

1. Write the general equation of a quadratic in each of the following forms:

Standard Form:

$$y = ax^2 + bx + c$$

Vertex Form:

$$y = a(x-h)^2 + k$$

Factored Form:

$$y = a(x-p)(x-q)$$

2. Given $y = x^2 + 2x - 3$, find the following:

a) Factored Form:

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

b) Vertex Form:

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

$$-\frac{2}{2(1)} = (-1, -4) \quad 1-2-3$$

Find vertex form if needed then: A) Identify the vertex and axis of symmetry, B) then write a verbal expression for each equation describing the transformation from the parent function.

3. $y = -(x-7)^2 + 3$

A: (7, 3) B $x=7$, reflect over x-axis, right 7, up 3

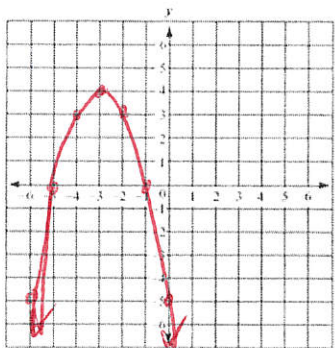
4. $y = x^2 - 5x + 4$

A: (+2.5, -2.25) B $x=2.5$, right 2.5, down 2.25

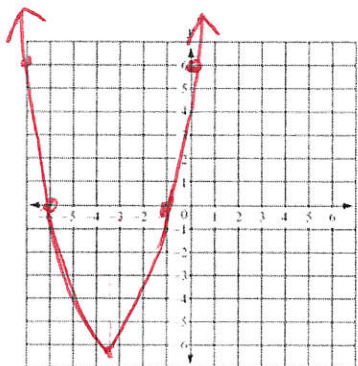
Graph the functions, and then find the parts (a-d) below:

5. $f(t) = -t^2 - 6t - 5$

6. $f(x) = (x+6)(x+1)$



- a) Vertex: (-3, 4)
- b) Axis of Symmetry: $x = -3$
- c) x-intercept(s): (-5, 0), (-1, 0)
- d) y-intercept: (0, -5)



- a) Vertex: (-3.5, -6.25)
- b) Axis of Symmetry: $x = -3.5$
- c) x-intercept(s): (-6, 0), (-1, 0)
- d) y-intercept: (0, 6)

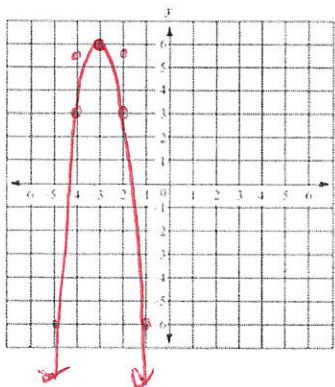
Write the equation of a function that is described below.

7. A quadratic function that is shifted up 5 units, shifted right 2 units and vertically compressed/shrunk by a factor of $\frac{1}{3}$. $y = -\frac{1}{3}(x-2)^2 + 5$

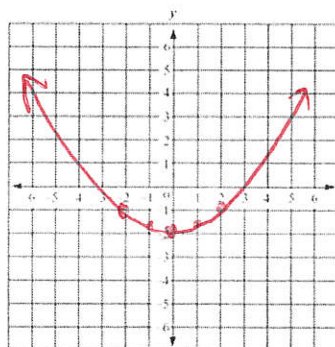
Graph the functions and describe the transformations.

8. $y = -3(x+3)^2 + 6$

9. $y = \frac{1}{4}x^2 - 2$



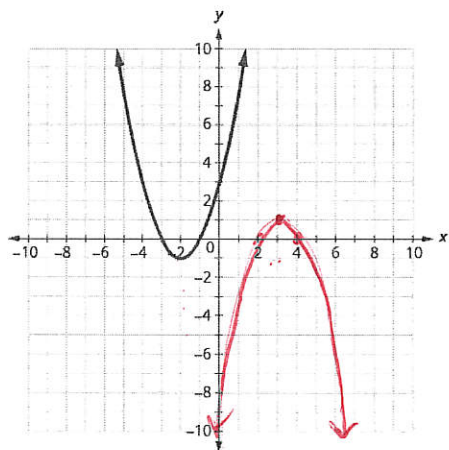
reflect over x-axis
stretch by 3
left 3
up 6



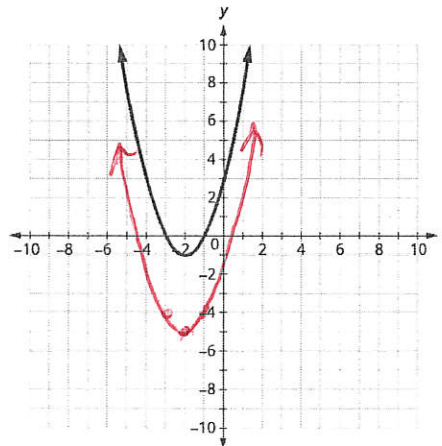
compress by 1/4
down 2

Let $h(x)$ be the function represented by the graph below.

