Warm-up:

The two forms at the right represent the same graph.

$f(x) = (x-4)(x+1)$

$f(x) = x^2 - 3x - 4$

Identify :

the direction of the opening **UP**

The *y*-intercept $(0, -4)$

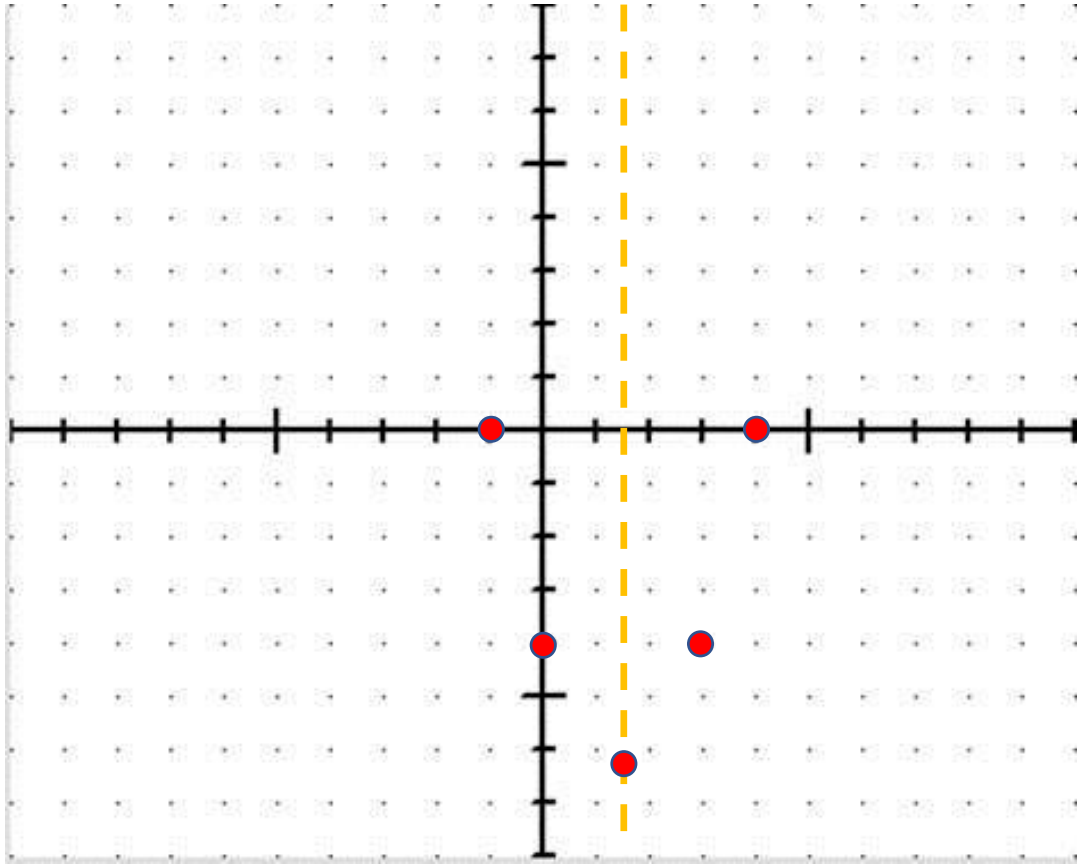
***x*-intercepts** $(4, 0)$ and $(-1, 0)$

