

Review Unit 1 Quadratics Review

Solutions

Add or Subtract

1. $(5x^2 - 8x - 6) + (7x^2 - 9x - 3)$
 $= 12x^2 - 17x - 9$

2. $(3x^2 + 5x - 9) - (6x^2 + 5x - 11)$
 $= -3x^2 + 2$

Multiply:

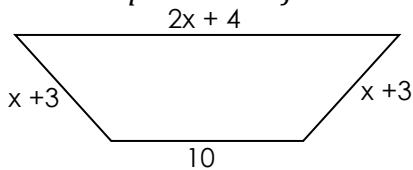
3. $7x^2(9xy^3 - 8z^4y + 4y^3)$
 $= 63x^3y^3 - 56z^4yx^2 + 28y^3x^2$

4. $(x - 4)^2$
 $= x^2 - 8x + 16$

5. $(x - 6)(x + 7)$
 $= x^2 + x - 42$

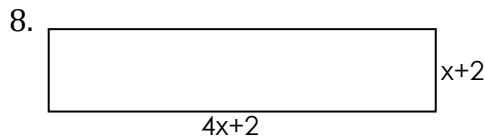
6. $(x - 2)(x^2 - 4x + 6)$
 $= x^3 - 6x^2 + 14x - 12$

7. Give the perimeter of the deck shown below.

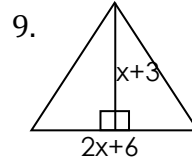


Perimeter = $4x + 20$

Find the area of the figures.



Area = $4x^2 + 10x + 4$



Area = $x^2 + 6x + 9$

Evaluate.

10. i^{12}
 $= 1$

11. i^{27}
 $= -i$

12. i^{121}
 $= i$

Perform the following complex operations.

13. $(2 + 5i) - (-4 - 12i)$
 $= 6 + 17i$

14. $(4 - 5i)(6 + 5i)$
 $= 49 - 10i$

15. $\frac{9 + 2i}{1 + 3i}$
 $= \frac{3}{2} - \frac{5}{2}i$

16. $7i^2 - 3i^6$
 $= -4$

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17. Rewrite in exponential form $(\sqrt[4]{x})^9$.

$$= x^{\frac{9}{4}}$$

18. Rewrite in radical form $(4x^2)^{\frac{2}{3}}$

$$(\sqrt[3]{4x^2})^2$$

Simplify each expression completely.

19. $8^{\frac{5}{3}}$
 $= 32$

20. $\sqrt[4]{256a^{16}b^{20}c^{13}}$
 $= 4a^4b^5c^{\frac{13}{4}}$

21. $\sqrt[3]{\frac{125x^3}{8}}$
 $= \frac{5x}{2}$

22. $(64^{\frac{1}{3}} \cdot 9^{\frac{1}{4}})^2$
 $= 48$

23. $2\sqrt[5]{8x^4y^2} \cdot \sqrt[5]{8x^2y^3}$
 $= 4xy\sqrt[5]{2x^6}$

24. $4\sqrt[3]{54x^4} - x\sqrt[3]{16x}$
 $= 10x\sqrt[3]{2x}$

25. $\frac{4\sqrt[3]{x}}{8x^{\frac{5}{2}}}$
 $= \frac{1}{2x^{\frac{1}{15}}}$

26. $\sqrt[4]{16x^{\frac{2}{5}}}$
 $= 2x^{\frac{1}{10}}$

27. $(8x^3y^6)^{\frac{2}{3}}$
 $= 4x^2y^4$

28. $\frac{\sqrt[3]{x} \cdot x^{\frac{1}{2}}}{x^{\frac{2}{3}}}$
 $= x^{\frac{1}{6}}$

Factor the polynomial. Remember to use GCF if necessary.

