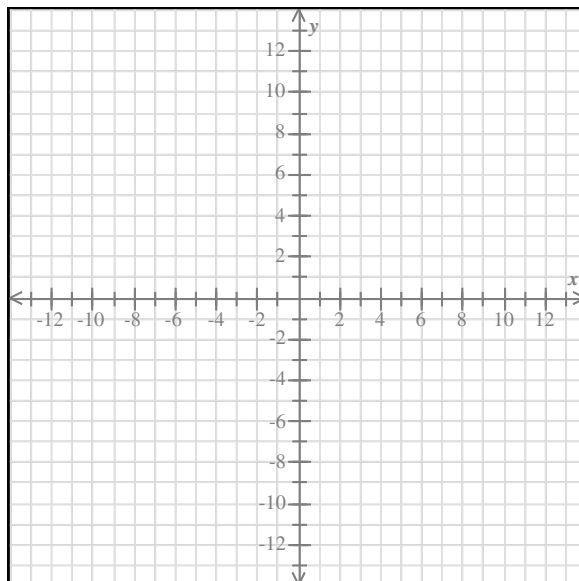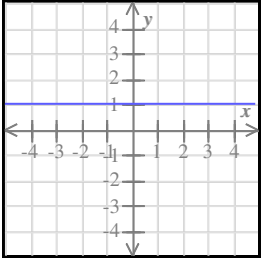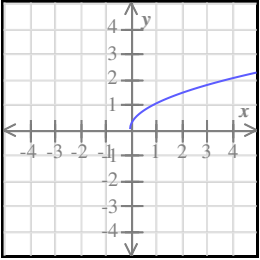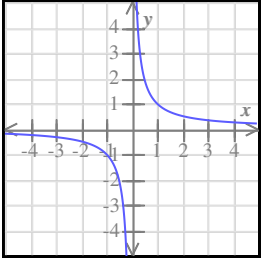
Graph the function $f(x) = 3\sqrt{x} - 1$.
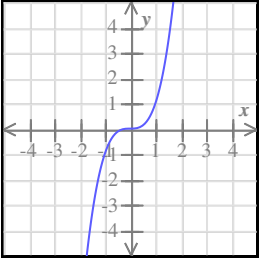
Graph the following function.

$$f(x) = \sqrt[3]{x+3}$$
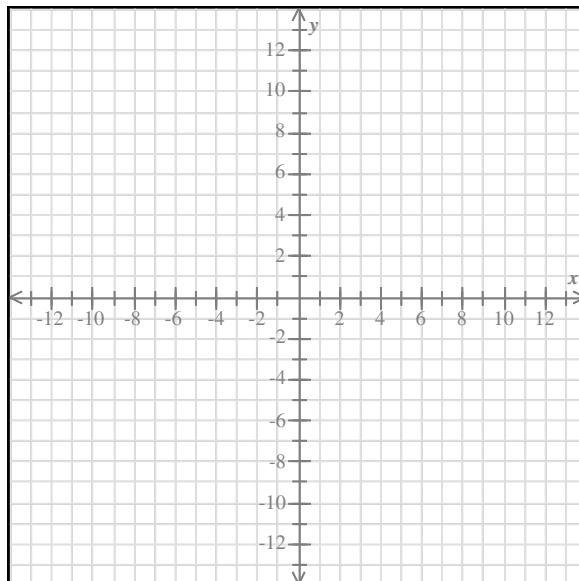
For each graph, choose the function that best describes it.

**(a)**



○ $f(x)=1$    ○ $f(x)=|x|$

○ $f(x)=x$

○ $f(x)=x^2$    ○ $f(x)=\dfrac{1}{x}$

○ $f(x)=x^3$    ○ $f(x)=\dfrac{1}{x^2}$

○ $f(x)=\sqrt{x}$

**(b)**



○ $f(x)=1$    ○ $f(x)=|x|$

○ $f(x)=x$

○ $f(x)=x^2$    ○ $f(x)=\dfrac{1}{x}$

○ $f(x)=x^3$    ○ $f(x)=\dfrac{1}{x^2}$

○ $f(x)=\sqrt{x}$

**(c)**



○ $f(x)=1$    ○ $f(x)=|x|$

○ $f(x)=x$

○ $f(x)=x^2$    ○ $f(x)=\dfrac{1}{x}$

○ $f(x)=x^3$    ○ $f(x)=\dfrac{1}{x^2}$

○ $f(x)=\sqrt{x}$

**(d)**



○ $f(x)=1$    ○ $f(x)=|x|$

○ $f(x)=x$

○ $f(x)=x^2$    ○ $f(x)=\dfrac{1}{x}$

○ $f(x)=x^3$    ○ $f(x)=\dfrac{1}{x^2}$

○ $f(x)=\sqrt{x}$

Translate each graph as specified below.

(a) The graph of $y = x^2$ is shown. Translate it to get the graph of $y = (x - 1)^2$.

(b) The graph of $y = x^2$ is shown. Translate it to get the graph of $y = x^2 + 4$.

Part (a)

Part (b)
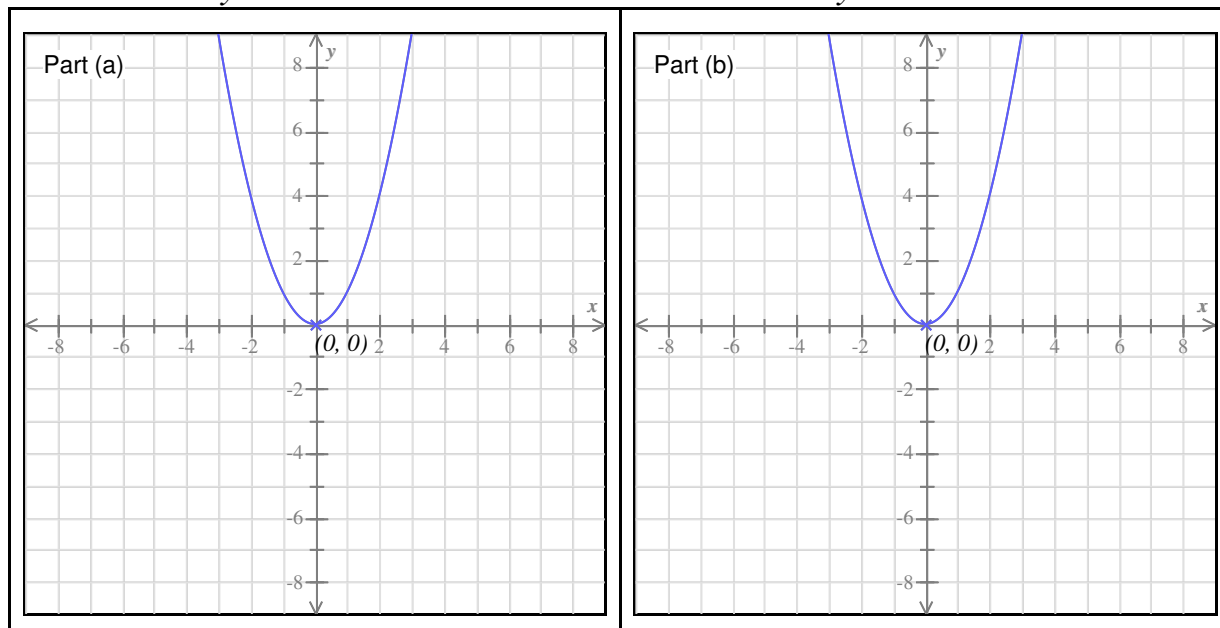
**Question 12 of 58**

Below is the graph of $y = x^2$.

Translate it to make it the graph of $y = (x - 5)^2 + 1$.

Translate each graph as specified below.

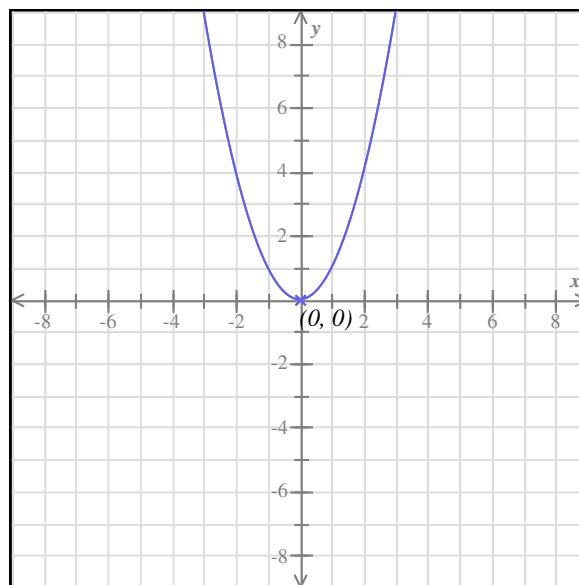(a) The graph of $y = |x|$ is shown. Translate it to get the graph of $y = |x + 4|$.

(b) The graph of $y = |x|$ is shown. Translate it to get the graph of $y = |x| - 1$.
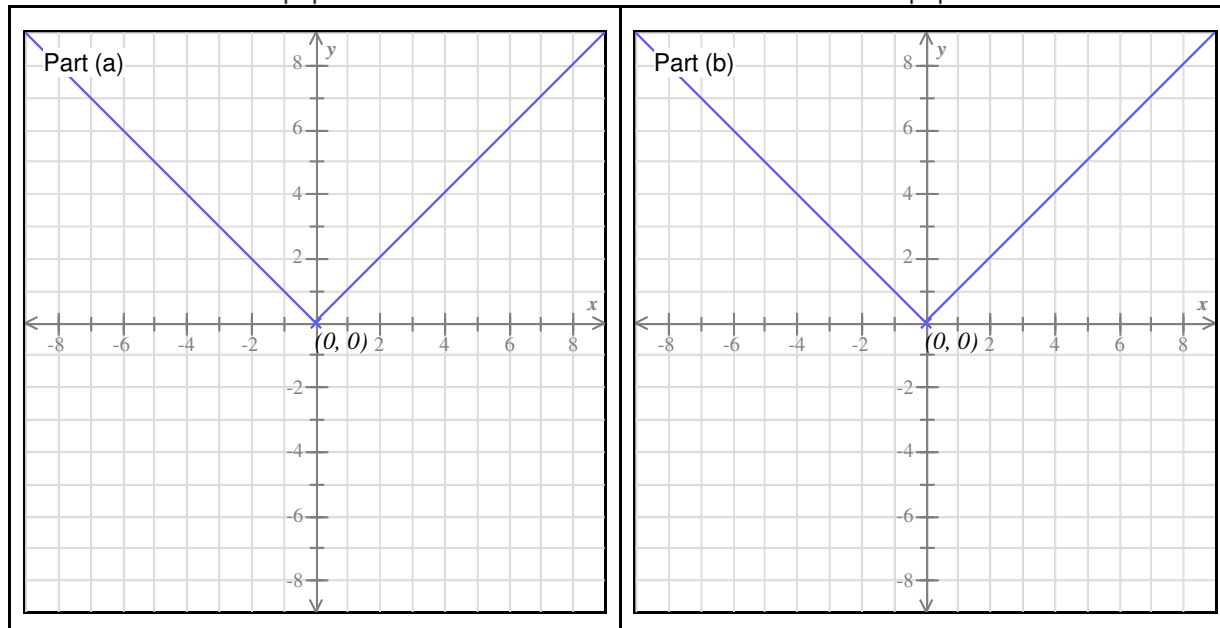


## Question 14 of 58

Below is the graph of $y = |x|$.

