

Algebra 1

Writing Equations of Lines

Graphing Linear Equations

Geometry/Trig

Pythagorean Theorem

Special Right Triangles (30-60-90 and 45-45-90)

Right Triangle Trigonometry  $S \frac{o}{h}$   $C \frac{a}{h}$   $T \frac{o}{a}$

Important Topics from Algebra II/Trigonometry

Solving Equations, Absolute Value Equations, and Inequalities

Operations with Radicals and Imaginary numbers

Solving Radical Equations

Quadratics

- FACTORING

- Solving for roots

- Quadratic form, intercept form, vertex form

- Completing the square

Properties of Exponents including Rational Exponents

Logarithms

- Expanding and condensing

- Logarithmic to exponential form and exponential to logarithmic form

- Solving Logarithmic Equations

- Graphing logarithms and exponential functions

Parent Graphs

- Domain and Range (interval notation)

- Transformations

- inverses

Operations with Functions (include restrictions where appropriate)

Piecewise Functions

Polynomials 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> degree

- End behavior

- Relative maximum and relative minimum

- Intervals of increasing and decreasing

- Rational Root Theorem

- Synthetic division

- Complex roots

Rational Expressions

- All operations (+, -, x, ÷)

- Graphing (asymptotes, holes, domain and range)

Write the equation of the line using the information given.

1. Through the points  $(-1, 3)$  and  $(2, -1)$ .

$$y = -\frac{4}{3}x + \frac{5}{3}$$

2. Perpendicular to the line  $2x - 3y = 4$  and through the point  $(4, -2)$ .

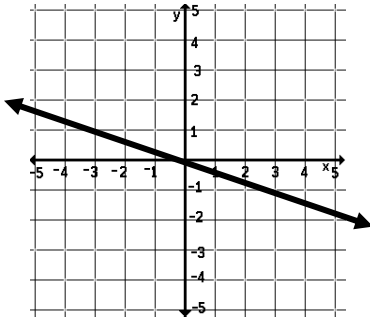
$$y = -\frac{3}{2}x + 4$$

3. Parallel to  $x = -1$  and through the point  $(-2, 3)$ .

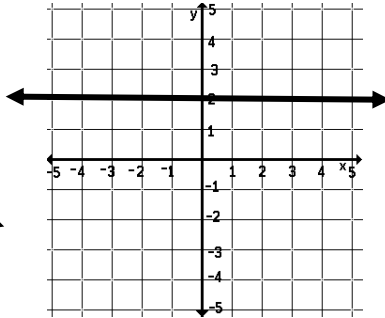
$$x = -2$$

Graph the following lines.

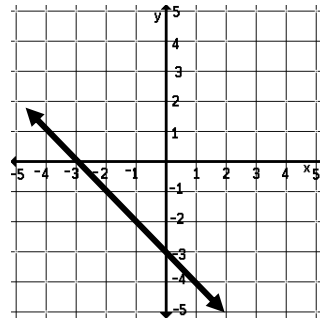
4.  $y = -\frac{1}{3}x$



5.  $y = 2$

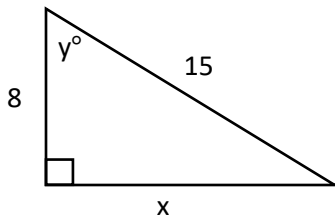


6.  $-2x - 2y = 6$



Solve for  $x$  and  $y$ .

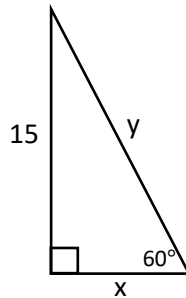
7.



$$x = 7$$

$$y = 57.8^\circ$$

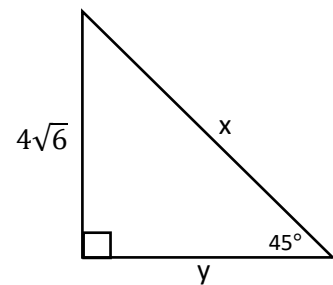
8.



$$x = 5\sqrt{3}$$

$$y = 10\sqrt{3}$$

9.



$$x = 4\sqrt{6}$$

$$y = 8\sqrt{3}$$

Solve each of the following for x.