1. $3x^3 - 9x^2$
 $= 3x^2(x-3)$

2. $x^2 + 9x + 20$
 $= (x+4)(x+5)$

3. $x^2 + 7x - 30$
 $= (x-3)(x+10)$

4. $x^2 - 49$
 $= (x-7)(x+7)$

5. $x^2 - 10x + 24$
 $= (x-6)(x-4)$

6. $x^2 - 13x + 22$
Not Factorable

7. $x^2 + 10x + 25$
 $= (x+5)(x+5)$

8. $x^2 - 49$
 $= (x-7)(x+7)$

9. $x^2 - 10x + 24$
 $= (x-6)(x-4)$

10. $x^2 - 13x + 22$
Not Factorable

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11. $x^2 + 10x + 25 = (x+5)(x+5)$ 12. $x^2 - 4x - 32 = (x-8)(x+4)$ 13. $3x^2 - 24x + 36 = (3x-6)(x-2)$ 14. $2x^2 + 11x + 5 = (2x+1)(x+5)$ 15. $4x^2 - 64 = 4(x+4)(x-4)$

16. $3x^2 + 16x + 21 = (3x+7)(x+3)$ 17. $5x^2 - 7x - 6 = (5x+3)(x-2)$ 18. $4x^2 - 10x + 6 = 2(2x-3)(x-1)$ 17. $6x^2 - 18x - 24 = 6(x-4)(x+1)$ 18. $12x^2 + 7x - 12 = (4x-3)(3x+4)$

19. $9x^2 - 12x + 4 = (3x-2)(3x-2)$ 20. $81x^4 - 16 = (9x^2+4)(3x+2)(3x-2)$

21. The area of a rectangle is $(8x^2 + 8x + 2) \text{ cm}^2$. The width is $(2x + 1) \text{ cm}$. What is the length of the rectangle. $(4x+2)$

22. The area of a rectangle is $(x^2 - 12x + 35) \text{ cm}^2$. The width is $(x + 5) \text{ cm}$. What is the length of the rectangle. $(x-7)$

22. The area of a rectangle is $(3x^2 + 5x - 12) \text{ cm}^2$. What are the factors of the length and width of a rectangle? $(3x-4)(x+3)$

23. After t seconds, a ball tossed in the air from the ground level reaches a height of feet given by the equation $h(t) = -16t^2 + 144t$.

- a. What is the height of the ball after 3 second? 288 ft
- b. Find the number of seconds the ball is in the air when it reaches a height of 224 feet. $t = 2 \text{ or } 7 \text{ seconds}$
- c. After how many seconds will the ball hit the ground before rebound? 9 seconds

24. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h(t) = -16t^2 + 64t + 80$.

- d. How long will it take for the rocket to hit 128 feet? $t = 1 \text{ or } t = 3 \text{ seconds}$
- e. After how many seconds after it is launched will the rocket hit the lake? $t = 5 \text{ seconds}$

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25. A rock is dropped from the top of a tall building, 382 feet high. The path, in feet, is given by

$h(t) = -16t^2 + 382$. How long after the rock is thrown is it 100 from the ground? $t = 4.2$ seconds

Solve each quadratic equation using the best method.

26. Factoring: $3x^2 - 17x - 6 = 0$

$x = -\frac{1}{3}, x = 6$

27. Square Roots: $2(x - 3)^2 + 10 = 24$

$x = 3 + \sqrt{7}, 3 - \sqrt{7}$

28. Quadratic Formula: $5x^2 = -6x - 1$

$x = -1, -\frac{1}{5}$

2

29. Completing The Square: $x^2 + 4x - 12 = 0$

$x = -6, 2$

Solve each quadratic equation using the best method.

30. $(x + 2)^2 - 40 = 9$

$x = 5, -9$

3

31. $x^2 + 4x - 5 = 0$

$x = -5, 1$

33. $5x^2 + 3x + 1 = 0$

$x = \frac{-3 + i\sqrt{11}}{10}, \frac{-3 - i\sqrt{11}}{10}$

34. $2x^2 + 28 = 4$

$x = 2i\sqrt{3}, -2i\sqrt{3}$

35. $2x^2 - 3x = 2$

$x = -\frac{1}{2}, 2$

37. $\frac{2}{5}x^2 + 63 = 13$

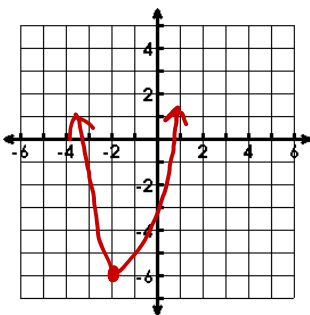
$x = 5i\sqrt{5}, -5i\sqrt{5}$

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Graph the following equation. Then, write the characteristics for the graph.