Translate it to make it the graph of $y = |x - 5| - 3$.
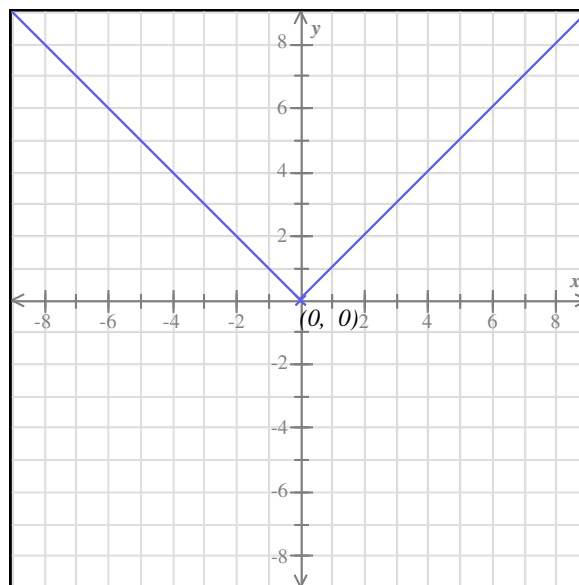
Fill in the information about the absolute value functions below.

| | $\left[y == 3/4 * \lvert x\rvert\right]$ | $\left[y == -\left(2 * \lvert x\rvert\right)\right]$ | $\left[y == 1/2 * \lvert x\rvert\right]$ | $\left[y == -\left(4 * \lvert x\rvert\right)\right]$ |
|---|---|---|---|---|
| **(a)** For each function, choose whether its graph opens up or down | - up<br>- down | - up<br>- down | - up<br>- down | - up<br>- down |
| **(b)** Choose the function with the narrowest graph | ○ | ○ | ○ | ○ |
| **(c)** Choose the function with the widest graph | ○ | ○ | ○ | ○ |

If the graph of the function $h$ defined by

$$h(x) = 5x^2 + 8$$

is translated vertically downward by $6$ units, it becomes the graph of a function $f$.

Find the expression for $f(x)$.

Translate each graph as specified below.

(a) The graph of $y = f(x)$ is shown. Translate it to get the graph of $y = f(x+5)$.
(b) The graph of $y = g(x)$ is shown. Translate it to get the graph of $y = g(x)+2$.
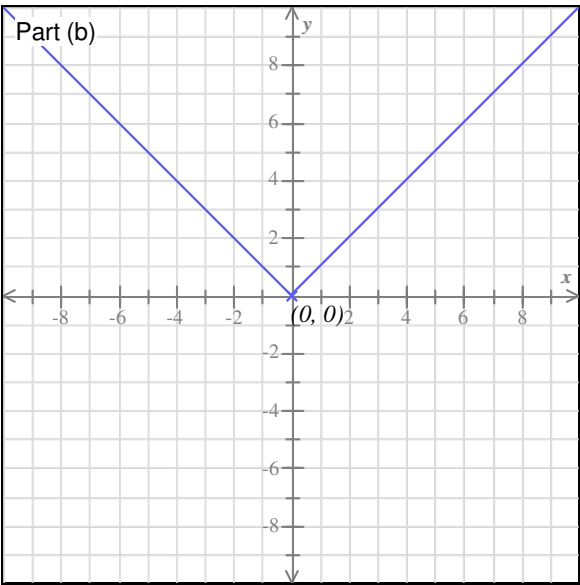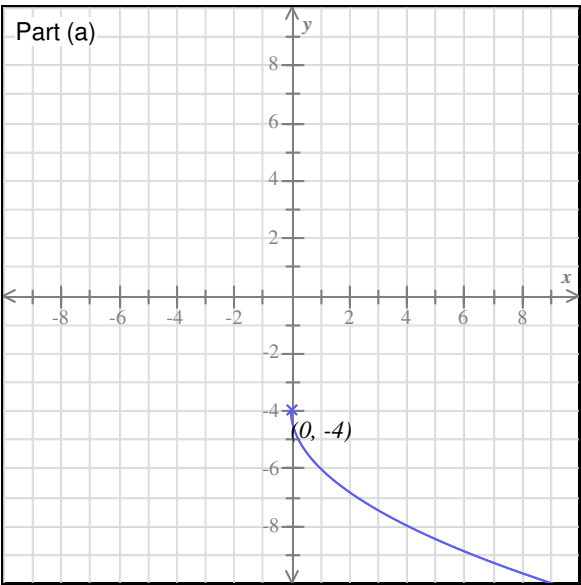
Below is the graph of $y = |x|$.

Translate it to make it the graph of $y = |x + 1| - 3$.
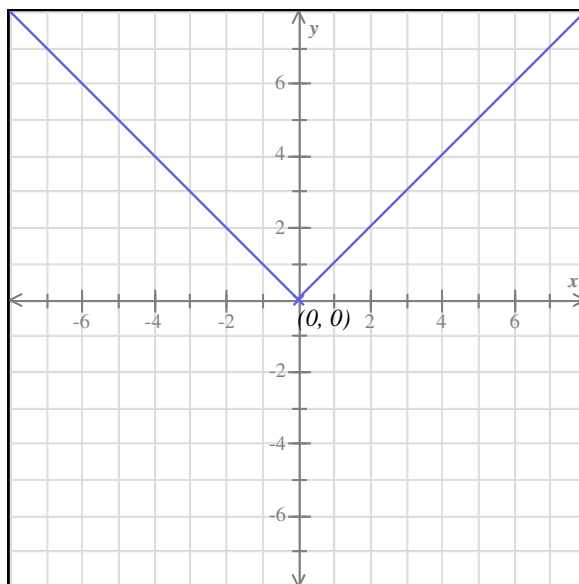
Transform each graph as specified below.

The graph of $y = f(x)$ is shown. Graph $y = \dfrac{1}{2} f(x)$.
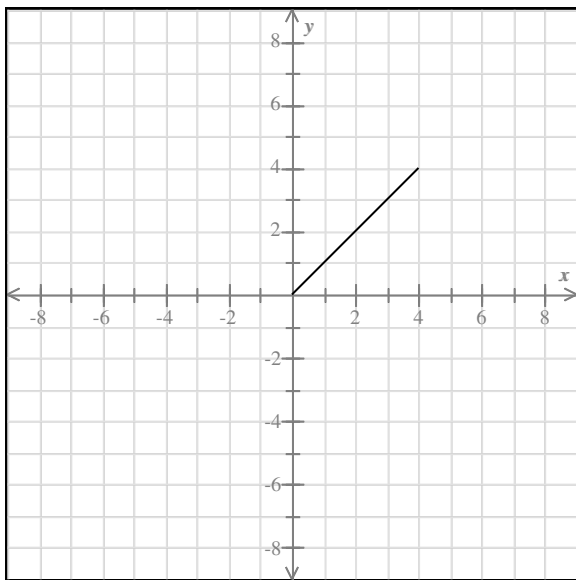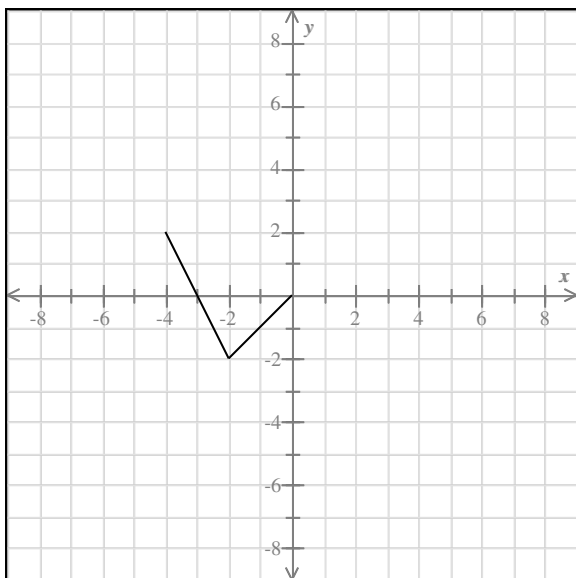


The graph of $y = g(x)$ is shown. Graph $y = g\left(\dfrac{1}{2}x\right)$.

Complete the following.

The graph of $y = f(x)$ is shown. Draw the graph of $y = 2f(x-4)$.
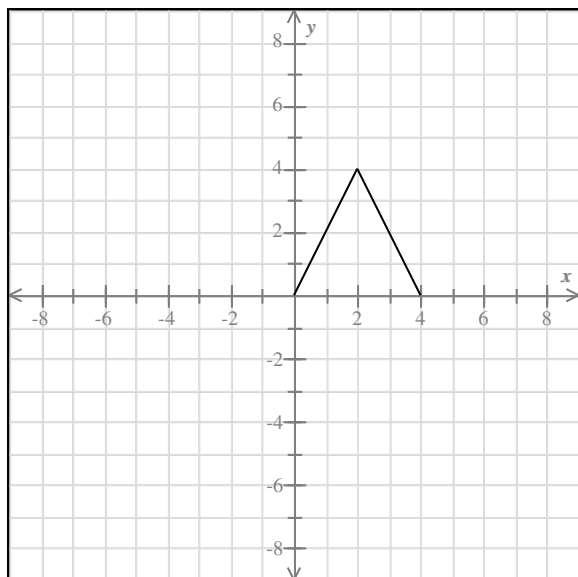


The graph of $y = g(x)$ is shown. Draw the graph of $y = g(-x) - 1$.
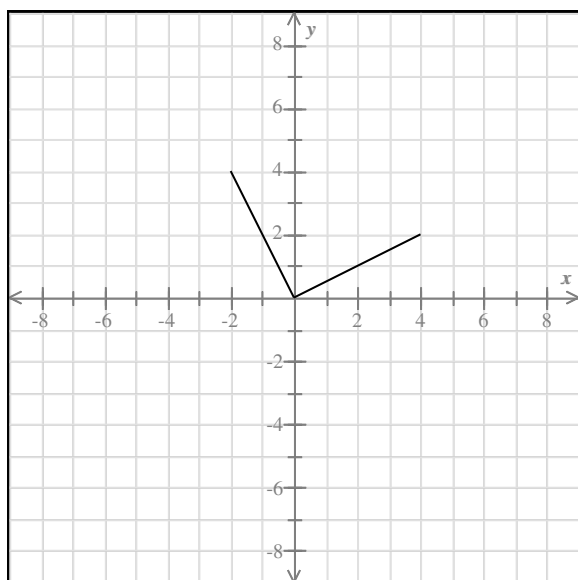
Below is the graph of $y = |x|$.

Transform it to make it the graph of $y = 3|x+1| + 4$.
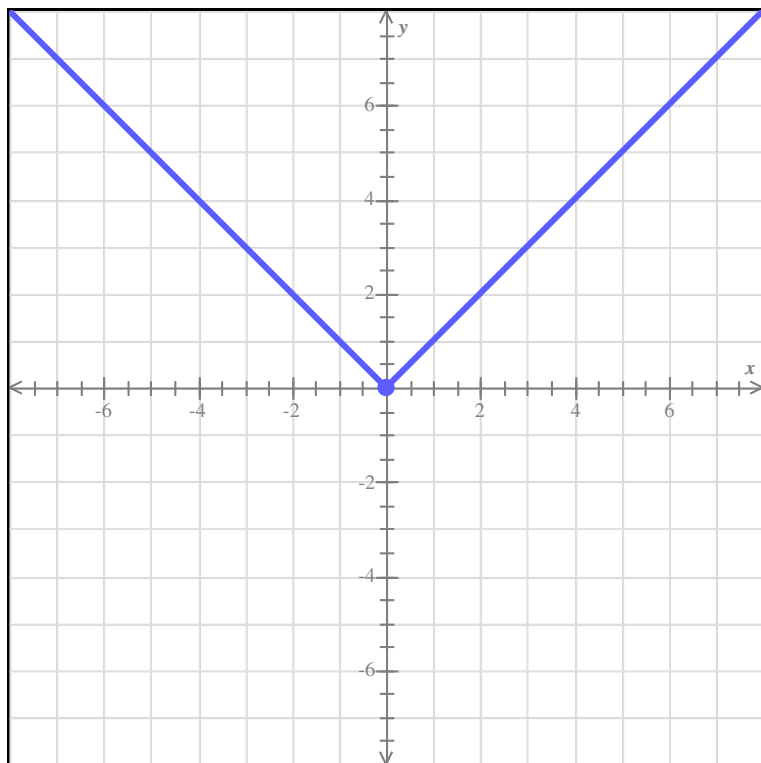
The graph of $f$ (in blue) is translated a whole number of units horizontally and vertically to obtain the graph of $k$ (in red).
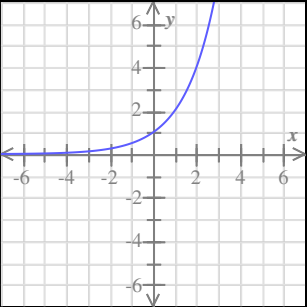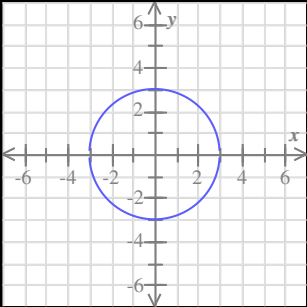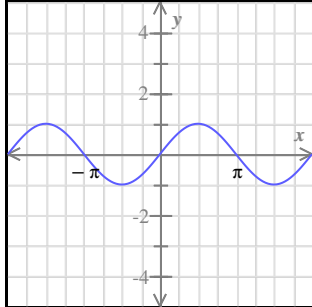
The function $f$ is defined by $f(x) = x^2$.