AOS $\frac{4+(-1)}{2} = \frac{3}{2}$

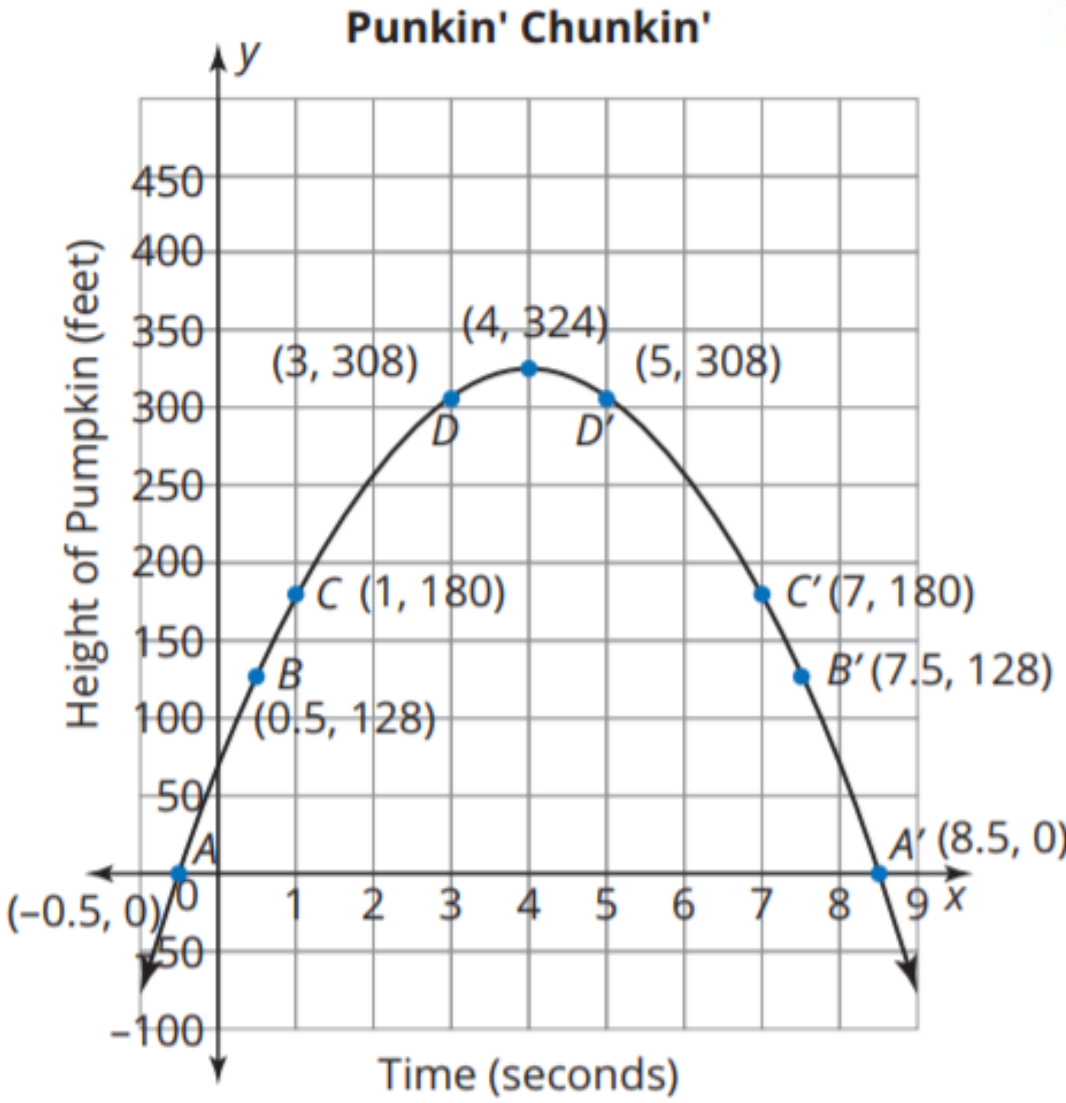
Vertex: $f(1.5) = (1.5)^2 - 3(1.5) - 4$

$f(1.5) = -6.25$ $V(1.5, -6.25)$

Graph the function



Consider the graph of the quadratic function representing the Punkin' Chunkin' problem situation.