10. Sketch the graph $-h(x-5)$



11. Sketch the graph $h(x) - 4$

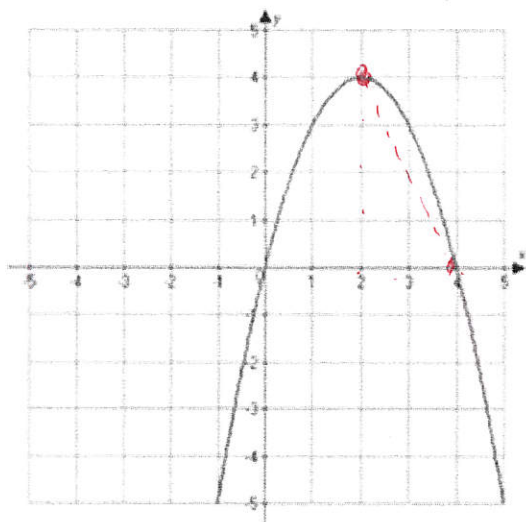


12. Calculate the **average rate of change** of the function $y = 3x^2 + 6x - 8$ on the interval $[-2, 0]$

$$\frac{f(0) - f(-2)}{0 - (-2)} = \frac{-8 - (-8)}{2} = \frac{0}{2} = \boxed{0}$$

$(-2, -8)$
 $(0, -8)$

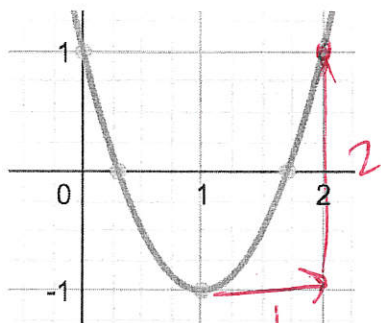
13. Using the graph below Find the following:



- State the vertex: $(2, 4)$
- What is the axis of symmetry: $x = 2$
- Is the vertex a max or min and what is the max or min: **max at 4**
- Find the equation of the quadratic:
 $y = -(x - 2)^2 + 4$
- State the zeros:
 $(0, 0), (4, 0)$
- State the y-intercept:
 $(0, 0)$
- State the Domain:
 $(-\infty, \infty)$
- State the Range:
 $(-\infty, 4]$
- Find $f(1)$:
 3
- Find the average rate of change on the interval $[2, 4]$:
 $\frac{0 - 4}{4 - 2} = -2$ $(2, 4)$ $(4, 0)$

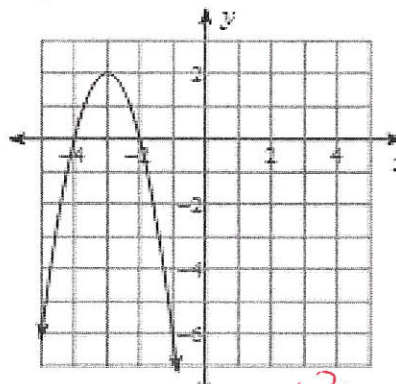
Write a quadratic equation for the given graphs.

14.



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

15.



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

Write a quadratic function whose graph satisfies the given conditions.

16. x-intercepts: -5 and $\frac{2}{3}$ 17. x-intercepts: 0 and 3

$y = (x+5)(3x-2)$ or $y = 3x^2 + 3x - 10$
 $x = -5, x = \frac{2}{3}$
 $(x+5)(3x-2) = 0$ $y = x(x-3)$ or $y = x^2 - 3x$

18. Vertex (-1, 1) and a point (2, 4)

$4 = a(2+1)^2 + 1$
 $4 = 9a + 1$
 $a = \frac{1}{3}$
 $y = \frac{1}{3}(x+1)^2 + 1$

19. Vertex (-3, -1) and a point (-1, -9)

$-9 = a(-1+3)^2 - 1$
 $-9 = 4a - 1$
 $-8 = 4a$
 $a = -2$
 $y = -2(x+3)^2 - 1$

20. Given $f(x) = ax^2 + bx + c$. State a value for a that makes $f(x)$ opens down and wider than!

$g(x) = 2x^2 + 5x + 3$
~~.....~~ or ~~.....~~
 $0 \leq |a| < 2$
 $a = -\frac{1}{2}, a = -1, a = -\frac{9}{10}$ etc...

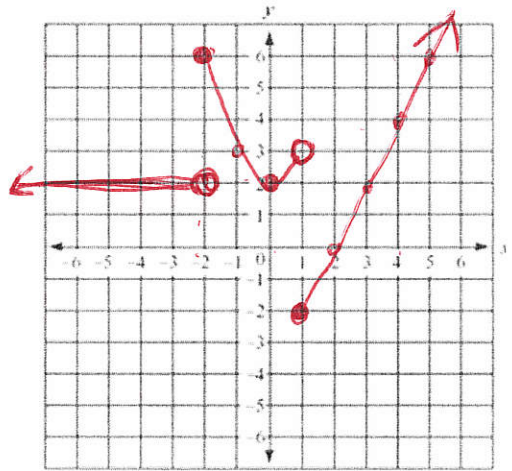
Find a value for c that will make each polynomial a perfect square trinomial.

21. $x^2 + 16x + c$

$(\frac{16}{2})^2 = (8)^2 = 64$

22. Graph the function $f(x) = \begin{cases} 2 & \text{if } x < -2 \\ x^2 + 2 & \text{if } -2 \leq x < 1 \\ 2x - 4 & \text{if } x \geq 1 \end{cases}$

- a) $f(-2) = 6$
 b) $f(0) = 2$
 c) $f(4) = 4$



23. Write a Piece wise function for the given graph.

$f(x) = \begin{cases} x+3, & x < -1 \\ x^2, & -1 \leq x \leq 2 \\ 3, & x > 2 \end{cases}$

