

Key

Rewrite the function in Standard Form. Determine whether the function is linear or quadratic.

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

Standard Form  $-15x - 9$

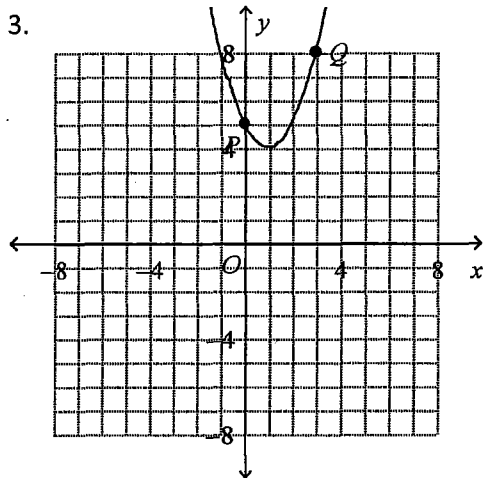
Linear or Quadratic? Linear

2.  $f(x) = (3x - 3)(6x + 4)$

Standard Form  $18x^2 - 6x - 12$

Linear or Quadratic? quad

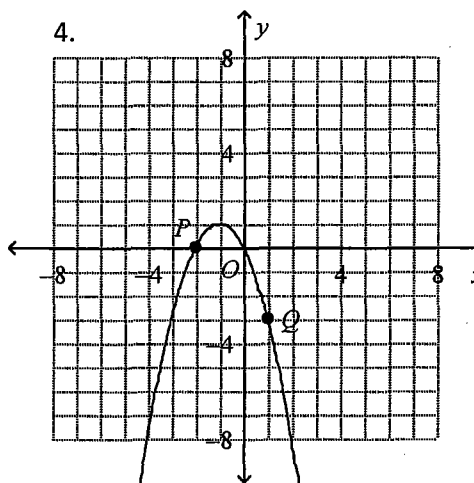
Identify the vertex and the axis of symmetry of the parabola. Then describe the value of the discriminant.



Vertex 1, 4

Axis of Symmetry  $x = 1$

Discriminant Negative



Vertex -1, 1

Axis of Symmetry  $x = -1$

Discriminant positive

5. A manufacturer determines that the number of drills it can sell is given by the formula  $D = -3p^2 + 180p - 255$ , where  $p$  is the price of the drills in dollars.

a. At what price will the manufacturer sell the maximum number of drills?

b. What is the maximum number of drills that can be sold?

~~48~~ 30  
2445

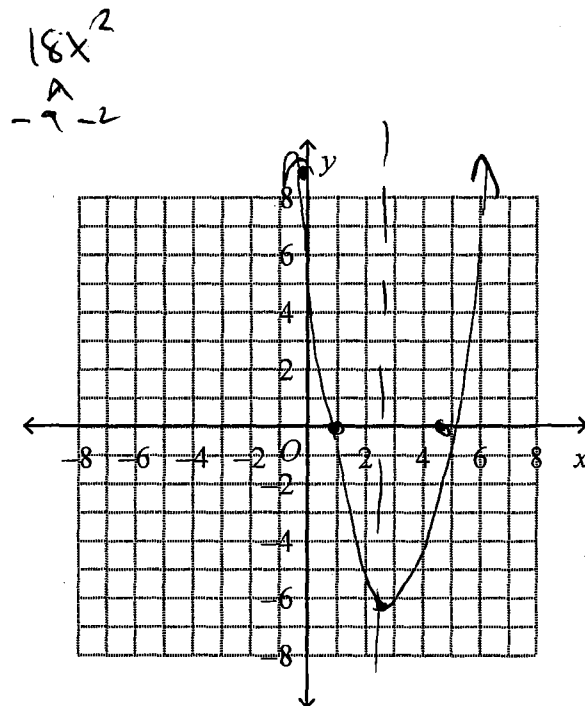
$\frac{-180}{2(-3)} = \frac{-180}{-6} = 30$

6. Dalco Manufacturing estimates that its weekly profit,  $P$ , in hundreds of dollars, can be approximated by the formula  $P = -5x^2 + 10x + 9$ , where  $x$  is the number of units produced per week, in thousands.