7. Determine the average rate of change between each pair. Then summarize what you notice.

a. points *A* and *B*

$$\frac{128-0}{0.5-(-0.5)}=\frac{128}{1}$$

b. points *A′* and *B′*

$$\frac{0-128}{8.5-7.5}=\frac{-128}{1}$$

c. points *B* and *C*

$$\frac{180-128}{1-(0.5)}=\frac{52}{0.5}=104$$

d. points *B′* and *C′*

$$\frac{128-180}{7.5-(7)}=\frac{-52}{0.5}=-104$$

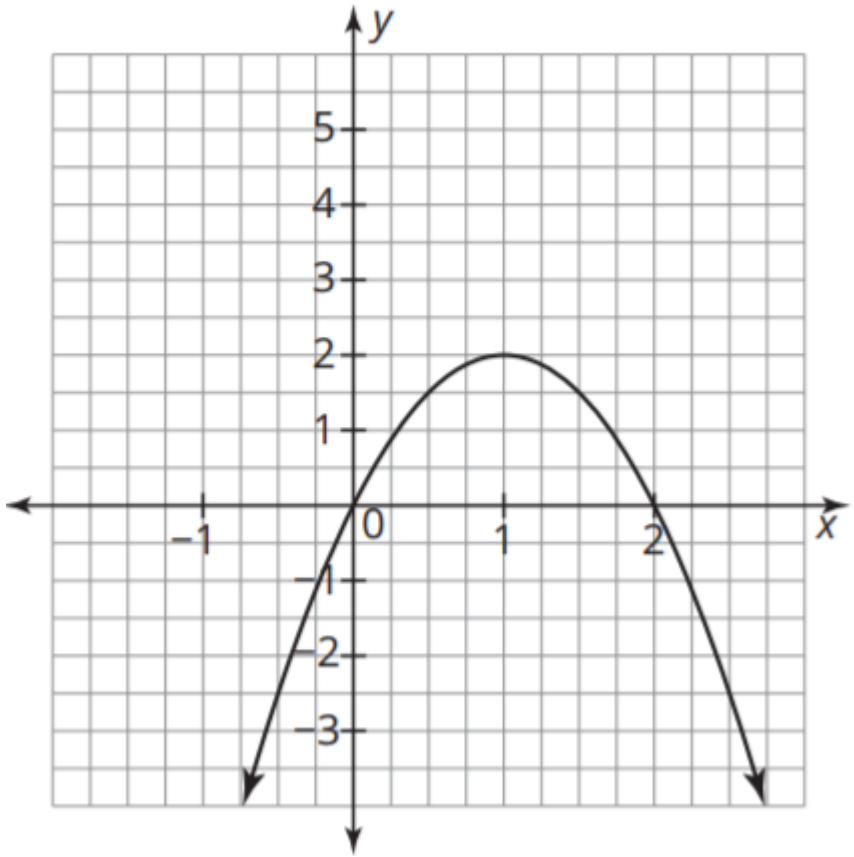
e. What do you notice about the average rates of change between pairs of symmetric points?

The formula for the average rate of change is $\frac{f(b) - f(a)}{b - a}$.

The average rates of change between pairs of symmetric points on a parabola are *opposites* of each other.

8. For each function shown, identify the domain, range, *x*-intercepts, *y*-intercept, axis of symmetry, vertex, and interval of increase and decrease.

a. The graph shown represents the function $f(x) = -2x^2 + 4x$.



Domain: Domain: all real numbers

Range: Range: $f(x) \leq 2$

***x*-intercepts:**

x-intercepts: (0, 0) and (2, 0)

***y*-intercept:**

y-intercept: (0, 0)

Axis of symmetry:

Axis of symmetry: $x = 1$

Vertex:

Vertex: (1, 2)