Write down the expression for $k(x)$.
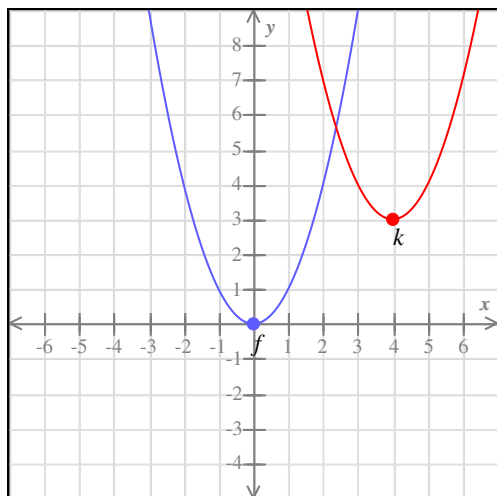
For each graph, select *all* symmetries that apply.

(a)



Symmetry:
- ☐ $x$-axis
- ☐ $y$-axis
- ☐ origin
- ☐ none of these

(b)



Symmetry:
- ☐ $x$-axis
- ☐ $y$-axis
- ☐ origin
- ☐ none of these

(c)



Symmetry:
- ☐ $x$-axis
- ☐ $y$-axis
- ☐ origin
- ☐ none of these

For each equation, determine whether its graph is symmetric with respect to the $x$-axis, the $y$-axis, and the origin.

Check *all* symmetries that apply.

$$x = y^4 - y^2 + 2$$

Symmetry:

- ☐ $x$-axis
- ☐ $y$-axis
- ☐ origin
- ☐ none of the above

$$35 x^4 + 30 y^4 = 82$$

Symmetry:

- ☐ $x$-axis
- ☐ $y$-axis
- ☐ origin
- ☐ none of the above

Suppose that the function $g$ is defined, for all real numbers, as follows.

$$g(x) = \begin{cases} -\dfrac{1}{4}x^2 + 4 & \text{if } x \neq 2 \\ 4 & \text{if } x = 2 \end{cases}$$

Find $g(-1)$, $g(2)$, and $g(4)$.

$g(-1)$
$g(2)$
$g(4)$

Determine the interval(s) on which the function is (strictly) increasing.

Write your answer as an interval or list of intervals.
When writing a list of intervals, make sure to separate each interval with a comma and to use as few intervals as possible.

Click on "None" if applicable.
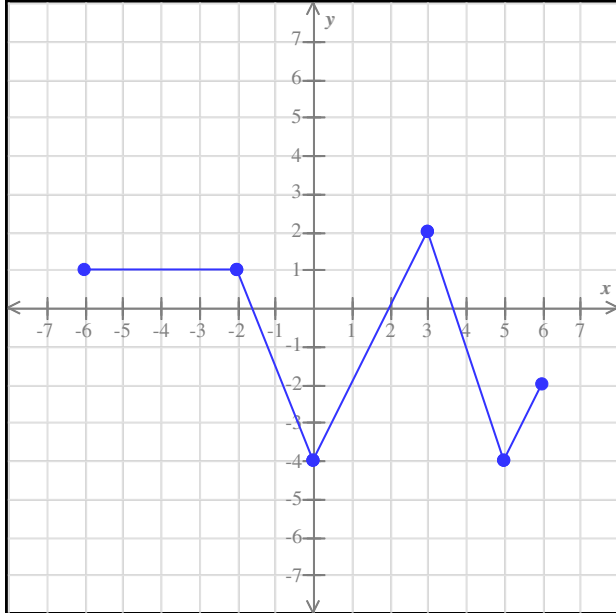
Here is a graph of the function $f$:
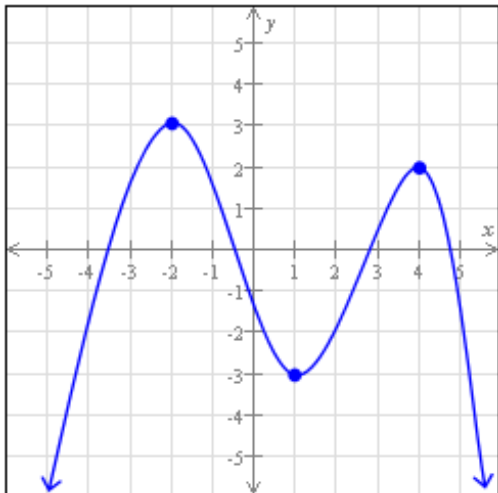


Use the graph to find the following.
If there is more than one answer, separate them with commas.

(a)    All values at which $f$ has a local maximum:

(b)    All local maximum values of $f$:

Suppose that the function $f$ is defined as follows.

$$f(x) = \begin{cases} -2 & \text{if } -2 \leq x < -1 \\ -1 & \text{if } -1 \leq x < 0 \\ 0 & \text{if } 0 \leq x < 1 \\ 1 & \text{if } 1 \leq x < 2 \end{cases}$$

Graph the function $f$:
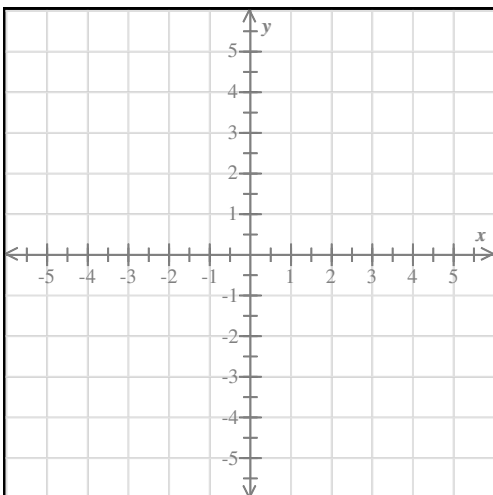
Suppose that the function $f$ is defined, for all real numbers, as follows.

$$f(x) = \begin{cases} x - 4 & \text{if } x < 2 \\ -2x + 2 & \text{if } x \geq 2 \end{cases}$$

Graph the function $f$. Then determine whether or not the function is continuous.
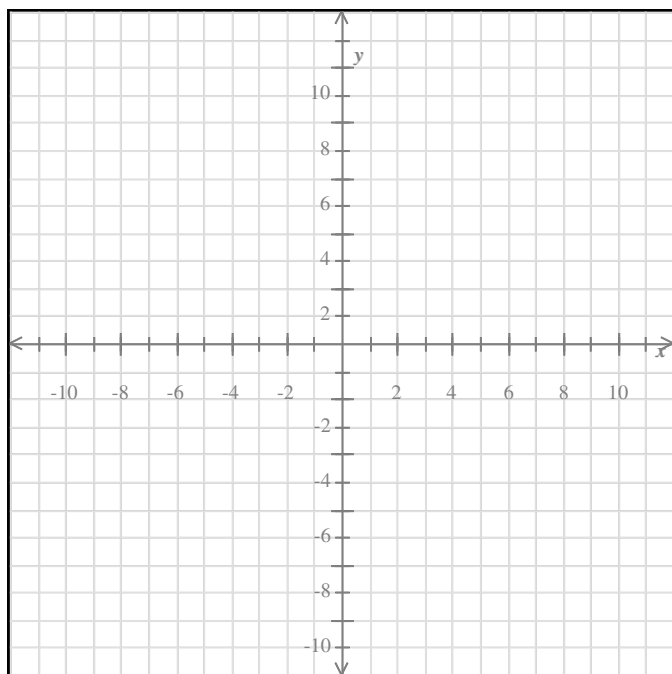
Is the function continuous?

○ Yes
○ No

Suppose that the function $f$ is defined for all real numbers as follows.

$$f(x) = \begin{cases} 1 - x^2 & \text{if} \quad x < 1 \\ -2x + 2 & \text{if} \quad x \geq 1 \end{cases}$$

Graph the function $f$. Then determine whether or not the function is continuous.
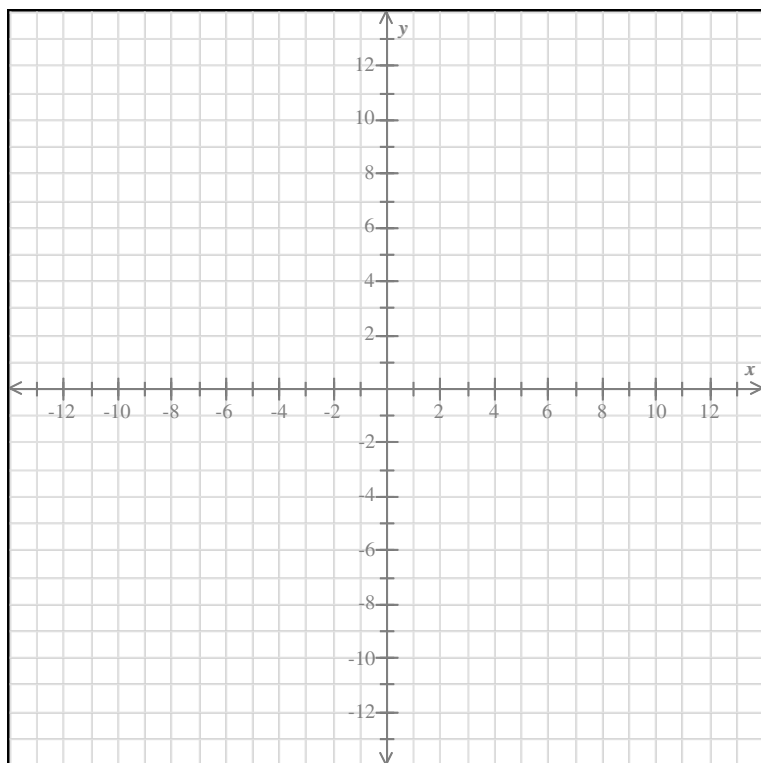
Four functions are given below. Either the function is defined explicitly, or the entire graph of the function is shown.

For each, decide whether it is an even function, an odd function, or neither.

The function $r$
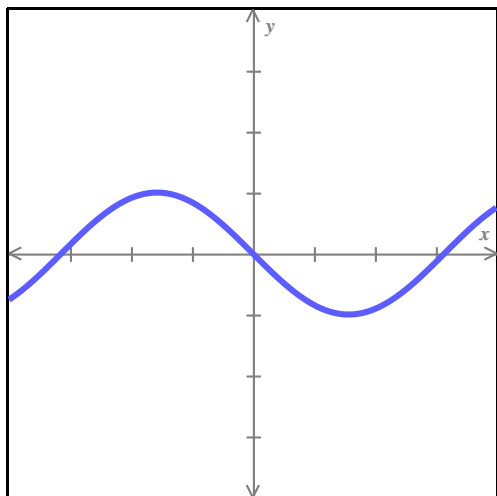


- Even - Odd - Neither

The function $s$
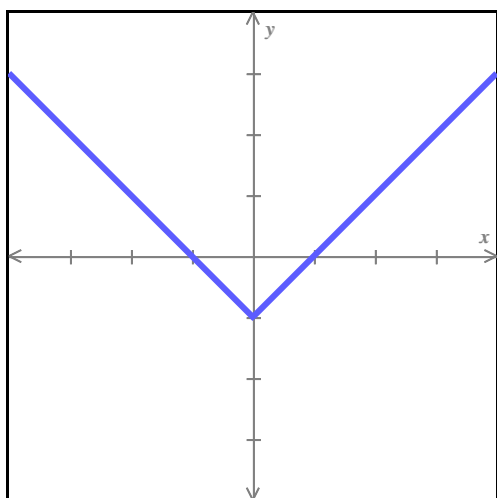


- Even - Odd - Neither

$g(x) = -2x^4 + 3x^2$

- Even - Odd - Neither

$h(x) = -4x^5 + 3x^2$

- Even - Odd - Neither

Three functions are given below.
For each, decide whether it is an even function, an odd function, or neither.

| $f(x) = \dfrac{1}{6x^3}$ | $g(x) = \sqrt[3]{5x^2}$ | $h(x) = x\,|x+7|$ |
|---|---|---|
| ○ Even | ○ Even | ○ Even |
| ○ Odd | ○ Odd | ○ Odd |
| ○ Neither | ○ Neither | ○ Neither |

**Question 33 of 58**

Latoya and her husband are each starting a saving plan. Latoya will initially set aside $50 and then add $40.75 every week to the savings. The amount $A$ (in dollars) saved this way is given by the function $A = 50 + 40.75N$, where $N$ is the number of weeks she has been saving.