- a. How many units should the company produce per week to earn the maximum profit? 1,000
- b. Find the maximum weekly profit.  $\frac{14}{5}$   $\frac{-10}{2(-5)} = 1$   
2,800

7. Answer the following questions, then graph  $y = 2x^2 - 11x + 9$ .

- a. Factored form  $(x-1)(2x-9)$
- b. X-intercepts  $x=1$  &  $4.5$
- c. Y-intercept  $9$
- d. Vertex  $\frac{11}{2(2)} = (2.75, -6.1)$
- e. Open up or Down?
- f. Maximum or Minimum?
- g. Domain  $\mathbb{R}$
- h. Range  $(-6.1, \infty)$



7. Simplify  $\sqrt{-16}$   $4i$

8. Simplify  $(-1 + 6i) + (-4 + 2i)$   
 $-5 + 8i$

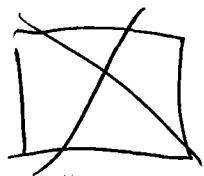
9. Simplify  $(2 - 5i) - (3 + 4i)$   
 $-1 - 9i$

10. Simplify  $(-7i)(-7i)$   
 $49i^2 =$   $-49$

11. Simplify  $(2 + 5i)(-1 + 5i)$   
 $-2 + 10i - 5i + 25i^2$   
 $(-1)$   
 $-27 + 5i$

12.  $i(2 - 5i)^2$   
 $(2 - 5i)^2$   
 $(2 - 5i)(2 - 5i)$   
 $4 - 10i - 10i + 25i^2$   
 $i(-21 - 20i)$   
 $-21i - 20i^2$   $20 - 21i$

13. Solve by quadratic formula:  $2x^2 + 16x + 7 = 0$



not factorable

quad form

$$x = -7.5 \pm .464$$

14. Solve the equation by using any method.  $x^2 + 18x + 81 = 25$

$$x^2 + 18x + 56 = 0$$

$$(x+7)(x+8) = 0$$

$$x = -7 \quad x = -8$$

15. Solve the equation by using any method.  $5x^2 + 6x + 5 = 0$

quad form

$$\frac{-6 \pm \sqrt{6^2 - 4(5)(5)}}{2(5)}$$

$$\frac{-6 \pm \sqrt{-16}}{10}$$

$$\frac{-6 \pm 4i}{10}$$

16. Determining the number and type of solutions to the function:  $5x^2 - 4x + 2 = 0$ .

$$(-4)^2 - 4(5)(2)$$

$$16 - 40 = -24$$

2 imaginary sol

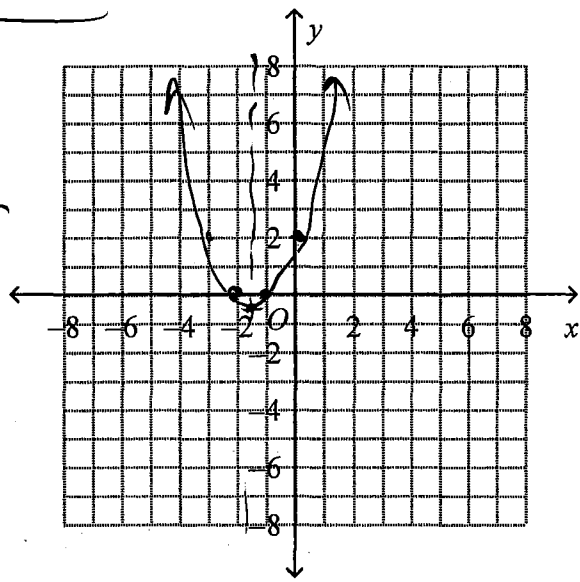
17. The height of a football kicked during a game is modeled by  $h = -16t^2 + 50t + 3$  where  $h$  is the height of the ball in feet and  $t$  is the time, in seconds, that the ball is in the air. According to this model, how long was the football in the air?

$$\frac{-50 \pm \sqrt{(50)^2 - 4(-16)(3)}}{2(-16)}$$

$$\frac{-50 \pm \sqrt{2692}}{-32}$$

quad form

$$x = 3.18 \text{ sec}$$



18. For the equation  $y = x^2 + 3x + 2$ , complete the following & graph.

Vertex:  $(-1.5, -2.5)$

Vertex Form:  $y = 1(x + 1.5)^2 - 2.5$

Y-intercept:  $2$

Factored Form:  $(x + 2)(x + 1)$

X-intercept(s):  $-2$  &  $-1$

$$\frac{-3}{2(1)} = -1.5$$

19. For a model rocket that is launched off of the ground, the altitude,  $h(t)$ , in meters, as a function of time  $t$ , in seconds is given by  $h(t) = 160t - 16t^2$ .