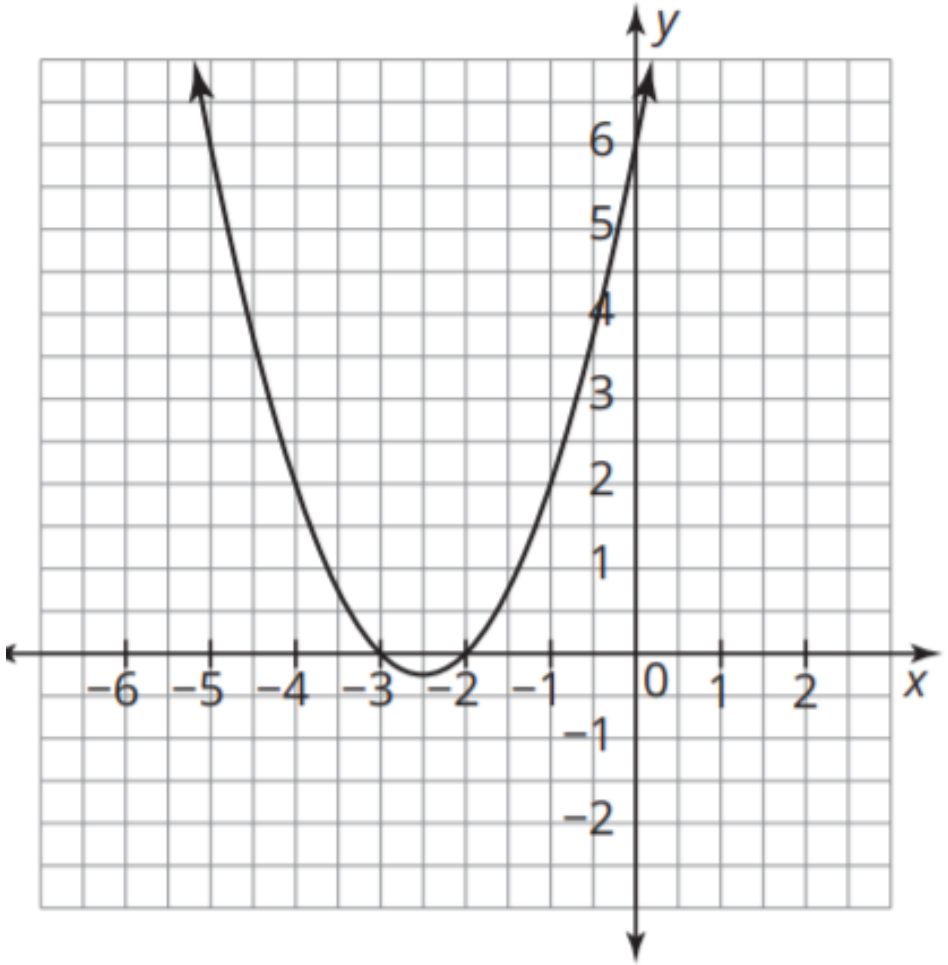
Interval of increase:

Interval of increase: $-\infty < x < 1$

Interval of decrease:

Interval of decrease: $1 < x < \infty$

b. The graph shown represents the function $f(x) = x^2 + 5x + 6$.



Domain:

Domain: all real numbers

Range:

Range: $f(x) \geq -\frac{1}{4}$

***x*-intercepts:**

x-intercepts: (−3, 0) and (−2, 0)

***y*-intercept:**

y-intercept: (0, 6)

Axis of symmetry:

Axis of symmetry: $x = -2.5$

Vertex:

Vertex: (−2.5, −0.25)