Her husband will not set an initial amount aside but will add $70.55 to the savings every week. The amount $B$ (in dollars) saved using this plan is given by the function $B = 70.55N$.

Let $T$ be total amount (in dollars) saved using both plans combined. Write an equation relating $T$ to $N$. Simplify your answer as much as possible.

**Question 34 of 58**

Suppose that the functions $s$ and $t$ are defined for all real numbers $x$ as follows.

$$s(x) = x - 1$$
$$t(x) = 4x + 3$$

Write the expressions for $(s+t)(x)$ and $(s-t)(x)$ and evaluate $(s \cdot t)(1)$.

$(s+t)(x)$
$(s-t)(x)$
$(s \cdot t)(1)$

Suppose that the functions $f$ and $g$ are defined as follows.

$$f(x) = x + 5$$
$$g(x) = (x + 6)(x - 2)$$

(a) Find $\left(\dfrac{f}{g}\right)(-2)$.

(b) Find all values that are NOT in the domain of $\dfrac{f}{g}$.

If there is more than one value, separate them with commas.

Suppose that the functions $f$ and $g$ are defined as follows.

$$f(x) = \dfrac{x}{x-9} \qquad g(x) = \dfrac{x+6}{x-9}$$

Find $\dfrac{f}{g}$. Then, give its domain using an interval or union of intervals.

Simplify your answers.

Suppose that the functions $f$ and $g$ are defined as follows.

$$f(x) = \frac{1}{2x^2 + 3}$$
$$g(x) = \sqrt{3x + 5}$$

Find $f \cdot g$ and $f + g$. Then, give their domains using interval notation.

$(f \cdot g)(x) =$ 　　$\square$

Domain of $f \cdot g$: 　$\square$

$(f + g)(x) =$ 　　$\square$

Domain of $f + g$: 　$\square$

Suppose that the functions $q$ and $r$ are defined as follows.

$$q(x) = 2x + 1$$
$$r(x) = -x^2$$

Find the following.

$$(r \circ q)(-5)$$
$$(q \circ r)(-5)$$

Suppose that the functions $f$ and $g$ are defined as follows.

$$f(x) = \frac{5}{x}, \; x \neq 0$$

$$g(x) = x^2 - 8$$

Find the compositions $f \circ f$ and $g \circ g$.

Simplify your answers as much as possible.

(Assume that your expressions are defined for all $x$ in the domain of the composition. You do *not* have to indicate the domain.)

$$(f \circ f)(x) = \underline{\hspace{1.5cm}}$$
$$(g \circ g)(x) = \underline{\hspace{1.5cm}}$$

For the real-valued functions $g(x) = 4x - 5$ and $h(x) = \sqrt{x - 5}$, find the composition $g \circ h$ and specify its domain using interval notation.

$$(g \circ h)(x) =$$

Domain of $g \circ h$:

The volume $V(r)$ (in cubic meters) of a spherical balloon with radius $r$ meters is given by $V(r) = \frac{4}{3}\pi r^3$.

The radius $W(t)$ (in meters) after $t$ seconds is given by $W(t) = 5t + 3$.

Write a formula for the volume $M(t)$ (in cubic meters) of the balloon after $t$ seconds.

It is not necessary to simplify.

$$M(t) =$$

Suppose that $y$ varies directly with $x$, and $y = 15$ when $x = 6$.

| (a) Write a direct variation equation that relates $x$ and $y$. |
|---|
| Equation: |

| (b) Find $y$ when $x = 7$. |
|---|
| $y =$ |

For a moving object, the force acting on the object varies directly with the object's acceleration. When a force of $90$ N acts on a certain object, the acceleration of the object is $9$ m/s$^2$. If the force is changed to $80$ N, what will be the acceleration of the object?

Miguel is running. The number of minutes he has run varies directly with the number of calories he has burned. See the graph below.



Number of minutes
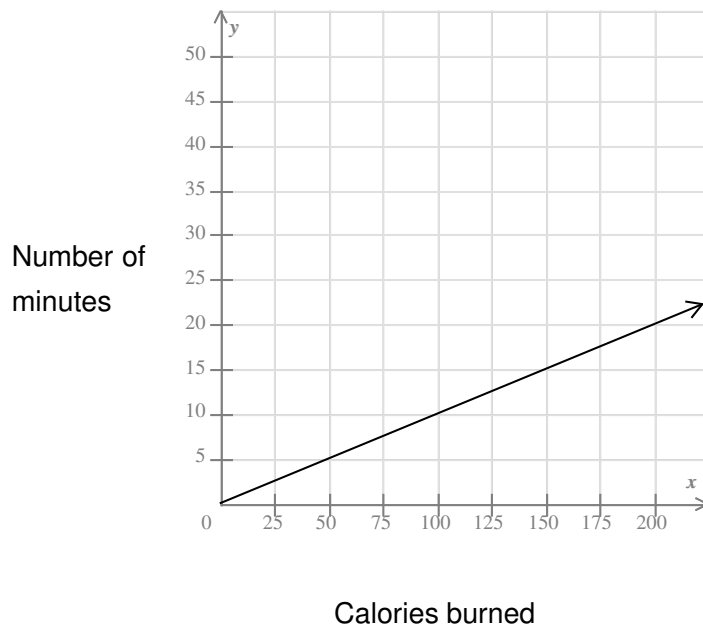
Calories burned

(a) How many calories is Miguel burning per minute?

☐ calorie(s)

(b) What is the slope of the graph?

☐

**Question 45 of 58**

Suppose that $y$ varies inversely with $x$, and $y = 10$ when $x = 2$.

| |
|---|
| (a) Write an inverse variation equation that relates $x$ and $y$.<br><br>    Equation: |
| (b) Find $y$ when $x = 5$.<br><br>    $y =$ |

When a constant force is applied to an object, the acceleration of the object varies inversely with its mass. When a certain constant force acts upon an object with mass $35$ kg, the acceleration of the object is $2$ m/s$^2$. When the same force acts upon another object, its acceleration is $5$ m/s$^2$. What is the mass of this object?

**Question 47 of 58**

Write an equation that expresses the following relationship.

$w$ varies directly with the cube of $u$ and inversely with $d$

In your equation, use $k$ as the constant of proportionality.

**Question 48 of 58**

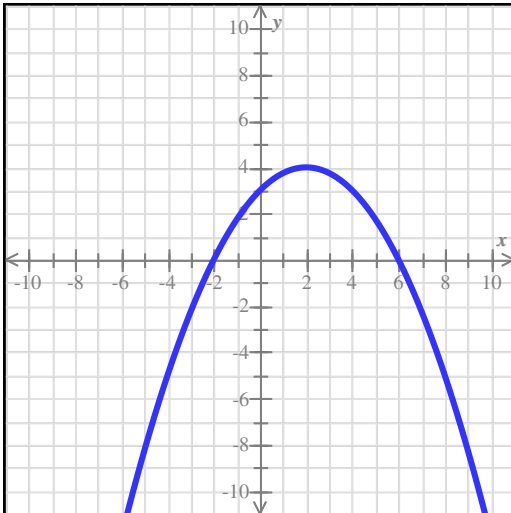The volume $V$ of a fixed amount of a gas varies directly as the temperature $T$ and inversely as the pressure $P$. Suppose that $V = 160$ cm$^3$ when $T = 320$ kelvin and $P = 12$ $\dfrac{\text{kg}}{\text{cm}^2}$. Find the temperature when $V = 90$ cm$^3$ and $P = 16$ $\dfrac{\text{kg}}{\text{cm}^2}$.

☐ kelvin

Use the graph of the parabola to fill in the table.



(a) Does the parabola open upward or downward?

○         ○

upward       downward

(b) Find the intercept(s).

For both the $x$- and $y$-intercept(s), make sure to do the following.

- If there is more than one, separate them with commas.
- If there are none, select "None".

$x$-intercept(s): ☐

$y$-intercept(s): ☐

(c) Find the equation of the axis of symmetry.
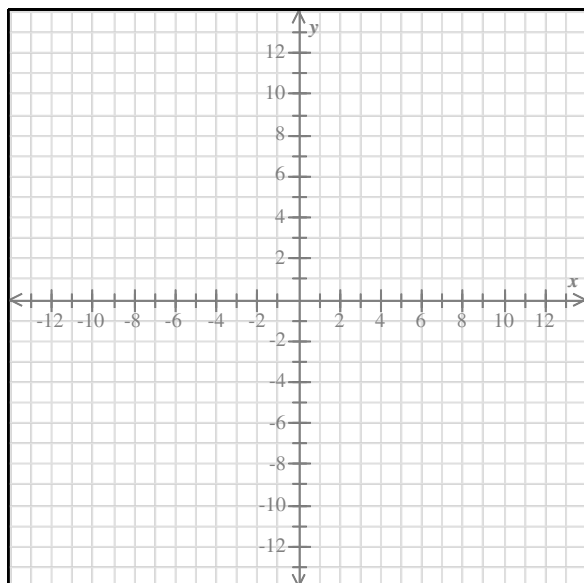
equation of axis of symmetry: ☐

(d) Find the coordinates of the vertex.

vertex: (☐, ☐)

Graph the parabola.
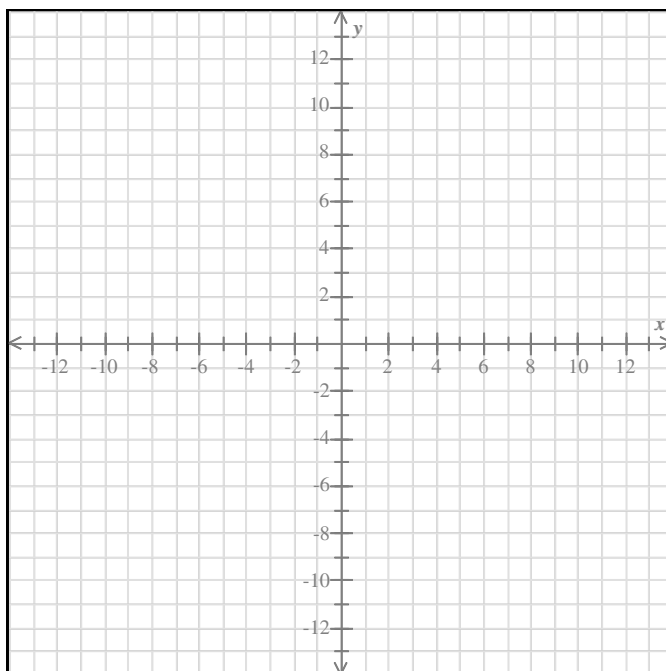
$$y = x^2 - 4x + 2$$

Graph the parabola.

$$y = 3(x - 2)^2 + 1$$

Graph the parabola.

$$y = -2x^2 + 8x - 3$$
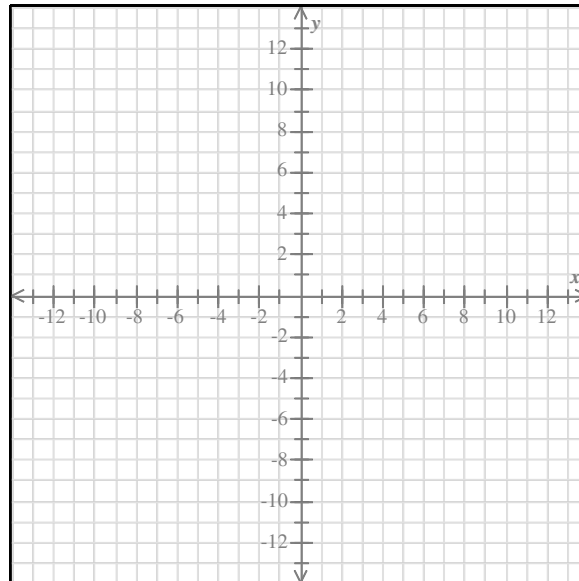
Find the $x$-intercept(s) and the coordinates of the vertex for the parabola $y = x^2 - 4x - 5$. If there is more than one $x$-intercept, separate them with commas.

