

Math 1010 Final Exam

Solutions to practice problems.

1. Perform the indicated operation.

$$(8x - 3y)^2$$
$$(8x - 3y)(8x - 3y)$$
$$64x^2 - 24xy - 24xy + 9y^2$$

$$64x^2 - 48xy + 9y^2$$

2. Find the midpoint of the segment with the given endpoints.

$$\begin{array}{cc} x_1 & y_1 & x_2 & y_2 \\ (2, -2) & & (-1, 4) \end{array}$$

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left(\frac{2 + (-1)}{2}, \frac{-2 + 4}{2} \right)$$

$$\left(\frac{1}{2}, 1 \right)$$

3. Graph the inequality or compound inequality.

$$y \geq -3x - 1 \text{ and } x - y \geq -1$$

$$y \geq -3x - 1$$

↙ Solid
shade above

$$x - y \geq -1$$

$$-y \geq -x - 1$$

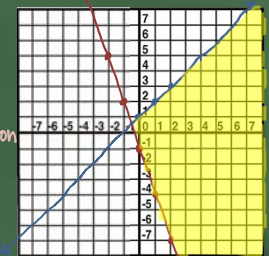
↗ *switch direction

and

$$y \leq x + 1$$

shade only where the graphs intersect

↘ Solid
shade below



4. Solve the equation.

$$4r^2 - 31r - 8 = 0$$

use Synthetic factoring

$$\frac{-32}{4} = \left[\frac{-8}{1} \right] \left[\frac{1}{4} \right]$$

Factors of -32
Sum of -32
(-32, 1)

$$(r-8)(4r+1) = 0$$

$$\begin{aligned} r-8=0 & \quad 4r+1=0 \\ r=8 & \quad 4r=-1 \\ & \quad r=-\frac{1}{4} \end{aligned}$$

$$\left\{ -\frac{1}{4}, 8 \right\}$$

5. Evaluate the expression.

$$\lceil 6.5 \rceil$$

Greatest Integer

* This means: what integer is less than or equal to this number?

$$\lceil 6.5 \rceil = 6$$

6. Solve the investment problem.

Roberto invested some money at 8%, and then invested \$4000 more than twice this amount at 11%. His total annual income from the two investments was \$4940. How much was invested at 11%?

$$I = P \cdot r \cdot t$$

P	r	t	I
x	0.08	1	0.08x
2x+4000	0.11	1	0.11(2x+4000)
			4940

$$0.08x + 0.11(2x+4000) = 4940$$

$$0.08x + 0.22x + 440 = 4940$$

$$0.3x = 4500$$

$$x = 15000 @ 8\%$$

$$2(15000) + 4000$$

$$\$34,000 @ 11\%$$

7. Solve the equation.

$$\log_4(x+2) + \log_4(x-4) = 2$$

$$\log_4(x+2)(x-4) = 2$$

rewrite in exponential form

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

$$16 = x^2 - 4x + 2x - 8$$

$$x^2 - 2x - 24 = 0$$

$$(x-6)(x+4) = 0$$

$$x = 6, \cancel{x = -4} \text{ check}$$

can't take log of a negative number.

$$\{6\}$$

8. Simplify. Assume that all variables represent positive real numbers.

$$(3 - 3\sqrt{3})^2$$

$$(3 - 3\sqrt{3})(3 - 3\sqrt{3})$$

$$9 - 9\sqrt{3} - 9\sqrt{3} + 9\sqrt{9}$$

$$9 - 18\sqrt{3} + 9(3)$$

$$9 - 18\sqrt{3} + 27$$

$$36 - 18\sqrt{3}$$

9. Multiply or divide. Write the answer in lowest terms.

$$\frac{3(p-1)}{p} \div \frac{5(p-1)}{2p^2}$$

copy • flip

$$\frac{3(\cancel{p-1})}{\cancel{p}} \cdot \frac{2p^{\cancel{2}}}{5(\cancel{p-1})}$$

$$\frac{6p}{5}$$

10. Solve the absolute value equation or inequality. Give the solution set in interval notation.

$$|-8x + 8| + 1 < 6 \quad \text{*Isolate absolute value}$$

$| | <$ less than AND

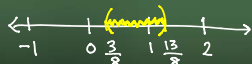
$$|-8x + 8| < 5$$

$$-8x + 8 < 5 \quad \text{and} \quad -8x + 8 > -5$$

$$\frac{-8x < -3}{-8} \quad \frac{-8x > -13}{-8}$$

$$x > \frac{3}{8} \quad \text{and} \quad x < \frac{13}{8}$$

$$\left(\frac{3}{8}, \frac{13}{8} \right)$$



11. Add or subtract as indicated. Write your answer in the form $a + bi$.

$$[(3 + 9i) - (8 + 3i)] - (8 - 8i)$$

$$[3 + 9i - 8 - 3i] - (8 - 8i)$$

$$-5 + 6i - 8 + 8i$$

$$-13 + 14i$$

12. Solve the problem.

A pension fund invests \$92,600 in municipal bonds and earns 6% per year on the investment. How much money is earned per year?

$$I = Prt$$

$$I = ?$$

$$P = 92,600$$

$$r = 6\% = 0.06$$

$$t = 1$$

$$I = (92,600)(0.06)(1)$$

$$I = \$5,556.00$$

13. Simplify. Assume that all variables represent positive real numbers.

$$\sqrt{150} - 4\sqrt{96} - 6\sqrt{54}$$

$\sqrt{150} = \sqrt{3 \cdot 5 \cdot 2 \cdot 5} = 5\sqrt{6}$
 $4\sqrt{96} = 4\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} = 16\sqrt{6}$
 $6\sqrt{54} = 6\sqrt{3 \cdot 3 \cdot 2 \cdot 3} = 18\sqrt{6}$

$$5\sqrt{6} - 16\sqrt{6} - 18\sqrt{6}$$

$$-29\sqrt{6}$$

14. Solve the equation. Give the exact solution.

$$5^x = \frac{1}{25}$$

*rewrite with the same base

$$5^x = \frac{1}{5^2}$$

$$5^x = 5^{-2}$$

$$x = -2$$

$$\{-2\}$$

15. Solve the problem.

A ladder is resting against a wall. The top of the ladder touches the wall at a height of 12 feet. Find the length of the ladder if the length is 4 feet more than its distance from the wall.

$a^2 + b^2 = c^2$
 $(12)^2 + x^2 = (x+4)^2$
 $144 + x^2 = x^2 + 8x + 16$
 $144 = 8x + 16$
 $128 = 8x$
 $\frac{128}{8} = \frac{8x}{8}$
 $x = 16$

The length of the ladder is $x + 4 = 16 + 4 = 20$ feet.

16. Graph the given logarithmic function.

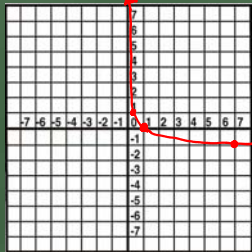
$$y = \log_{\frac{1}{7}} x$$

*write in exponential form

$$\left(\frac{1}{7}\right)^y = x$$

x	y
1	0
$\frac{1}{7}$	1
$\frac{1}{49}$	2
7	-1
49	-2

*choose values for y.



17. Solve the problem.

Find the measure of an angle, if its supplement $(180-x)$ measures 44° more than twice its complement. =

$$2 \times (90-x)$$

$$180-x = 2(90-x) + 44$$

$$180-x = 180 - 2x + 44$$

$$180-x = 224 - 2x$$

$$-180 + 2x \quad -180 + 2x$$

$$x = 44$$

18. Add or subtract. Write the answer in lowest terms.

$$\frac{5x}{x+6} + \frac{3}{x-6} \quad \text{* rewrite with a common denominator}$$

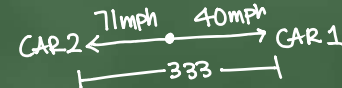
$$\frac{5x(x-6)}{(x+6)(x-6)} + \frac{3(x+6)}{(x-6)(x+6)}$$

$$\frac{5x^2 - 30x + 3x + 18}{(x-6)(x+6)}$$

$$\frac{5x^2 - 27x + 18}{(x-6)(x+6)} \rightarrow \text{top won't factor}$$

19. Solve the problem.

From a point on a straight road, two cars are driven in opposite directions, one at 40 miles per hour and the other at 71 miles per hour. In how many hours will they be 333 miles apart.