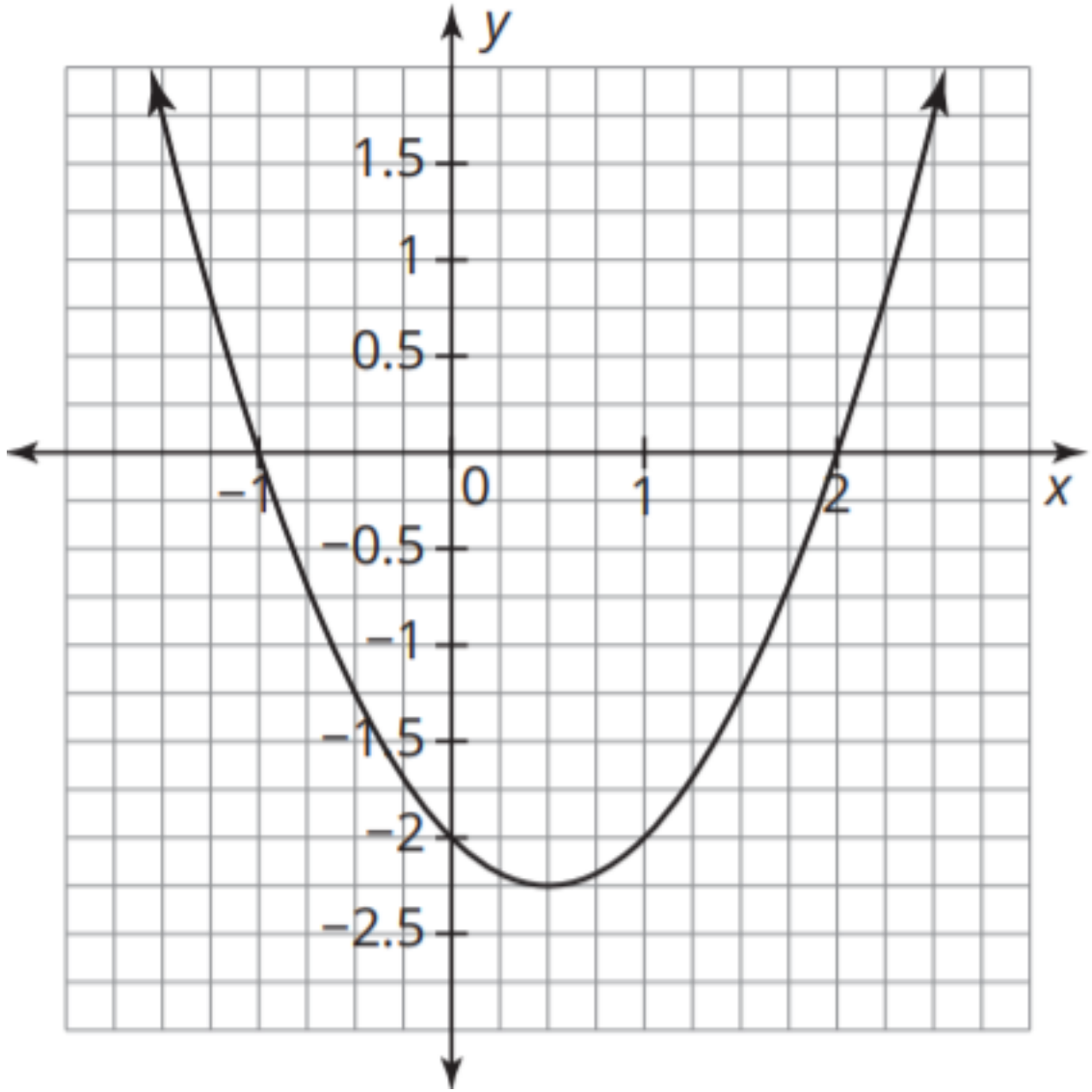
Interval of increase:

Interval of increase: $-2.5 < x < \infty$

Interval of decrease:

Interval of decrease: $-\infty < x < -2.5$

c. The graph shown represents the function $f(x) = x^2 - x - 2$.