13.  $\frac{1}{3}x^3 = x$

$$x = 0, \pm\sqrt{3}$$

14.  $x^4 - 16 = 0$

$$x = \pm 2, \pm\sqrt{2}$$

15.  $x^2 - 8x + 3 = 0$

$$x = 4 \pm \sqrt{13}$$

16.  $2x^2 - 21x + 49 = 0$

$$x = \frac{7}{2}, 7$$

17.  $\frac{x}{3} - \frac{x-2}{4} = 2$

$$x = 18$$

18.  $\sqrt{x} - 2 = x - 8$

$$x = 9$$

Simplify each of the following.

19.  $\sqrt{72}$

$$6\sqrt{2}$$

20.  $\sqrt{40} + \sqrt{90}$

$$5\sqrt{10}$$

21.  $\sqrt{50} - \sqrt{8}$

$$3\sqrt{2}$$

22.  $2\sqrt{3} \cdot 3\sqrt{6}$

$$18\sqrt{2}$$

23.  $\frac{2}{\sqrt{2}}$

$$\sqrt{2}$$

24.  $\frac{3}{\sqrt{6}}$

$$\frac{\sqrt{6}}{2}$$

25.  $\frac{\sqrt{10}}{\sqrt{5}}$

$$\sqrt{2}$$

26.  $\frac{\sqrt{30}}{\sqrt{45}}$

$$\frac{\sqrt{6}}{3}$$

27.  $\sqrt{-10} \cdot \sqrt{-15}$

$$-5\sqrt{6}$$

28.  $\sqrt{-45}$

$$3i\sqrt{5}$$

29.  $\frac{2}{3-i}$

$$\frac{3+i}{4}$$

Write each exponential equation in logarithmic form.

30.  $5^x = 625$

31.  $10^x = 1000$

32.  $e^3 = 20.085$

33.  $u^v = w$

$\log_5 625 = x$

$\log_{10} 1000 = x$

$\ln 20.085 = 3$

$\log_u w = v$

Rewrite each logarithmic equation in exponential form.

34.  $\log_2 \frac{1}{8} = -3$

35.  $\ln 143 = x$

36.  $\log_4 64 = 3$

37.  $\log \frac{1}{100} = -2$

$2^{-3} = \frac{1}{8}$

$e^x = 143$

$4^3 = 64$

$10^{-2} = \frac{1}{100}$

Evaluate without using a calculator.

38.  $\log_x x^8 =$  \_\_\_\_\_

39.  $\ln e^3 =$  \_\_\_\_\_

40.  $\log 100 =$  \_\_\_\_\_

41.  $e^{\ln 12} =$  \_\_\_\_\_

42.  $\log_{27} 3 =$  \_\_\_\_\_

43.  $\log_3 81 =$  \_\_\_\_\_

38. 8

39. 3

40. 2

41. 12

42.  $\frac{1}{3}$

43. 4

Expand each logarithmic expression. Your answer may not contain any exponents or radicals.

44.  $\log \left( \frac{x^3 \sqrt{y+1}}{z^2} \right)$

45.  $\ln \left( \frac{y\sqrt{x}}{wz} \right)$

$3 \log x + \frac{1}{2} \log(y+1) - 2 \log z$

$\ln y + \frac{1}{2} \ln x - \ln w - \ln z$

Condense each logarithmic expression.

46.  $3 \log x + 2 \log y + \frac{1}{2} \log z$

47.  $3 \ln x + 2 \ln 5 - \ln(x+2)$

$\log x^3 y^2 \sqrt{z}$

$\ln \frac{25x^3}{x+2}$

Solve the exponential equations. Round any irrational answers to the nearest thousandths.

48.  $3^{x-2} = 27$

49.  $4(5^{x+2}) = 32$

50.  $3e^x + 5 = 24$

$x = 5$

$x = -0.708$

$x = 1.846$

51.  $\log_4(x-1) = 2$

52.  $\ln x = 2$

53.  $\log x = 6$

$x = 17$

$x = 7.389$

$x = 1,000,000$

**Application Problems.**

**Simple Compound Interest:**  $A = P \left(1 + \frac{r}{n}\right)^{nt}$

**Continuous Compound Interest:**  $A = Pe^{rt}$

54. Emily plans to put her graduation money into an account and leave it there for 4 years while she goes to college. She receives \$1,050 in graduation money to college that she puts into an account that earns 4.25%. How much money will be in Emily's account at the end of four years if it is compounded...
- a.) Quarterly?
  - b.) Monthly?
  - c.) Continuously?
  - d.) If the interest is compounded semi-annually, how long would it take for the balance to reach \$2,000? Round to the nearest hundredth of a year.