Answer the questions below about the quadratic function.

$$f(x) = -2x^2 - 4x - 6$$

| |
|---|
| Does the function have a minimum or maximum value? |
| What is the function's minimum or maximum value? |
| Where does the minimum or maximum value occur?<br>$x =$ |

A ball is thrown vertically upward. After $t$ seconds, its height $h$ (in feet) is given by the function $h(t) = 96t - 16t^2$. What is the maximum height that the ball will reach?

Do not round your answer.

Raina has $360$ meters of fencing and wishes to form three sides of a rectangular field. The fourth side borders a river and will not need fencing.

As shown below, one of the sides has length $x$ (in meters).
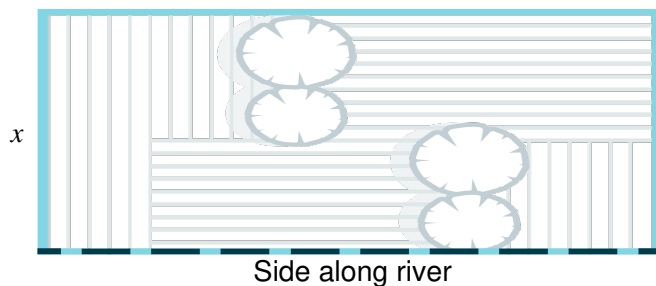
$x$

Side along river

(a) Find a function that gives the area $A(x)$ of the field (in square meters) in terms of $x$.

$A(x) = \boxed{\phantom{0}}$

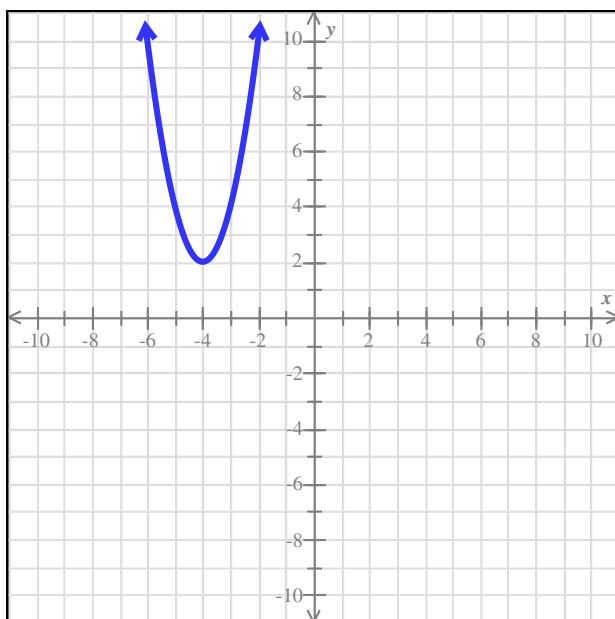(b) What side length $x$ gives the maximum area that the field can have?

Side length $x$ : $\boxed{\phantom{0}}$ meters

(c) What is the maximum area that the field can have?

Maximum area: $\boxed{\phantom{0}}$ square meters

The graph of a quadratic function with vertex $(-4, 2)$ is shown in the figure below.
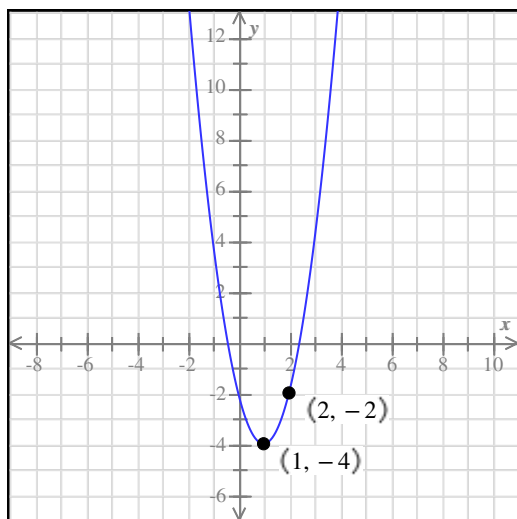Find the domain and the range.



Write the domain and range using interval notation.

$$\text{domain} = \underline{\hspace{2cm}}$$
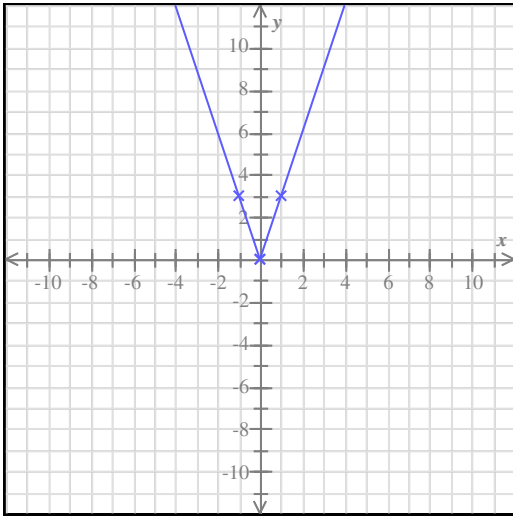
$$\text{range} = \underline{\hspace{2cm}}$$

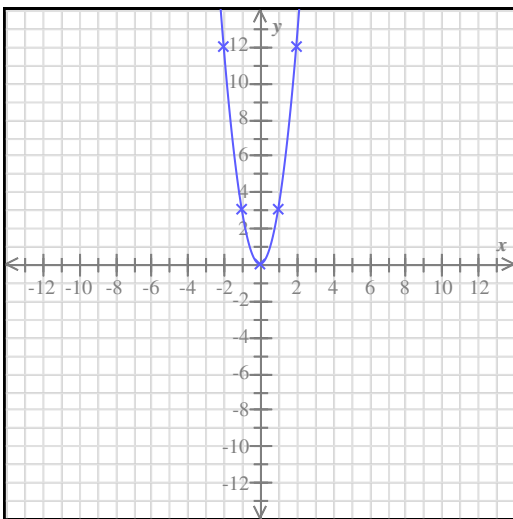Find the equation of the quadratic function $f$ whose graph is shown below.



$(2, -2)$

$(1, -4)$

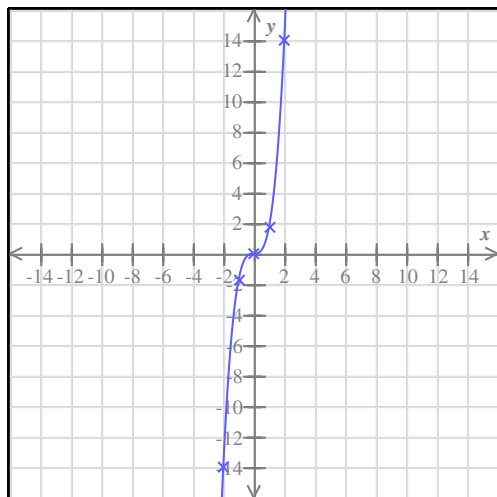# Practice Problems for Exam 3 Version #1 Answers for class Lacoste College Algebra Fall 2019

## Question 1 of 58
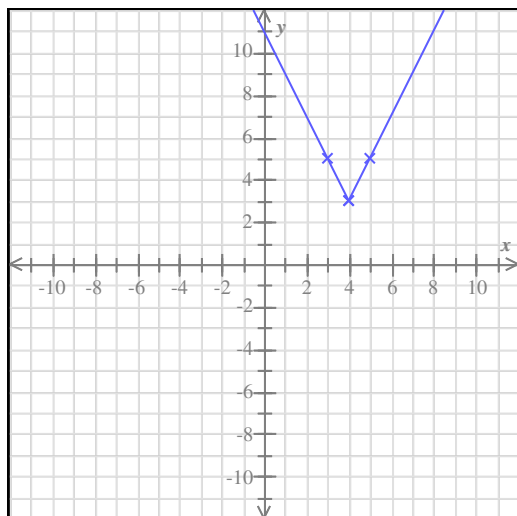


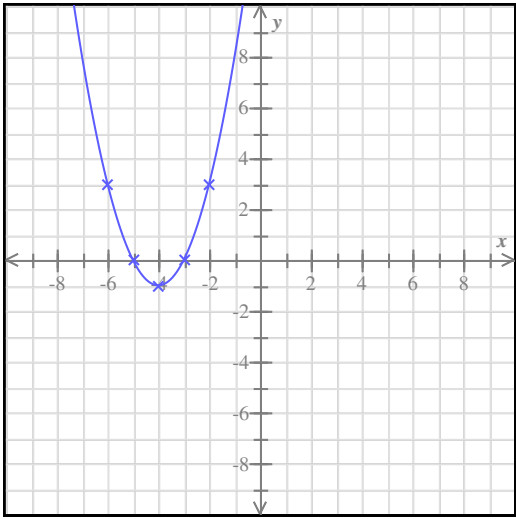## Question 2 of 58



## Question 3 of 58

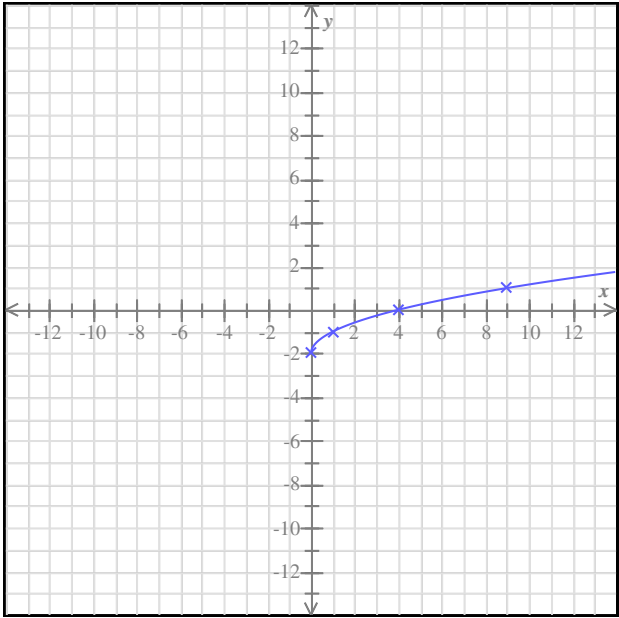## Question 4 of 58
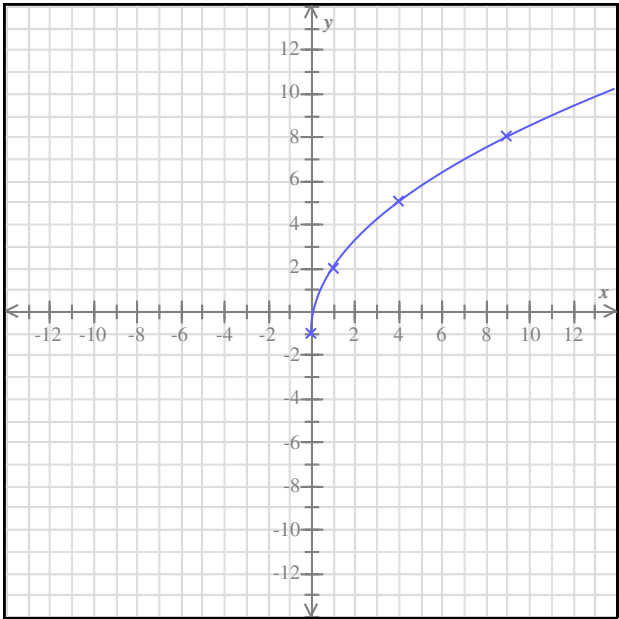
$f(125) = 8$