Domain:

Range:

***x*-intercepts:**

***y*-intercept:**

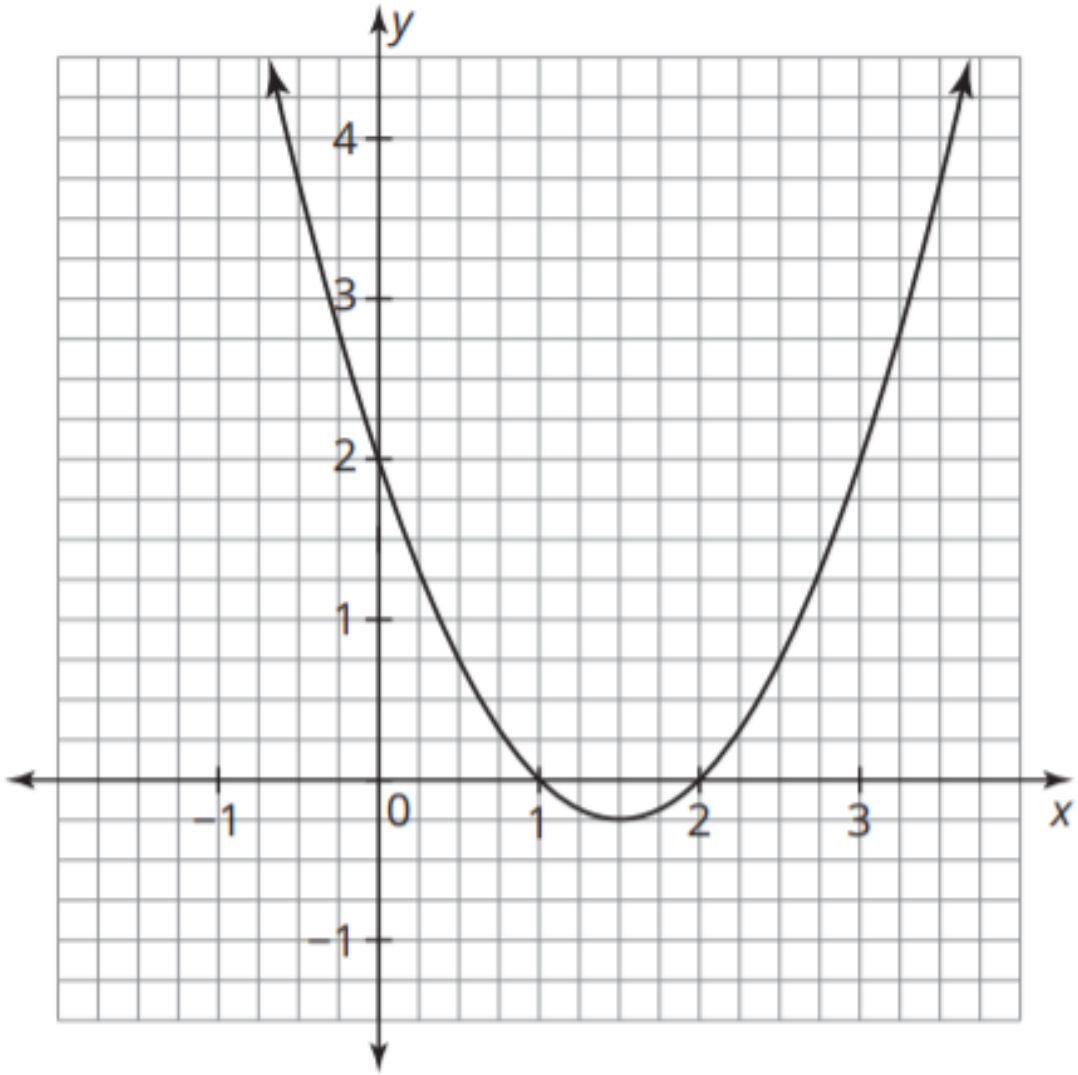
Axis of symmetry:

Vertex:

Interval of increase:

Interval of decrease:

d. The graph shown represents the function $f(x) = x^2 - 3x + 2$.



Domain:

Range:

***x*-intercepts:**

***y*-intercept:**

Axis of symmetry:

Vertex:

Interval of increase:

Interval of decrease: