

Vertex Form: Write the vertex of each equation. State if the graph opens up or down. State if the graph is narrower than, wider than, or the same as the parent graph $y = x^2$.

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

vertex: $(3, 2)$

Opens: up

Same

2.) $y = -\frac{1}{3}(x + 4)^2 - 12$

vertex: $(-4, -12)$

Opens: down

wider

3.) $y = 8(x - 4)^2$

vertex: $(4, 0)$

Opens: up

narrower

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

vertex: $(2, 7)$

Opens: down

same

5.) $y = \frac{5}{8}(x)^2 + 1$

vertex: $(0, 1)$

Opens: up

wider

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

vertex: $(2, 2)$

Opens: up

narrower

7.) $y = (x + 1)^2 + 10$

vertex: $(-1, 10)$

Opens: up

same

8.) $y = \frac{7}{3}(x)^2 + 2$

vertex: $(0, 2)$

Opens: up

narrower

Vertex and Standard Form: Graph the quadratic. State the vertex, axis of symmetry, y-intercept, domain and range. Make a table of values if needed.

9.) $y = (x - 2)^2 + 1$

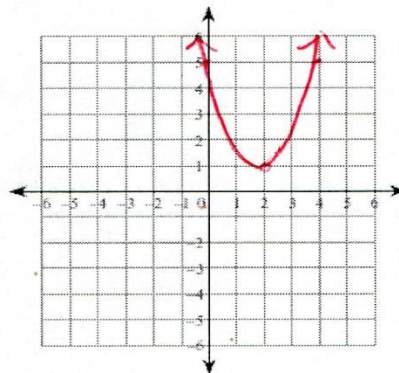
Vertex $(2, 1)$

Axis of Symmetry $x = 2$

y-intercept $(0, 5)$

Domain \mathbb{R}

Range $[1, \infty)$



10.) $y = -\frac{1}{2}(x - 4)^2 + 6$

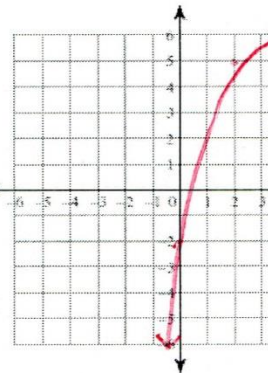
Vertex $(4, 6)$

Axis of Symmetry $x = 4$

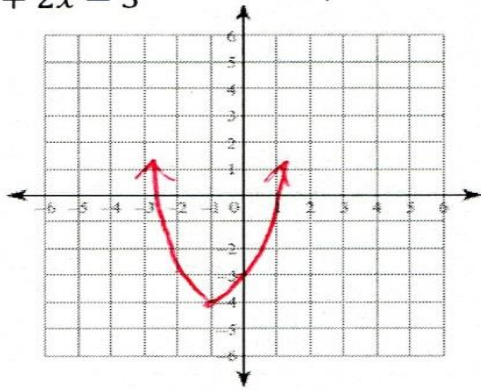
y-intercept $(0, -2)$

Domain \mathbb{R}

Range $(-\infty, 6]$

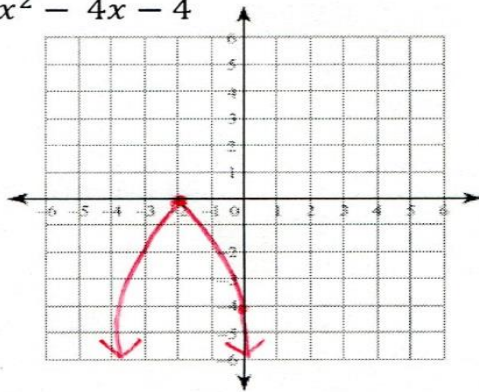


$$11.) y = x^2 + 2x - 3$$



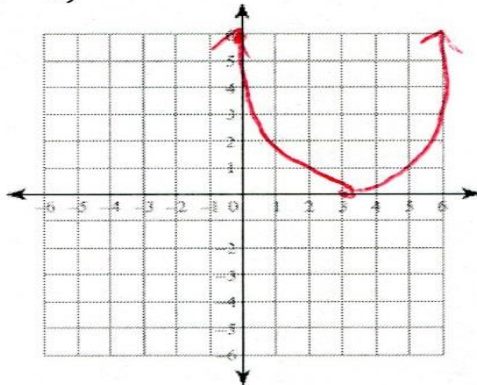
Vertex $(-1, -4)$
 Axis of Symmetry $x = -1$
 y-intercept $(0, -3)$
 Domain \mathbb{R}
 Range $[-4, \infty)$

$$12.) y = -x^2 - 4x - 4$$



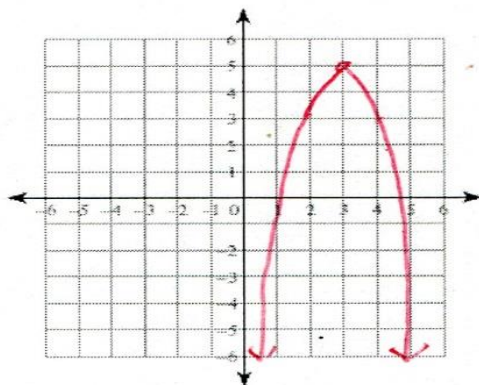
Vertex $(-2, 0)$
 Axis of Symmetry $x = -2$
 y-intercept $(0, -4)$
 Domain \mathbb{R}
 Range $(-\infty, 0]$

$$13.) y = \frac{2}{3}(x - 3)^2$$



Vertex $(3, 0)$
 Axis of Symmetry $x = 3$
 y-intercept $(0, 6)$
 Domain \mathbb{R}
 Range $[0, \infty)$

$$14.) y = -2(x - 3)^2 + 5$$



Vertex $(3, 5)$
 Axis of Symmetry $x = 3$
 y-intercept $(0, -13)$
 Domain \mathbb{R}
 Range $(-\infty, 5]$

Factor the trinomial.

1.) $x^2 + 19x + 90$

$(x+9)(x+10)$

2.) $x^2 - 16x + 55$

$(x-5)(x-11)$

3.) $3x^2 - 13x + 12$

$x^2 - 13x + 36$
 $(x-\frac{9}{3})(x-\frac{4}{3})$
 $(x-3)(3x-4)$

4.) $15x^2 - x - 2$

$x^2 - x - 30$
 $(x-\frac{6}{15})(x+\frac{5}{1})$
 $(x-\frac{2}{5})(x+5)$

Factor the expression.

5.) $x^2 - 6x + 9$

$(x-3)(x-3)$

6.) $16x^2 - 9$

$(4x-3)(4x+3)$

7.) $25x^2 - 121$

$(5x-11)(5x+11)$

8.) $81x^2 + 198x + 121$

~~$(9x+11)^2$~~

9.) $3x^2 - 243$

$3(x^2-81)$
 $3(x-81)$

10.) $49x^2 - 14x + 1$

$x^2 - 14x + 49$
 $(x-\frac{7}{49})(x-\frac{7}{49})$
 $(7x-1)(7x-1)$

11.) ~~$8a^2 + 10ab^2 + 4ab + 5b^3$~~

Solve the equation.

12.) $x^2 - 22x + 120 = 0$

$(x-10)(x-12) = 0$
 $x=10 \quad x=12$

13.) $5x^2 + 14x - 3 = 0$

$x^2 + 14x - 15 = 0$
 $(x+\frac{15}{5})(x-\frac{1}{5}) = 0$
 $(x+3)(5x-1) = 0$
 $x=-3 \quad x=1/5$

14.) $4x^2 + 10x = x^2 - x + 4$

$3x^2 + 11x - 4 = 0$
 $x^2 + 11x - 12 = 0$
 $(x+\frac{12}{3})(x-\frac{1}{3}) = 0$
 $(x+4)(3x-1) = 0$
 $x=-4 \quad x=1/3$

15.) $3x^2 - x - 40 = x^2 + 2x$

$2x^2 - 3x - 35 = 0$
 $x^2 - 3x - 70 = 0$
 $(x-\frac{10}{2})(x+\frac{7}{2}) = 0$
 $(x-5)(2x+7) = 0$
 $x=5 \quad x=-7/2$

Write the equation in factored form and state the x-intercepts.

16.) $y = x^2 - 1$

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

17.) $y = 3x^2 - 8x + 4$

$y = x^2 - 8x + 12$
 $y = (x-\frac{6}{3})(x-\frac{2}{3})$
 $y = (x-2)(3x-2)$
 $x=2 \quad x=2/3$

18.) $y = x^2 + 10x + 25$

$y = (x+5)(x+5)$
 ~~$x=-5$~~