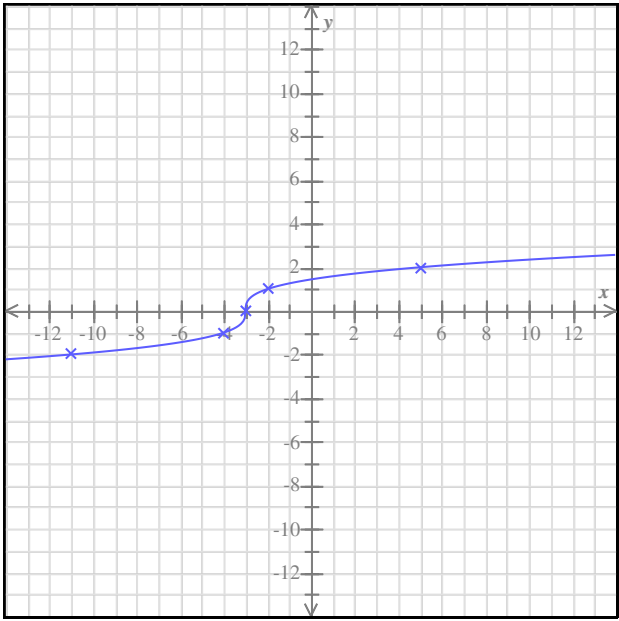$f(-64) = -1$

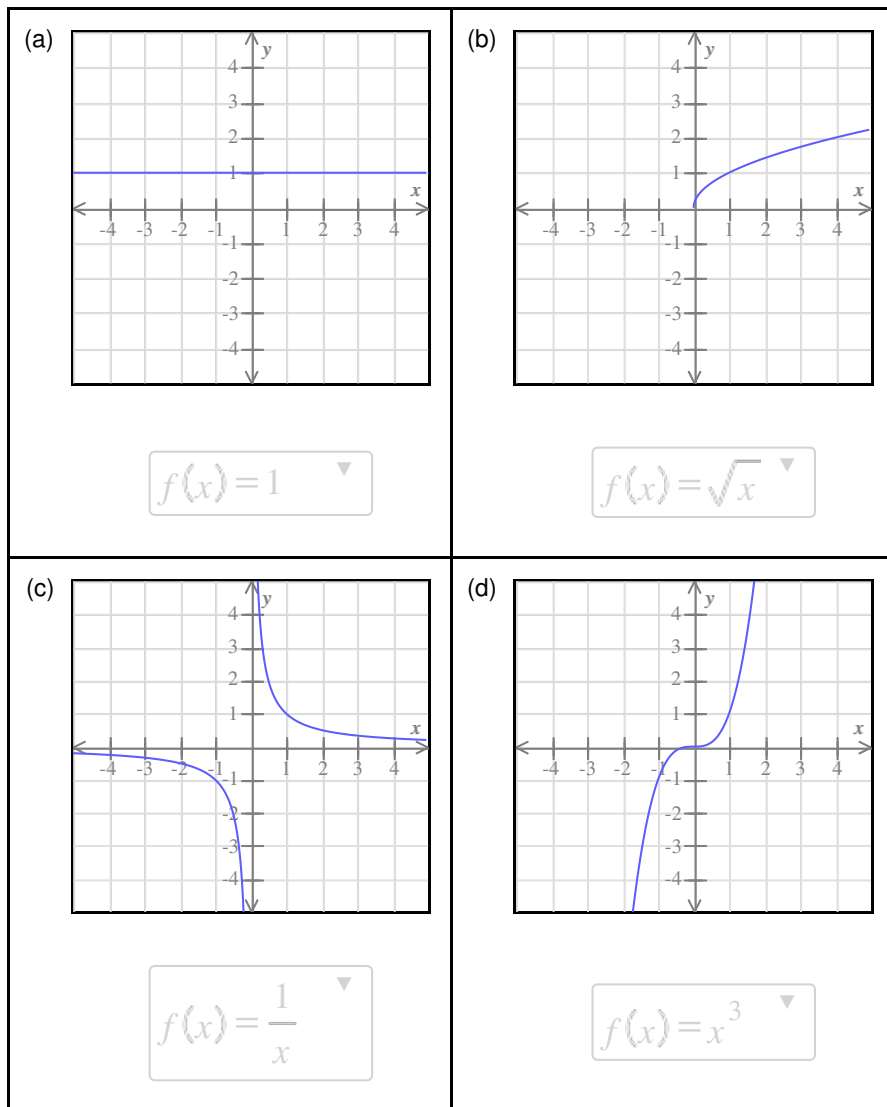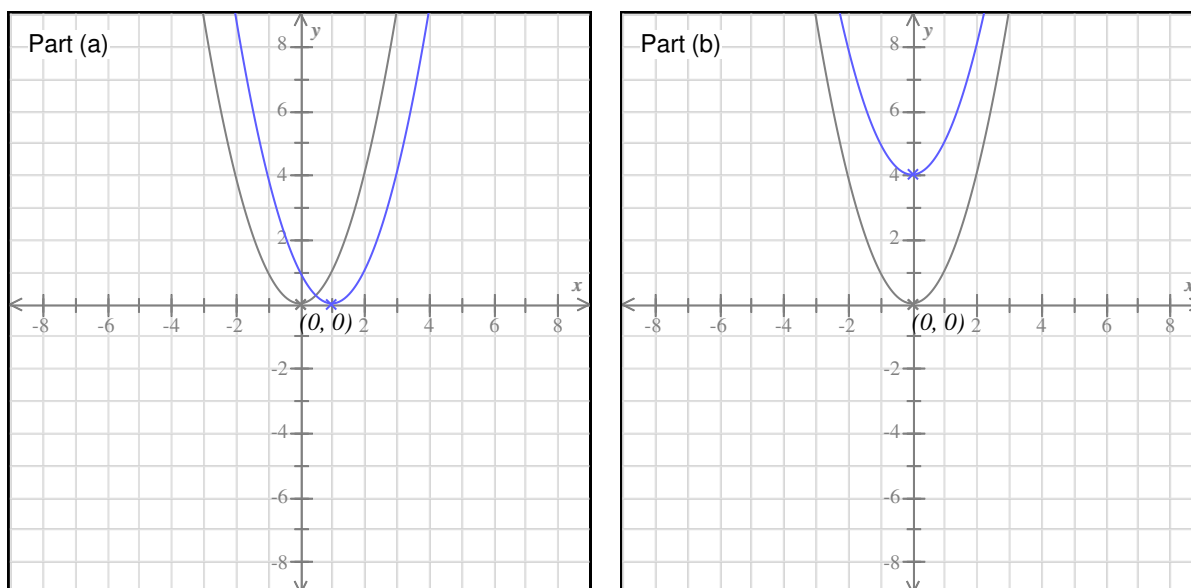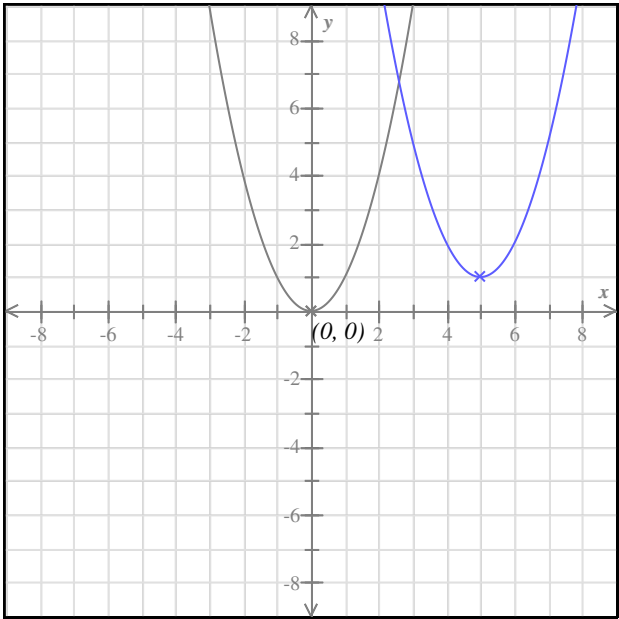## Question 5 of 58



## Question 6 of 58
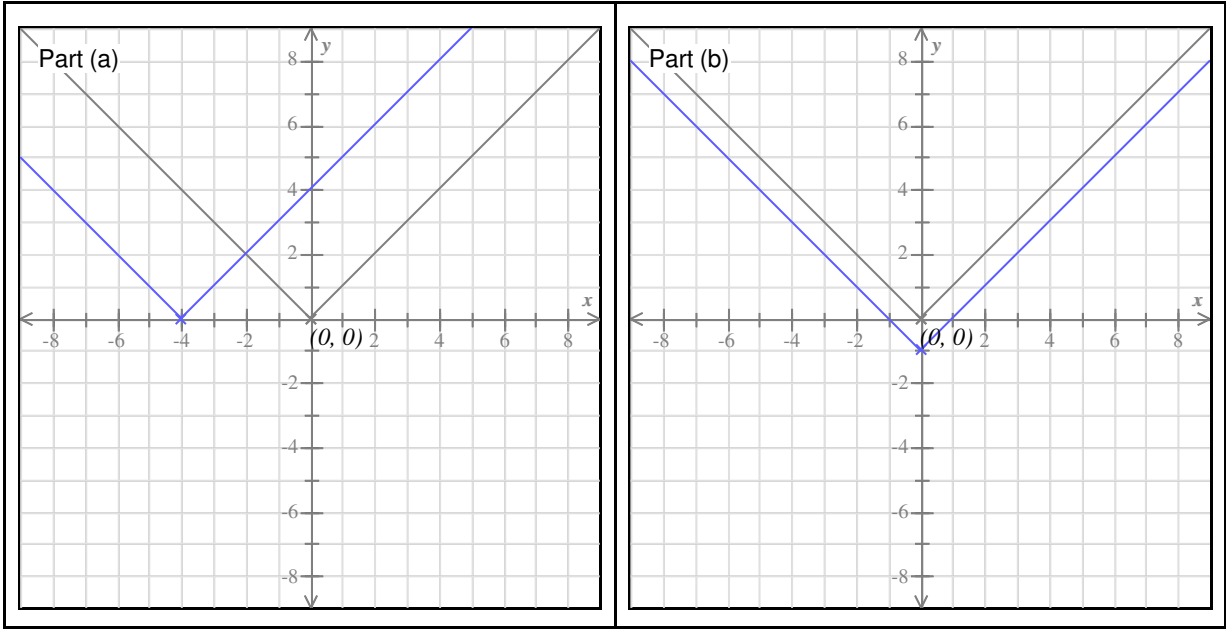
**Question 7 of 58**



**Question 8 of 58**

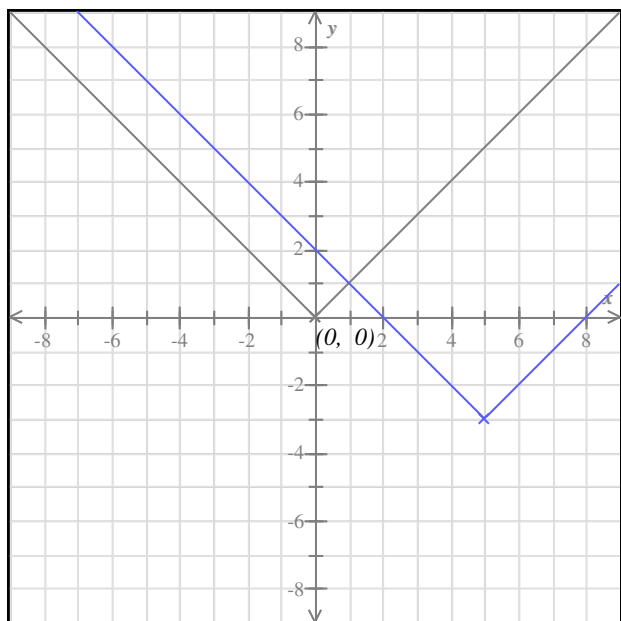## Question 9 of 58



## Question 10 of 58

(a)

$f(x) = 1$ ▼

(b)

$f(x) = \sqrt{x}$ ▼

(c)

$f(x) = \dfrac{1}{x}$ ▼

(d)

$f(x) = x^3$ ▼

## Question 11 of 58

Part (a)

(0, 0)

Part (b)

(0, 0)

## Question 12 of 58

**Question 13 of 58**

Part (a)



Part (b)



**Question 14 of 58**

## Question 15 of 58

| | $y = \dfrac{3}{4}\,\lvert x \rvert$ | $y = -2\,\lvert x \rvert$ | $y = \dfrac{1}{2}\,\lvert x \rvert$ | $y = -4\,\lvert x \rvert$ |
|---|---|---|---|---|
| **(a)** For each function, choose whether its graph opens up or down | up ▼ | down ▼ | up ▼ | down ▼ |
| **(b)** Choose the function with the narrowest graph | ○ | ○ | ○ | ◉ |
| **(c)** Choose the function with the widest graph | ○ | ○ | ◉ | ○ |