- Find the maximum height of the rocket
- How long does it take to reach the maximum height?
- How long is the rocket in the air before it hits the ground?

$$\frac{400}{5}$$

$$10 \text{ sec}$$

$$\frac{-160}{2(-16)}$$

$(5, \rightarrow)$

quad formula

20. Decide which method would be best to solve and tell why.

a.  $2x^2 + 4 = 0$

b.  $6x^2 + 13x + 6 = 0$

c.  $-x^2 + 5x - 7 = 0$

d.  $2x^2 = 7x - 8$

21. Write the equation for the quadratic functions described below in standard form.

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

$-2(x+3)(x+3) + 1$   
 $-2(x^2 + 6x + 9) + 1$

$-2x^2 - 12x - 17$

b.  $f(x) = -2(x + 2)(x - 1)$

$-2(x^2 + 2x - 1x - 2)$

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

22. Write the equation for the quadratic functions described below in vertex form.

a.  $f(x) = 3x^2 + 12x - 10$

$\frac{12}{6} = 2$

$(2, 26)$

$y = 3(x - 2)^2 + 26$

Find vertex

b. with vertex  $(3, 2)$  and goes through  $(1, 14)$

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

$14 = a(1 - 3)^2 + 2$

$14 = 4a + 2$

$a = 3$

c.  $f(x) = -2(x + 2)(x - 1)$

$-2x^2 - 2x - 4$

$\frac{2}{2(-2)} = -\frac{1}{2}, 4.5$

$y = -2(x + \frac{1}{2})^2 + 4.5$

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

23. Write a quadratic in factored form that has the x-intercepts of 2 and -2, then put it in standard form.

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

$x^2 - 4$

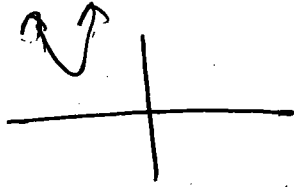
24. Write a quadratic in factored form that has solutions of  $-7i$  and  $7i$ , then put it in standard form.

$(x - 7i)(x + 7i)$

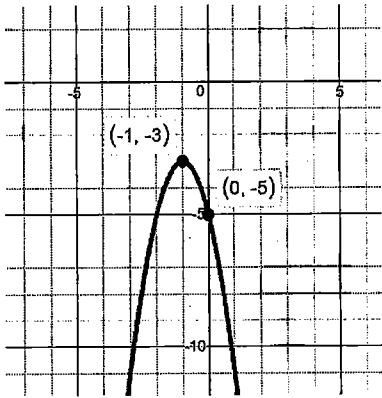
$x^2 - 7ix + 7ix - 49i^2$

$x^2 + 49$

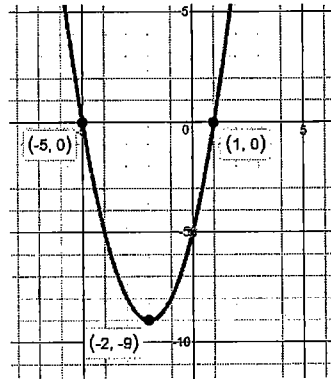
25. What do you know about a quadratic graph that has a discriminant of -3 and an a-value of 2.  
Sketch the graph.



26. Write the equation of each graph in the requested form.



Vertex Form



Standard Form

$$(x + 5)(x - 1)$$

$$x^2 + 4x - 5$$

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

$$-5 = a(0 + 1)^2 - 3$$

$$-2 = a$$

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

27.

Solve & graph.

$$3x^2 - 11x - 20 \geq 0$$

$$(x - 5)(3x + 4)$$

$$x = 5 \quad x = -4/3$$

-5	$\frac{-5x - 20}{3x^2 + 4x}$
x	$\frac{3x^2 + 4x}{3x \quad 4}$

$$\begin{array}{r} -5 \\ -15 \\ \hline -15 \end{array} \quad 4$$

