

1. Write a quadratic equation that has  $x = 5i$  and  $x = -5i$ , as the two solutions.

$$y = (x - 5i)(x + 5i) = x^2 - 25i^2$$

$$y = x^2 + 25$$

2. Write a quadratic equation that has  $x = 8i$  and  $x = -8i$ , as the two solutions.

$$y = (x - 8i)(x + 8i) = x^2 - 64i^2$$

$$y = x^2 + 64$$

NO

3. Convert the quadratic equation,  $f(x) = 2x^2 - 12x + 22$ , to vertex form.

$$y - 22 + \frac{18}{2} = 2(x^2 - 6x + 9)$$

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

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

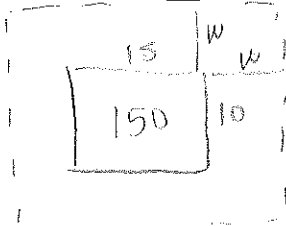
NO

4. Convert the quadratic,  $3x^2 + 6x + 5$ , to vertex form.

$$y - 5 + \frac{3}{3} = 3(x^2 + 2x + 1)$$

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

5. Happy has a patio next to his house that is 15 ft by 10 ft. He wants to put a uniform flower bed around the patio. The area of the flower bed is 100 ft<sup>2</sup>. Write an equation that can be used to find  $w$ , the width of the flower bed and solve for  $w$ .



$$(15 + 2w)(10 + 2w) = 250$$

$$150 + 30w + 20w + 4w^2 = 250$$

$$4w^2 + 50w - 100 = 0$$

$$2(2w^2 + 25w - 50) = 0$$

$$a=2, b=25, c=-50$$

$$w = \frac{-25 \pm \sqrt{(25)^2 - 4(2)(-50)}}{2(2)} = \frac{-25 \pm \sqrt{1025}}{4}$$

$$w = \frac{-25 + \sqrt{1025}}{4}$$

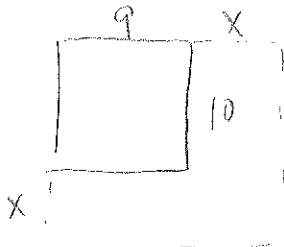
$$w = 1.754$$

$$w = \frac{-25 - \sqrt{1025}}{4}$$

$$w = -\cancel{14.254}$$

$$1.754 \text{ ft}$$

6. Snow White wants to increase her room in the 7 Dwarfs house by the same amount on the length and the width. The room was originally 9 feet by 10 feet. She wants the area of her new room to be 210 feet squared. How much does she need to increase the length and the width by? Write the equation needed and solve.



$$(9 + x)(10 + x) = 210$$

$$90 + 9x + 10x + x^2 = 210$$

$$x^2 + 19x - 120 = 0$$

$$(x - 5)(x + 24) = 0$$

$$x = 5$$

$$5 \text{ ft}$$

7. Larry kicked a football. The equation  $h = -16t^2 + 60t$  described the height of the ball  $t$  minutes after it was kicked. How many seconds went by before the ball hit the ground?

$$\boxed{3.75 \text{ sec.}}$$

8. During a basketball game, a shot was taken from midcourt and the basket was made. The equation  $h = -16t^2 + 26t + 5$  describes the height (in feet) of the ball  $t$  seconds after it was thrown. How high did the ball go into the air?

$$(0.812, 15.563)$$

$$\boxed{15.563 \text{ ft}}$$

9. What is the sum of the complex numbers  $(12 - 5i)$  and  $(-3 + 4i)$ ?

$$\boxed{9 - i}$$

10. Simplify  $(-3 - 2i) - (-5 + i)$

$$= -3 - 2i + 5 - i$$

$$\boxed{2 - 3i}$$

11. Simplify  $(8 - 12i) - (-1 + 2i)$

$$= 8 - 12i + 1 - 2i$$

$$\boxed{9 - 14i}$$

12. What is the product of the complex numbers  $(3 + i)$  and  $(3 - i)$ ?

$$9 - 3i + 3i - i^2 = 9 + 1 = \boxed{10}$$

13. Simplify  $(6 + 3i)(6 - 3i)$

$$= 36 - 18i + 18i - 9i^2 = 36 + 9 = \boxed{45}$$

14. Simplify  $(3 - 4i)^2$

$$= (3 - 4i)(3 - 4i) = 9 - 12i - 12i + 16i^2 = 9 - 24i - 16$$

$$= \boxed{-7 - 24i}$$

15. Write the equation of the graph formed when you translate the quadratic parent function 6 units left and 8 units down.

