

- Find the exact value of $27^{-2/3}$.
- Simplify each of the given expressions. Assume that all variables represent positive numbers. Express your answer using only positive integer exponents.

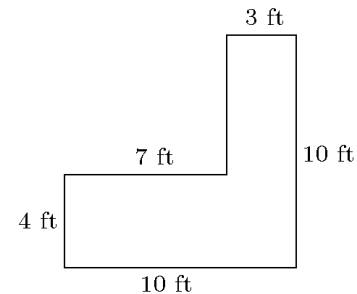
a) $\frac{p^{5/2}p^{2/3}}{p^{1/6}}$ b) $\sqrt[4]{\frac{x^{12}y^{18}z^{24}}{x^4y^6z^8}}$ c) $\sqrt[3]{\frac{x^{11}y^5}{x^2y^2}}$

- Solve the equation $3(x+2)^2 = 12 + (x-1)(4+x)$ over the complex numbers.
- Solve the equation $\frac{3x-4}{6} - \frac{x+6}{4} = \frac{4}{3}$ over the complex numbers.
- Solve the equation $3 + |4x - 6| = 9$ over the real numbers.
- Solve the compound inequality $-3 < \frac{1}{4}x + 2 \leq 3$.

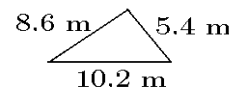
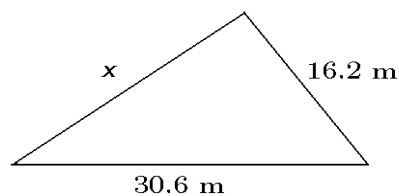
- Suppose that our workplace pays the same amount of money for each hour worked. Based on the table shown, how much money will we make if we work for 7 hours?

Hours	payment
2	\$30
4	\$60
6	\$90
7	

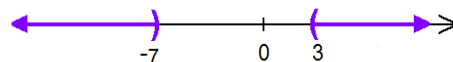
- What is the volume of a rectangular box with a length of 10 in, a width of 6 in, and a height of 3 in?
- You have a 13 inches long piece of plywood that you can use to make a ramp from the street to the top of the curb. If you only have 12 inches of horizontal space on the street, how tall is the curb?



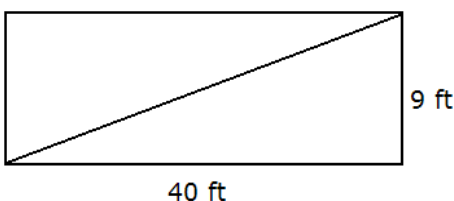
- Compute the area of the object shown on the figure.
- The two triangles shown on the picture are similar. Find the length of x .



- Find the point-slope form equation of the line that passes through the point $(-2, 3)$ and has slope $\frac{4}{5}$.
- (Multiple choice. Select the best answer.) If a line rises from left to right, the line has a slope that is:
A) positive B) negative C) zero D) undefined E) parallel
- What is the degree of the polynomial $P(x) = 3x^2 + 8x^5 - 3x + 1$?
- Which set is depicted on the picture? State your answer in interval form.



16. State the slope formula. It is the formula that we use to compute the slope m , of a line through the distinct points $A(x_1, y_1)$ and $B(x_2, y_2)$.
17. What is the complex conjugate of $2 + 3i$?
18. Suppose that $a \neq 0$. What point is the vertex of the parabola $y = a(x - h)^2 + k$?
19. Simplify the expression $\frac{x^2 + 2x - 15}{x^2 - 8x + 15}$.
20. Simplify the expression $\sqrt{12} - 2\sqrt{75} + \sqrt{48}$.
21. A boat's crew rowed 36 kilometers downstream, with the current, in three hours. The return trip upstream, against the current, covered the same distance, and it took six hours. Find the crew's rowing rate in still water.
22. Solve the given system of linear equations.
$$\begin{cases} 2x - 3y = 16 \\ x + 8y = -87 \end{cases}$$
23. Perform the indicated operations and simplify. $(3 - 2\sqrt{5})(\sqrt{5} - 1)$
24. Solve each of the given equations over the complex numbers.
 a) $2(x - 1)^2 = 8 - (x + 2)(3 - x)$ b) $x^2 = 6x + 1$ c) $(x - 3)^2 + 2x = 4$
25. The following expressions are all equal to each other except for one. Which one?
 A) $\sqrt{50} - \sqrt{8}$ B) $\sqrt{2} + \sqrt{12}$ C) $3\sqrt{2}$ D) $\sqrt{18}$ E) $\frac{\sqrt{72}}{2}$
26. Solve the equation $\frac{2x + 3}{5} - \frac{x - 5}{3} = 1$ over the complex numbers.
27. Find the length of the diagonal of the rectangle shown on the picture.