## Question 16 of 58

$$f(x) = 5x^2 + 2$$

## Question 17 of 58

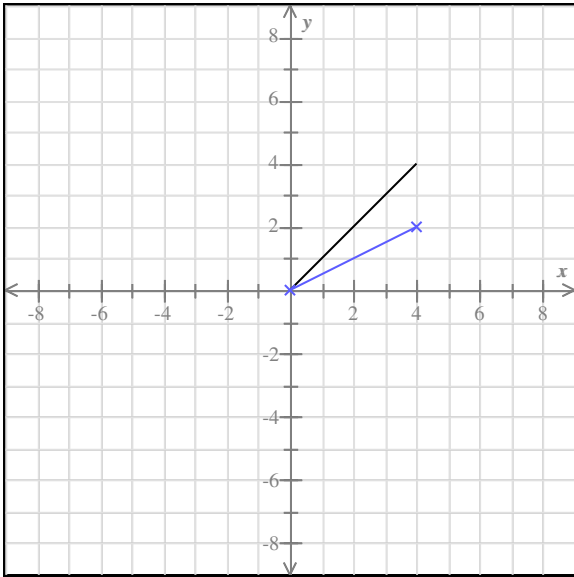Part (a)



(0, -4)

Part (b)
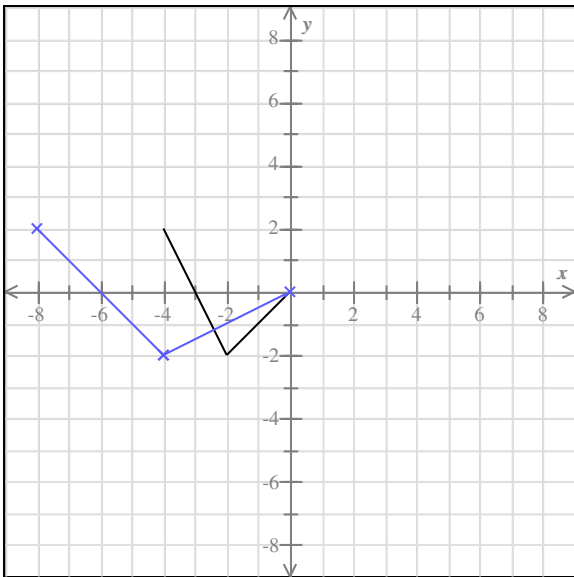


(0, 0)

## Question 18 of 58



(0, 0)
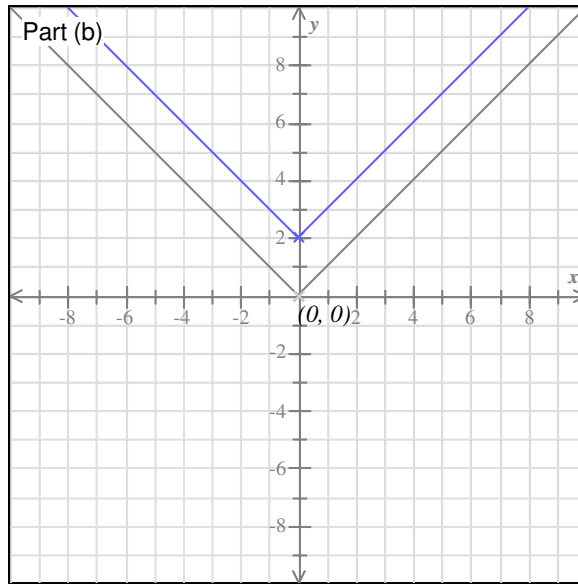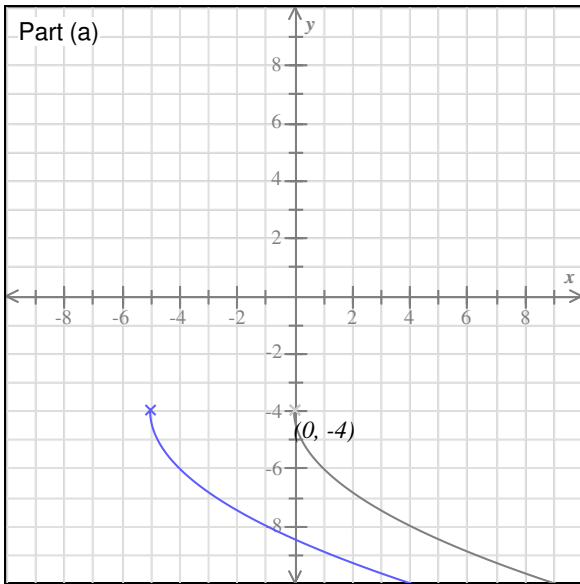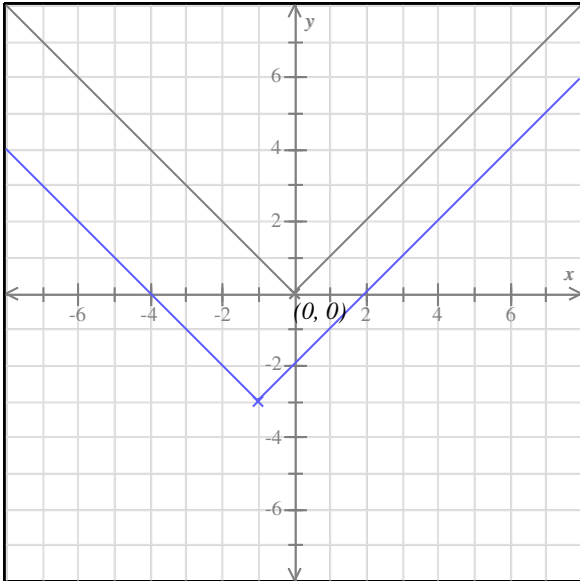
## Question 19 of 58

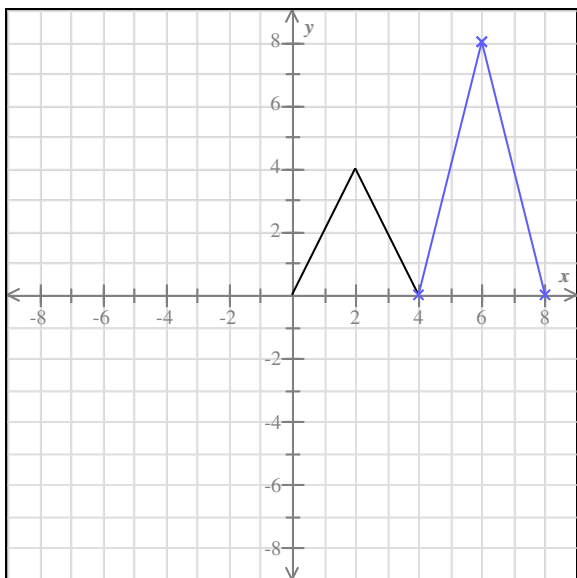The graph of $y = f(x)$ is shown. Graph $y = \dfrac{1}{2}f(x)$.



The graph of $y = g(x)$ is shown. Graph $y = g\left(\dfrac{1}{2}x\right)$.



**Question 20 of 58**

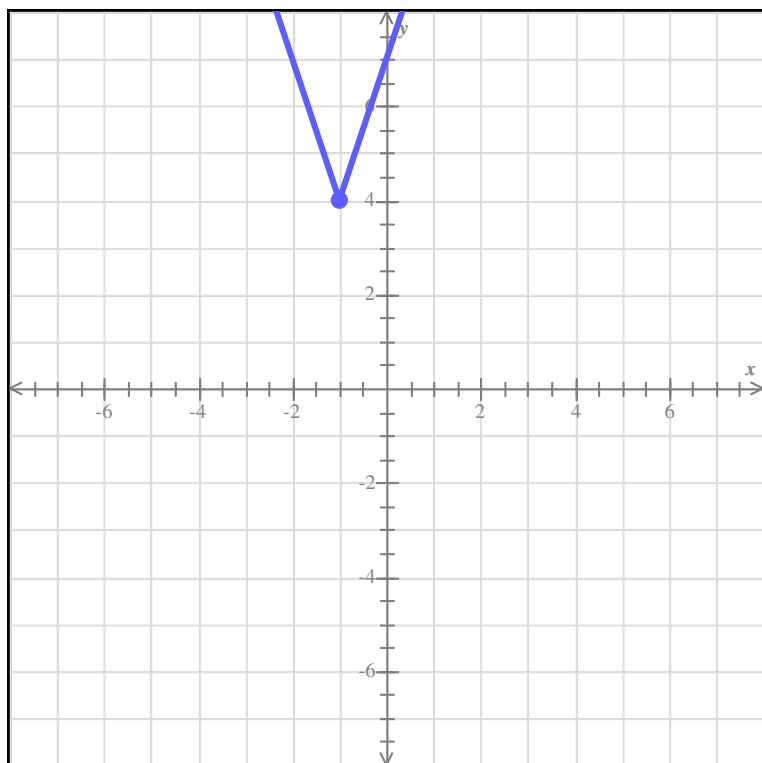The graph of $y = f(x)$ is shown. Draw the graph of $y = 2f(x-4)$.



The graph of $y = g(x)$ is shown. Draw the graph of $y = g(-x) - 1$.
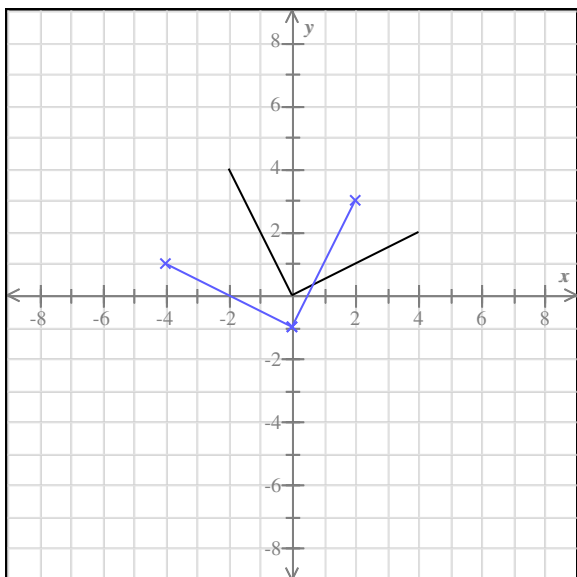


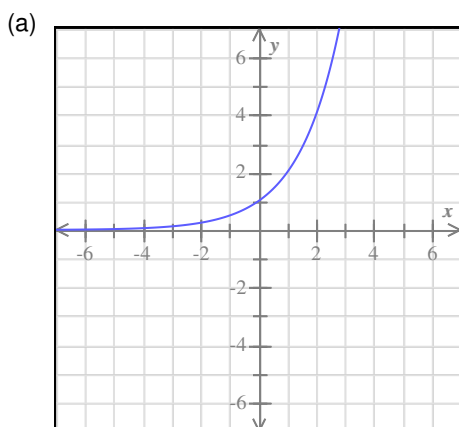**Question 21 of 58**

## Question 22 of 58

$$k(x) = (x-4)^2 + 3$$
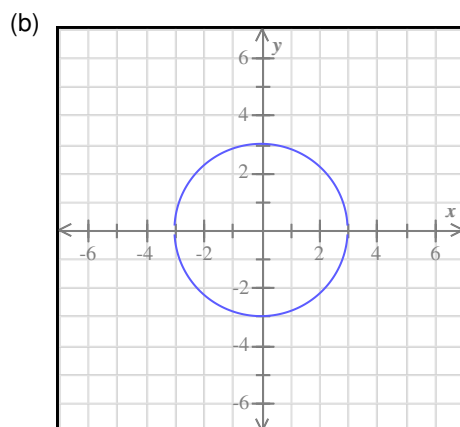
## Question 23 of 58

(a)



Symmetry:

☐ x-axis

☐ y-axis

☐ origin

☑ none of these

(b)



Symmetry:

☑ x-axis

☑ y-axis

☑ origin

☐ none of these

(c)



Symmetry:

☐ x-axis

☐ y-axis

☑ origin

☐ none of these

|  |  |
|---|---|
| $x = y^4 - y^2 + 2$ | $35 x^4 + 30 y^4 = 82$ |
| Symmetry: | Symmetry: |
| ☑ *x*-axis    ☐ *y*-axis    ☐ origin | ☑ *x*-axis    ☑ *y*-axis    ☑ origin |
| ☐ none of the above | ☐ none of the above |

**Question 25 of 58**

$g(-1) = \dfrac{15}{4}$

$g(2) = 4$

$g(4) = 0$

**Question 26 of 58**

$(0, 3), (5, 6)$

**Question 27 of 58**

(a)    All values at which *f* has a local maximum: $-2 , 4$

(b)    All local maximum values of *f*: $3 , 2$
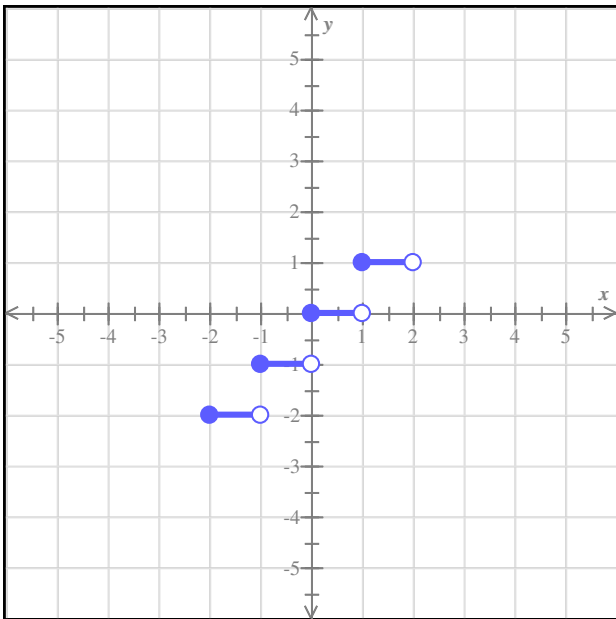
**Question 28 of 58**

Is the function continuous?