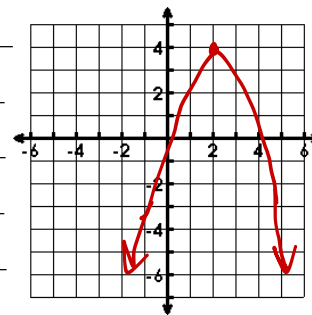
38. $y = 2(x+1)^2 - 5$

- Vertex: $(-1, 5)$
- Axis of Sym.: $x = -1$
- Domain: $(-\infty, \infty)$
- Range: $[-5, \infty)$
- Increase: $(-1, \infty)$
- Decrease: $(-\infty, -1)$

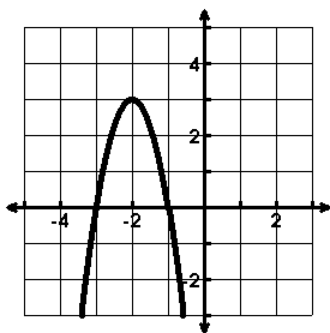


39. $y = -x^2 + 4x$

- Vertex: $(2, 4)$
- Axis of Sym.: $x = 2$
- Zeroes: $(0, 0), (4, 0)$
- Y-int: $(0, 0)$
- Increase: $(-\infty, 2)$
- Decrease: $(2, \infty)$



40.



• Describe the transformations:

reflected & stretched by 3

left 2

up 2

• Write the equation:

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

• Roots: $(-3, 0) (-1, 0)$

• Avg. Rate of Change

$-3 \leq x \leq -2$: 3

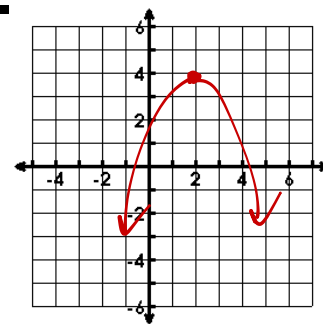
41. Sketch the quadratic function using the given information:

Domain: \mathbb{R}

Range: $y \leq 4$

Increasing: $-\infty < x < 2$

Decreasing: $2 < x < \infty$



Describe the transformations to the parent function in the given equations.

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

reflection across x-axis, left 2, down 5

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

stretch 3, right 4, up 2

Write the quadratic equation of the graph that has been....

44. shifted down 1 and shrunk by a factor of $\frac{1}{2}$ $y = \frac{1}{2}x^2 - 1$

45. reflected over the x-axis and has shifted right 2 $y = -(x-2)^2$

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Change the equations to standard form.

46. $y = 2(x - 1)^2 + 4$
 $y = 2x^2 - 4x + 6$

47. $y = -(x + 4)^2 - 6$
 $y = -x^2 - 8x - 22$

Change the equations to vertex form.

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

49. $y = 2x^2 + 8x + 1$
 $y = 2(x + 2)^2 - 7$

An object is projected into the air with a path described by the function $h(t) = -16t^2 + 96t + 160$ where h is the height above the ground in feet and t is the time in seconds since the object started along the path.

- 50. Find the time the object changes direction. *3 seconds*
- 51. Find the maximum height of the object. *$f(3) = 304$ or $(3, 304)$*
- 52. Describe the location of the object at 2.5 seconds. *going up*
- 53. Describe the location of the object at 4.1 seconds. *going down*

Use the table of maximum load allowances for various heights of spruce columns.

Maximum Load Allowance No. 1 Common Spruce	
Height of Column (ft)	Maximum Load (lb)
4	7280
5	7100
6	6650
7	5960

- 54. Find a quadratic regression equation to model the max load given height.
 $y = -1275x^2 + 961.5x + 5475.5$
- 55. Use your model to predict the maximum load allowed for an 8 ft. spruce column.
 $f(8) = 5007.5$

56. Compare the vertex, y-intercept, and rate of change from $x_1 = 1$ to $x_2 = 2$ for each of the following functions.

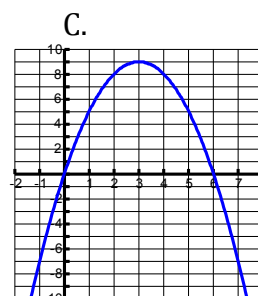
A. $y = -x^2 + 4x + 6$

vertex: (2, 10)
y-intercept: (0, 6)
rate of change: 1

B.

x	y
0	-26
1	-12
2	-2
3	4
4	6
5	4
6	-2

y-intercept: (0, 26)
vertex: (4, 6)
rate of change: 10



vertex: (3, 9)
y-intercept: (0, 0)
rate of change: 3