A. \$1,243.45

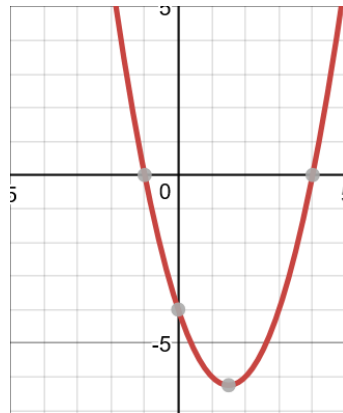
B. \$1,244.20

C. \$1,244.57

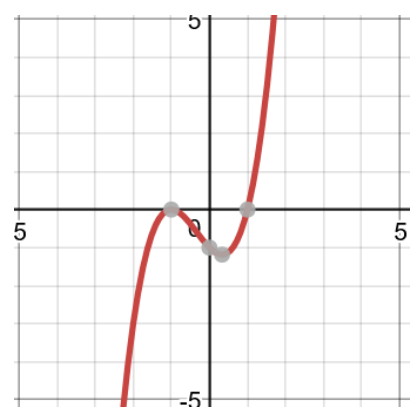
D. 70.07 years

**Graph each of the following without the aid of a graphing calculator.**

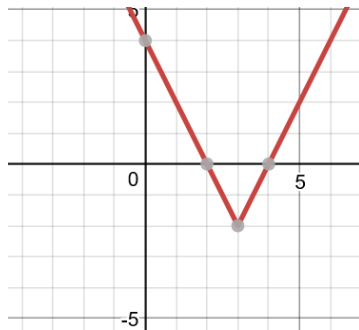
55.  $y = x^2 - 3x - 4$



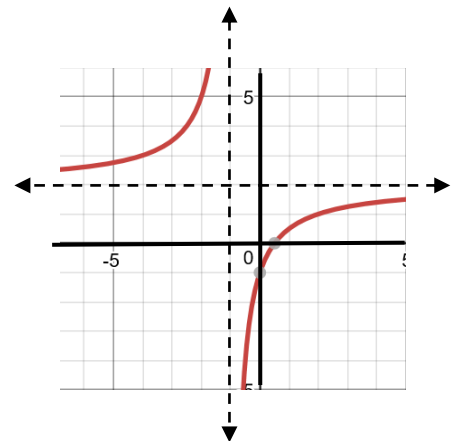
56.  $y = x^3 + x^2 - x - 1$



57.  $y = 2|x - 3| - 2$



58.  $y = \frac{2x-1}{x+1}$

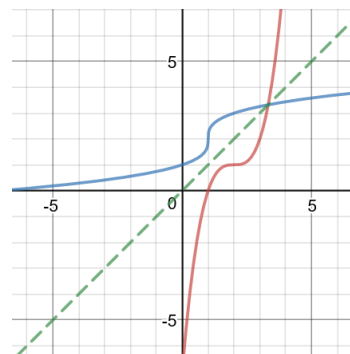


Find the inverse of the function. Graph both the function and its inverse. Confirm that the functions are inverses algebraically.

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

$$f(x)^{-1} = \sqrt[3]{x - 1} + 2$$

$$\begin{aligned} f(f(x)^{-1}) &= (\sqrt[3]{x - 1} + 2 - 2)^3 + 1 \\ &= (\sqrt[3]{x - 1})^3 + 1 \\ &= x - 1 + 1 \\ &= x \end{aligned}$$



Perform the requested operations given the functions.

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

$$g(x) = x^2 - 9$$

60.  $f(x) + g(x)$

$$= x^2 + x - 12$$

61.  $f(x) - g(x)$

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

62.  $\frac{f(x)}{g(x)}$

$$\begin{aligned} &= \frac{1}{x+3} \\ &(-\infty, -3) \cup (-3, 3) \cup (3, \infty) \end{aligned}$$

63.  $\frac{g(x)}{f(x)}$

$$\begin{aligned} &= x + 3 \\ &(-\infty, 3) \cup (3, \infty) \end{aligned}$$

64.  $f(g(x))$

$$= x^2 - 12$$

65.  $g(f(x))$

$$= x^2 - 6x$$

66.  $f(g(-2))$

$$= -8$$

67.  $f(x) \cdot g(x)$

$$= x^3 - 3x^2 - 9x + 27$$