Equation:  $y = (x + 6)^2 - 8$

Vertex:  $(-6, -8)$

Now translate your equation 8 units right and 6 units up. Write the equation of the new graph.

New equation:  $y = (x - 2)^2 - 2$

16. The function  $f(x) = (x + 1)^2 - 2$  is moved 5 units to the right and 3 units down. State the new vertex and write the equation of the newer function.

$$y = (x - 4)^2 - 5 \quad (4, -5)$$

17. List the following functions from widest to narrowest.

$$y = \frac{2}{3}x^2$$

2

$$y = -5x^2$$

4

$$y = x^2$$

3

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

1

18. Given the equation  $4x^2 + 5x - 6 = 0$ ,

a. What is the value of the discriminant?  $b^2 - 4ac$

$$25 - 4(4)(-6) = 121$$

b. What is the number and type of the solutions this discriminant represents?

positive  
+  
perfect

2 real  
rational

19. Solve the equation  $4x^2 + 5x - 2 = 0$  using the quadratic formula.

$$x = \frac{-5 \pm \sqrt{25 - 4(4)(-2)}}{2(4)} = \frac{-5 \pm \sqrt{57}}{8}$$

20. Use the quadratic formula to find the solutions of  $x^2 - 2x + 5 = 0$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(5)}}{2(1)} = \frac{2 \pm \sqrt{-16}}{2} = \frac{2 \pm 4i}{2} = 1 \pm 2i$$

21. Use the quadratic formula to find the solutions of  $x^2 - 6x + 5 = -9$

$$x = \frac{6 \pm \sqrt{36 - 4(1)(14)}}{2(1)}$$

$$x^2 - 6x + 14 = 0$$

$$x = \frac{6 \pm \sqrt{-20}}{2} = \frac{6 \pm 2i\sqrt{5}}{2} = 3 \pm i\sqrt{5}$$

22. Use the quadratic formula to find the solutions of  $10x^2 - 29x - 21 = 0$

$$x = \frac{29 \pm \sqrt{1681}}{2(10)} = \frac{29 \pm 41}{20}$$

$$x = \frac{29 + 41}{20} = \frac{70}{20} = \frac{7}{2} \quad x = \frac{29 - 41}{20} = \frac{-12}{20} = \frac{-3}{5}$$

23. Jenny is converting the equation  $x^2 - 8x - 9 = y$  to vertex form by completing the square. What number  $c$  should be added to both sides of the equation to complete the square?

$$\left(\frac{-8}{2}\right)^2 = (-4)^2 = \boxed{16}$$

24. The amount of rock present at the quarry can be modeled by a quadratic function. They started with 8 tons. After 3 days, they had 65 tons. At 5 days, they had 63 tons. At 6 days, they had 50 tons. Use your calculator and quadratic regression to predict the time when there will be no rocks left. (Write down the quadratic equation AND your solution.)

Day	Amount of rock (tons)
0	8
3	65
5	63
6	50

Quadratic equation:  $y = -4x^2 + 31x + 8$

Day when there are no rocks left: 8 days

25. The Food Pantry is stocked with canned food. The amount of cans for a given month can be modeled by a quadratic function. They started with only 24 cans. After 3 days, they had 72 cans. At 7 days, they had 80 cans. At 9 days, they had 60 cans. Fill in the table with the data from the situation. Use your calculator and quadratic regression to predict the day when there will be no cans left. (Write down the quadratic equation AND your solution.)

Day	Number of cans
0	24
3	72
7	80
9	60

Quadratic equation:  $y = -2x^2 + 22x + 24$

Day when there are no cans left: 12 days

26. A quadratic function has a vertex of (3, -1) and goes through the point (1, -4). Write the equation of the quadratic function.

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

$$-4 = a(1-3)^2 - 1$$

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

$$-3 = a(4) - 1$$

$$-3 + 1 = a(4) - 1 + 1$$

$$-2 = a(4)$$

$$-\frac{2}{4} = a$$

$$-\frac{1}{2} = a$$

$$y = -\frac{1}{2}(x-3)^2 - 1$$

27. A quadratic function has roots of 6 and -1 and goes through the point (8, 6). Write the equation of the quadratic function.

$$y = a(x-6)(x+1)$$

$$6 = a(8-6)(8+1)$$

$$6 = a(2)(9)$$

$$6 = a(18)$$

$$\frac{6}{18} = \frac{a(18)}{18}$$

$$\frac{1}{3} = a$$

$$y = \frac{1}{3}(x-6)(x+1)$$

NO

NO