28. Solve the equation $|2x - 5| + 2 = 11$ over the real numbers.
29. Rationalize the denominator in the expression $\frac{3}{\sqrt{10} + 1}$.
30. Solve the compound inequality $-2 \leq \frac{1}{3}x - 1 \leq 5$. Express the solution set using interval notation.
31. How many liters of a 17% acid solution should be mixed with 8 liters of an 11% acid solution to obtain a mixture that is 15%?
32. Solve each of the given equations over the complex numbers.
 a) $\sqrt{2x - 1} = 5$ b) $\sqrt{2x - 5} = x - 4$
33. We have invested a total of \$5000 in two bank accounts. One account earns 7% interest per year; the other earns 8% per year. After one year, the combined interest from the two account was \$382. How much money did we invest at 8%?
34. Find the distance between the points $(-4, -5)$ and $(1, 7)$.

35. Expand each of the following expressions.

a) $(5x - 2)^2$ b) $(5x - 2y)^2$ c) $(5 - 2\sqrt{3})^2$ d) $(5 - 2i)^2$ e) $(5 - 2\sqrt{3}i)^2$

36. a) Find the slope-intercept form of the equation of the straight line that is parallel to $y - 7 = -2(x + 2)$ and passes through the point $P(-6, 1)$.

b) Find the slope-intercept form of the straight line that is perpendicular to $y - 7 = -2(x + 2)$ and passes through the point $P(-6, 1)$.

c) Find the slope-intercept form of the straight line that passes through the points $A(-2, 3)$ and $B(4, 0)$.

37. Factor $-3x^3 + 12x$ completely over the real numbers.

38. Perform the indicated subtraction on the rational expressions and simplify.

$$\frac{2m - 1}{m^2 - m - 2} - \frac{1}{m + 1}$$

39. Solve the equation $|x + 1| = |3x - 1|$ over the real numbers.

40. Simplify the given complex fraction.

$$\frac{\frac{3}{x-1} - 1}{\frac{2}{x-1} + 1}$$

41. Find all real solutions of the given equation. $\frac{3}{p-7} + \frac{p+7}{p} = \frac{7p-28}{p(p-7)}$

42. Suppose that f is a function given by $f(x) = -x^2 - x + 2$. Compute the exact value of $f(-3)$.

43. Suppose that f is a function given by $f(x) = \sqrt{2x-1}$. Compute the exact value of $f(13)$.

44. Find both coordinates of the vertex of the parabola with equation $y = x^2 - 6x + 5$.

45. Solve each of the following compound inequalities.

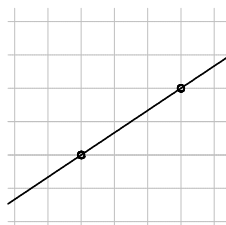
a) $3 - x \geq -2x + 5$ and $2(x - 7) < x + 4$ b) $3 - x \geq -2x + 5$ or $2(x - 7) < x + 4$

46. Find the coordinates of the vertex of the parabola given by $y = 2x^2 - 20x + 18$.

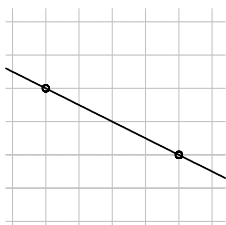
47. Completely factor $2x^3 + 3x^2 - 2x - 3$ over the real numbers.

48. Simplify completely. $\frac{x^2 - 9}{x^2 - 3x} \div \frac{x^2 + 8x + 15}{2x + 10}$

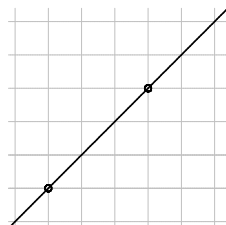
49. Assume that the spacing is the same on both axes. Which of the lines shown below has a slope of $-\frac{1}{2}$?



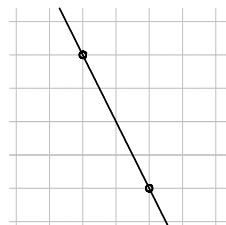
A)



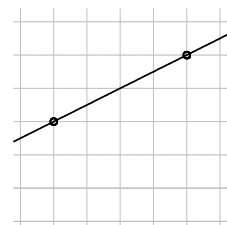
B)



C)



D)

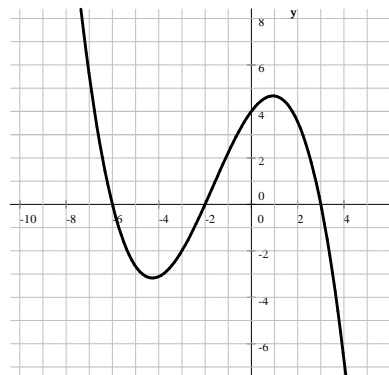


E)

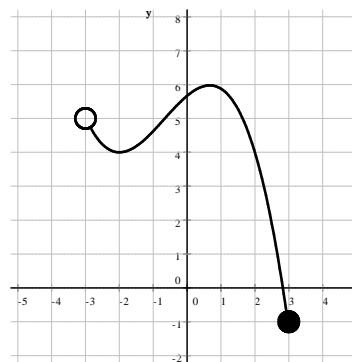
50. Ann invested \$20,000 in two accounts. She took a 4% loss on one of the accounts and made a 12% profit on the other investment, but ended up breaking even. How much money did she lose in the first investment?

