

Practice Test
Parabolas

Key

Factor completely.

1. $16a^2 - 25b^2$

$$(4a+5b)(4a-5b)$$

3. $8x^2 - 18$

$$2(4x^2 - 9) = 2(2x+3)(2x-3)$$

2. $x^2 - x - 6$

$$(x-3)(x+2)$$

4. $x^3 + 5x^2 - 9x - 45$

$$x^2(x+5) - 9(x+5) = (x+5)(x^2-9) = (x+5)(x+3)(x-3)$$

Solve with the quadratic formula.

5. $x^2 - 2x - 3 = 0$

$a=1$ $b=-2$ $c=-3$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4+12}}{2} = 3, -1$$

6. $1 - 5x = 2 + 2x^2$

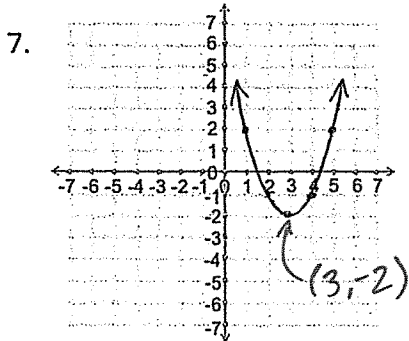
$$2x^2 + 5x + 1 = 0$$

$a=2$ $b=5$ $c=1$

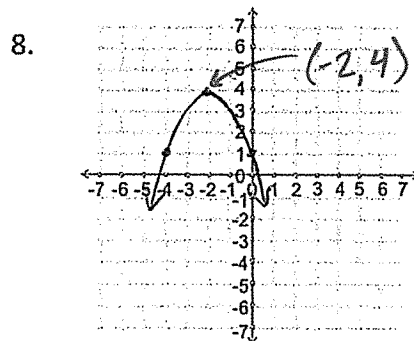
$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(2)(1)}}{2(2)} = \frac{-5 \pm \sqrt{25-8}}{4}$$

$$\approx \frac{-5 \pm 4.12}{4} = -0.22, 2.28$$

Give the equation in vertex form for each parabola.



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



$$f(x) = a(x+2)^2 + 4$$

$$1 = a(0+2)^2 + 4$$

$$1 = 4a + 4 \rightarrow a = -3/4$$

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

since the function goes through (0,1).

(In this case there are clearly no stretches/shrinks/reflections so $a=1$.)

9. Find the vertex and roots of the parabola given by $f(x) = 2(x-3)^2 - 8$.

$$\text{Vertex: } (3, -8)$$

$$f(x) = 2(x^2 - 6x + 9) - 8$$

$$= 2(x^2 - 6x + 5) = 2(x-5)(x-1)$$

$$\text{Roots: } x=5, 1 \text{ or } (5,0), (1,0)$$

Put each equation in vertex form.

10. $f(x) = x^2 - 6x + 7$

$$f(x) = x^2 - 6x + 9 - 9 + 7$$

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

11. $f(x) = x^2 + 5x + 1$

$$f(x) = x^2 + 5x + 6.25 - 6.25 + 1$$

$$f(x) = (x+2.5)^2 - 5.25$$

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

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

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

$$f(x) = 2(x-1)^2 - 5$$

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

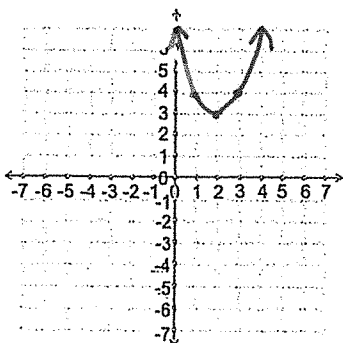
$$f(x) = -(x^2 - 3x) - 1$$

$$f(x) = -(x^2 - 3x + 2.25 - 2.25) - 1$$

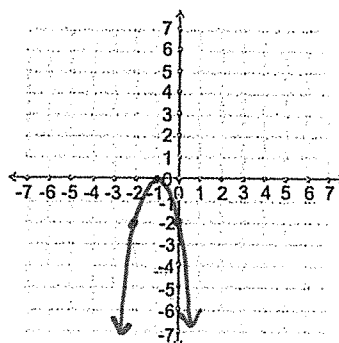
$$f(x) = -(x-1.5)^2 + 1.25$$

Graph each parabola.

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



15. $f(x) = -2(x+1)^2$



16. Give the equation for a parabola that has exactly one x-intercept.

Examples:

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

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

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

Extra Credit. Give the equation of the parabola that passes through the points (2,0), (-1,0), and (1,3).

$$f(x) = a(x-2)(x+1)$$

$$3 = a(1-3)(1+1)$$

$$3 = -4a \rightarrow a = -3/4$$

x-intercepts

$$f(x) = -3/4(x-2)(x+1)$$

plug in
1 for x &
3 for f(x).