⦿ Yes

◯ No
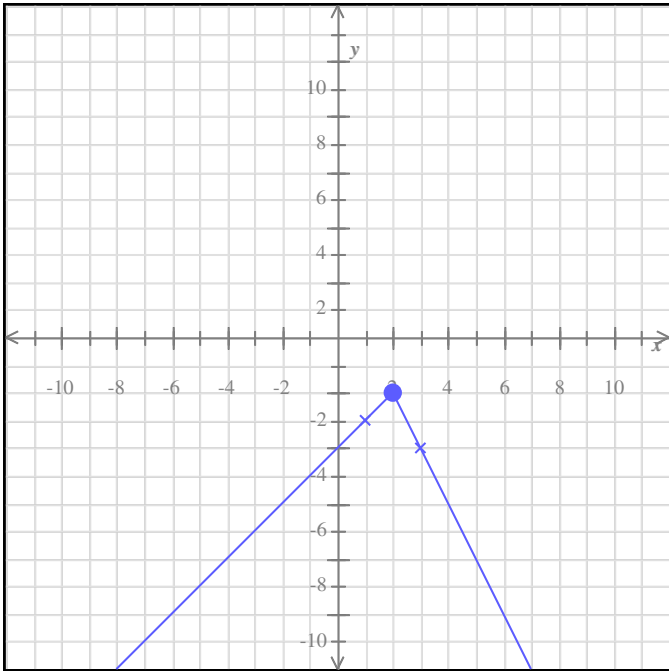
Is the function _f_ continuous?  ⊙ Yes  ○ No

## Question 31 of 58

| The function _r_ | | The function _s_ | |
|---|---|---|---|
|  | ○ Even<br>⊙ Odd<br>○ Neither |  | ⊙ Even<br>○ Odd<br>○ Neither |
| $g(x) = -2x^4 + 3x^2$ | ⊙ Even<br>○ Odd<br>○ Neither | $h(x) = -4x^5 + 3x^2$ | ○ Even<br>○ Odd<br>⊙ Neither |

## Question 32 of 58

| $f(x) = \dfrac{1}{6x^3}$ | $g(x) = \sqrt[3]{5x^2}$ | $h(x) = x\,\lvert x+7 \rvert$ |
|---|---|---|
| ○ Even | ◉ Even | ○ Even |
| ◉ Odd | ○ Odd | ○ Odd |
| ○ Neither | ○ Neither | ◉ Neither |

## Question 33 of 58

$T = 50 + 111.30N$

## Question 34 of 58

$(s+t)(x) = 5x + 2$

$(s-t)(x) = -3x - 4$

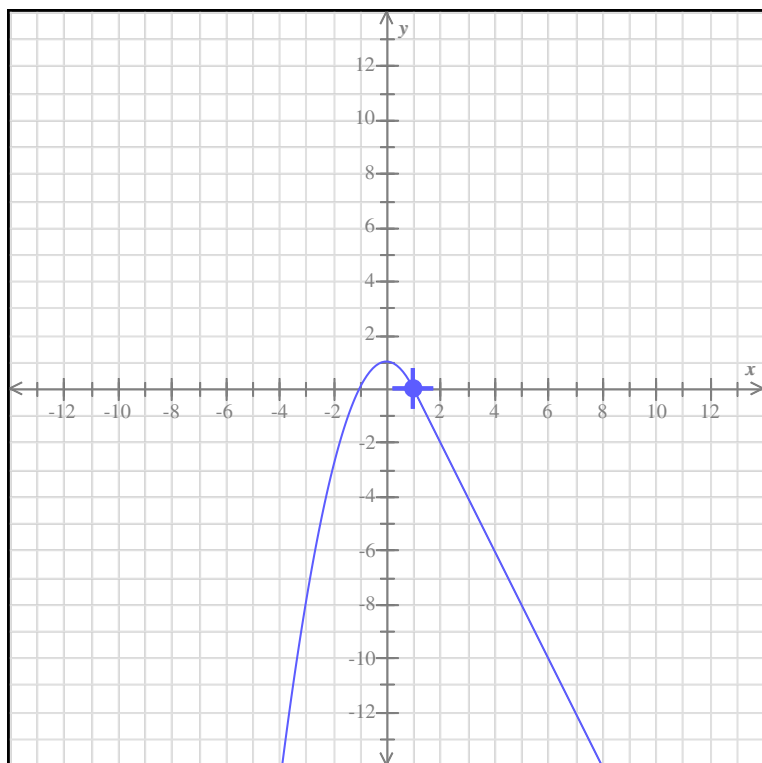$(s{\cdot}t)(1) = 0$

## Question 35 of 58

(a) $\left(\dfrac{f}{g}\right)(-2) = -\dfrac{3}{16}$

(b) Value(s) that are NOT in the domain of $\dfrac{f}{g}$: $-6, 2$

## Question 36 of 58

$\left(\dfrac{f}{g}\right)(x) = \dfrac{x}{x+6}$

Domain of $\dfrac{f}{g}$: $(-\infty, -6) \cup (-6, 9) \cup (9, \infty)$

## Question 37 of 58

$$(f \cdot g)(x) = \frac{\sqrt{3x+5}}{2x^2+3}$$

Domain of $f \cdot g$: $\left[ -\frac{5}{3}, \infty \right)$

$$(f+g)(x) = \frac{1}{2x^2+3} + \sqrt{3x+5}$$

Domain of $f+g$: $\left[ -\frac{5}{3}, \infty \right)$

**Question 38 of 58**

$$(r \circ q)(-5) = -81$$
$$(q \circ r)(-5) = -49$$

**Question 39 of 58**

$$(f \circ f)(x) = x$$
$$(g \circ g)(x) = x^4 - 16x^2 + 56$$

**Question 40 of 58**

$$(g \circ h)(x) = 4\sqrt{x-5} - 5$$

Domain of $g \circ h$: $[5, \infty)$

**Question 41 of 58**

$$M(t) = \frac{4}{3}\pi(5t+3)^3$$

**Question 42 of 58**

| |
|---|
| (a) Write a direct variation equation that relates $x$ and $y$. <br><br> Equation: $y = \dfrac{5}{2}x$ |
| (b) Find $y$ when $x = 7$. <br><br> $y = \dfrac{35}{2}$ |

## Question 43 of 58

$8 \text{ m/s}^2$

## Question 44 of 58

(a) How many calories is Miguel burning per minute?

    $10$ calorie(s)

(b) What is the slope of the graph?

    $\dfrac{1}{10}$

## Question 45 of 58

| |
|---|
| (a) Write an inverse variation equation that relates $x$ and $y$. <br><br> Equation: $y = \dfrac{20}{x}$ |
| (b) Find $y$ when $x = 5$. <br><br> $y = 4$ |

## Question 46 of 58

$14 \text{ kg}$

## Question 47 of 58

$w = \dfrac{k u^3}{d}$

The temperature is $240$ kelvin.

(a) Does the parabola open upward or downward?

  ○              ◉
upward        downward

(b) Find the intercept(s).

For both the $x$- and $y$-intercept(s), make sure to do the following.

- If there is more than one, separate them with commas.
- If there are none, select "None".

$x$-intercept(s):  $-2, 6$

$y$-intercept(s):  $3$

(c) Find the equation of the axis of symmetry.

equation of axis of symmetry:  $x = 2$
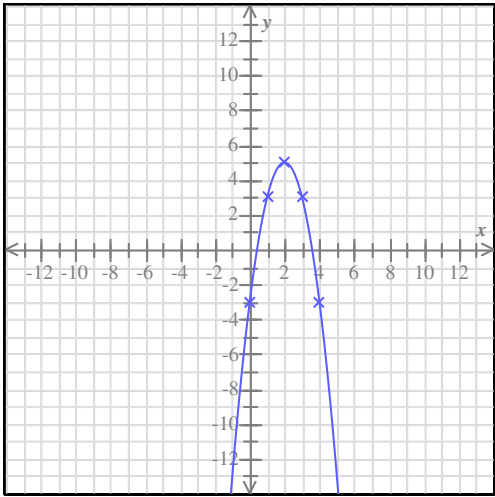
(d) Find the coordinates of the vertex.

vertex: $\left(2, 4\right)$
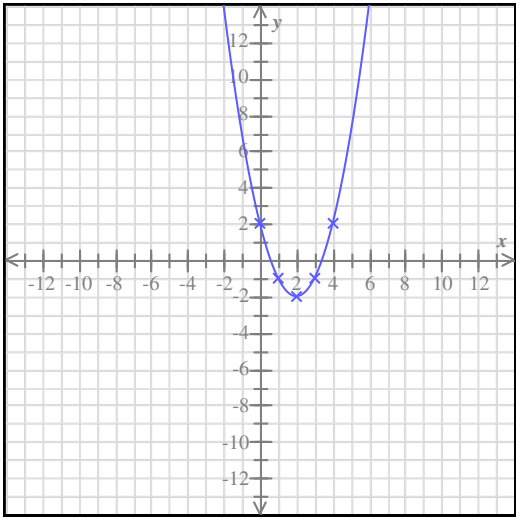
## Question 51 of 58
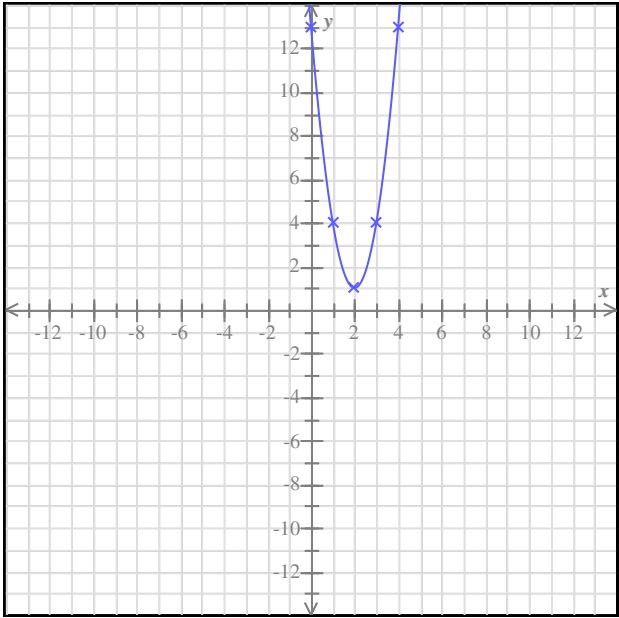


## Question 52 of 58

x-intercept(s): $-1$, $5$
vertex: $(2, -9)$

Does the function have a minimum or maximum value?

○ Minimum          ◉ Maximum

---

What is the function's minimum or maximum value?

$-4$

---

Where does the minimum or maximum value occur?

$x = -1$

Height: $144$ feet

(a) Find a function that gives the area $A\left(x\right)$ of the field (in square meters) in terms of $x$.

$A\left(x\right) = 360\,x - 2\,x^2$

(b) What side length $x$ gives the maximum area that the field can have?

Side length $x$ : $90$ meters

(c) What is the maximum area that the field can have?

Maximum area: $16{,}200$ square meters

domain: $\left(-\infty,\,\infty\right)$

range: $\left[2,\,\infty\right)$

$f\left(x\right) = 2\left(x-1\right)^2 - 4$