51. Solve the inequality $3(x - 2) \leq -2(x - 1) - 5$.

52. a) List all x -intercepts of the function graphed.
 b) List all y -intercepts of the function graphed.



53. The picture shows the graph of a function, $f(x)$.
 Based on its graph, determine each of the following.
 a) the domain of f
 b) the range of f .



54. Compute the slope of the line that passes through the points $(3, 1)$ and $(6, -3)$.

55. Perform the indicated operations on the complex numbers. Simplify your answer.

a) $(2 - 3i) + (8 - i)$

c) $(2 - 3i)(8 - i)$

e) $(5 + 2i)(5 - 2i)$

b) $(2 - 3i) - (8 - i)$

d) $(2 - 3i)^2$

f) $\frac{7 + i}{2 + i}$

56. Re-write $x^{-8/3}$ using only positive integer exponents.

57. Compute the exact value of $-p^2 + 4p - 1$ if

a) $p = -1 + 2\sqrt{3}$

b) $p = -1 + 2i$

58. Find an equation for the parabola graphed.

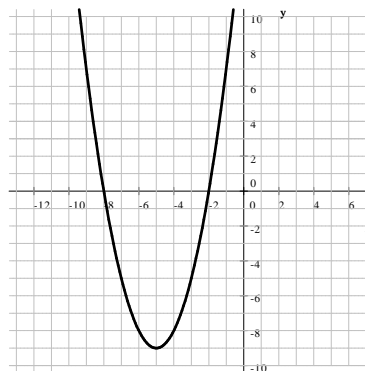
59. Use exponential notation to simplify each of the following. Assume that all variables represent positive numbers.

a) $\sqrt[3]{x}\sqrt[4]{x}$

c) $\sqrt[5]{x}\sqrt{x}$

b) $\sqrt[3]{\sqrt[4]{x}}$

60. Sketch the graph of $y = -2x^2 + 12x - 10$.



Answers

1. $\frac{1}{9}$
2. a) p^3
b) $x^2y^3z^4$
c) x^3y
3. $-4, -\frac{1}{2}$
4. 14
5. 0, 3
6. $(-20, 4]$
7. \$105
8. 180 in^3
9. 5 in
10. 58 ft^2
11. 25.8 m
12. $y - 3 = \frac{4}{5}(x + 2)$
13. A
14. 5
15. $(-\infty, -7) \cup (3, \infty)$
16. $m = \frac{y_2 - y_1}{x_2 - x_1}$
17. $2 - 3i$
18. (h, k)
19. $\frac{x + 5}{x - 5}$
20. $-4\sqrt{3}$
21. 9 kilometers per hour
22. $(-7, -10)$
23. $5\sqrt{5} - 13$
24. a) 0, 3 b) $3 - \sqrt{10}, 3 + \sqrt{10}$
c) $2 - i, 2 + i$
25. B
26. -19
27. 41 ft
28. -2, 7
29. $\frac{\sqrt{10} - 1}{3}$
30. $[-3, 18]$
31. 16 liters
32. a) 13 b) 7
33. \$3200
34. 13 units
35. a) $25x^2 - 20x + 4$
b) $25x^2 - 20xy + 4y^2$
c) $37 - 20\sqrt{3}$
d) $21 - 20i$
e) $13 - 20i\sqrt{3}$
36. a) $y = -2x - 11$
b) $y = \frac{1}{2}x + 4$
c) $y = -\frac{1}{2}x + 2$
37. $-3x(x - 2)(x + 2)$
38. $\frac{1}{m - 2}$
39. 0, 1
40. $\frac{-x + 4}{x + 1}$
41. -3
42. -4
43. 5
44. $(3, -4)$
45. a) $[2, 18)$
b) $(-\infty, \infty)$
46. $(5, -32)$
47. $(2x + 3)(x - 1)(x + 1)$
48. $\frac{2}{x}$
49. B
50. \$600
51. $\left(-\infty, \frac{3}{5}\right]$
52. a) -6, -2, 3
b) 4
53. a) $(-3, 3]$
b) $[-1, 6]$
54. $-\frac{4}{3}$
55. a) $10 - 4i$ b) $-6 - 2i$
c) $13 - 26i$ d) $-5 - 12i$
e) 29 f) $3 - i$
56. $\frac{1}{(\sqrt[3]{x})^8}$
57. a) $-18 + 12\sqrt{3}$
b) $-2 + 12i$
58. $y = x^2 + 10x + 16$
59. a) $\sqrt[12]{x^7}$ b) $\sqrt[12]{x}$ c) $\sqrt[10]{x^3}$
60. $y = -2x^2 + 12x - 10$