	r	t	d
CAR 1	40	x	40x
CAR 2	71	x	71x
			333

$$40x + 71x = 333$$

$$\frac{111x = 333}{111 \quad 111}$$

$$x = 3 \text{ hours}$$

20. Simplify

$$i = \sqrt{-1}$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

*repeats

$$i^5$$

$$i^5 = i \cdot i^4$$

$$= i(1)$$

$$= i$$

22. Graph the parabola. Identify the vertex, axis of symmetry, domain and range.

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

opens \curvearrowright^+

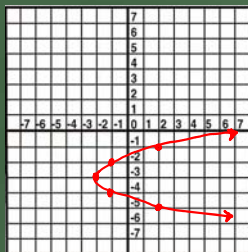
vertex $(-2, -3)$

axis: $y = -3$

domain $[-2, \infty)$

range $(-\infty, \infty)$

x	y
-2	-3
-1	-2
-1	-4
2	-1
2	-5



21. Solve the compound inequality.

$$-5 \leq 6x - 5 \text{ and } 2x + 2 < 10$$

intersection

$$\begin{array}{l} -5 \leq 6x - 5 \\ +5 \quad +5 \end{array}$$

$$\frac{0 \leq 6x}{6 \quad 6}$$

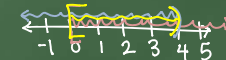
$$0 \leq x$$

$$\begin{array}{l} 2x + 2 < 10 \\ -2 \quad -2 \end{array}$$

$$\frac{2x < 8}{2 \quad 2}$$

$$x < 4$$

and



$$[0, 4)$$

23. If the following defines a one-to-one function, find its inverse. If not, write "Not one-to-one."

$$f(x) = 8x - 4$$

linear function
one-to-one

Inverse

$$x = 8y - 4$$

$$\frac{x+4}{8} = \frac{8y}{8}$$

$$\frac{1}{8}x + \frac{1}{2} = y$$

$$f^{-1}(x) = \frac{1}{8}x + \frac{1}{2}$$

24. Solve the compound inequality.

$$-4x \leq -12 \quad \text{or} \quad 9x - 6 < 3x$$

Union

$$-4x \leq -12$$

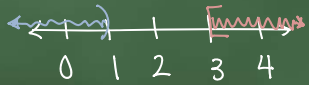
$$9x - 6 < 3x$$

$$-6 < -6x$$

$$x \geq 3$$

OR
Union

$$1 > x \quad \text{or} \quad x < 1$$



$$(-\infty, 1) \cup [3, \infty)$$

25. Find an equation of the line passing through the two points.

Write the equation in standard form.

$$(7, -5) \text{ and } (5, -2)$$

$x_1 \ y_1$

$x_2 \ y_2$

Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-2 - (-5)}{5 - 7} = \frac{-3}{-2}$$

Point-Slope

$$y - y_1 = m(x - x_1)$$

$$2(y + 5) = \left(-\frac{3}{2}(x - 7)\right)$$

$$2y + 10 = -3x + 21$$

$$+3x \quad -10 \quad +3x \quad -10$$

$$3x + 2y = 11$$

26. If the following defines a one-to-one function, find its inverse. If not, write "Not one-to-one."

$$f(x) = 10x^2 + 8$$

Quadratic Function



Not one-to-one

27. Simplify the expression. Assume that all variables represent positive real numbers.

$$(-216)^{-\frac{2}{3}}$$

$$\frac{1}{(-216)^{\frac{2}{3}}}$$

$$\frac{1}{(\sqrt[3]{-216})^2}$$

$$\frac{1}{(-6)^2} = \frac{1}{36}$$

28. Solve the problem. Round your answer to the nearest tenth, when appropriate.

A rock falls from a tower that is 73.5 m high. As it is falling, its height is given by the formula $h = 73.5 - 4.9t^2$. How many seconds will it take for the rock to hit the ground ($h = 0$).

$$0 = 73.5 - 4.9t^2$$

$$-73.5 = -4.9t^2$$

$$+15 = +t^2$$

$$t = \sqrt{15}, -\sqrt{15}$$

$$t = \sqrt{15}$$

$$t \approx 3.9 \text{ sec.}$$

time can't be negative

29. Simplify the expression. Assume that all variables represent positive real numbers.

$$\frac{5^{\frac{3}{4}} x^{\frac{-2}{3}} y^{\frac{3}{2}}}{x^{\frac{7}{3}} \cdot x^{\frac{2}{3}} y^{\frac{1}{4}}} = \frac{5^{\frac{3}{4}} y^{\frac{3}{2}}}{x^{\frac{9}{3}} y^{\frac{1}{4}}} = \frac{5^2 y^{\frac{3}{2}}}{x^3 y^{\frac{1}{4}}} = \frac{25 y^{\frac{5}{4}}}{x^3}$$

30. Graph the compound inequality.

$$2x + y < 6 \quad \text{or} \quad 3x - 2y > 5$$

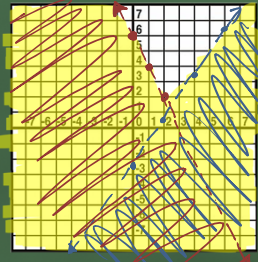
$$y < -2x + 6$$

dashed boundary
shade below

$$-2y > -3x + 5$$

$$y < \frac{3}{2}x - \frac{5}{2}$$

dashed boundary
shade below



31. Find an equation of the line, and write it in (a) slope-intercept form if possible and (b) standard form.

Through (5, -10); horizontal
 $y = b$

(a) slope-intercept

$$y = -10$$

(b) standard

$$y = -10$$

32. Write an equation for the line. Give the final answer in slope-intercept form.

Through (7,2) and (-1,-7)

Find the slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-7 - 2}{-1 - 7} = \frac{-9}{-8} = \frac{9}{8}$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = \frac{9}{8}(x - 7)$$

$$8y - 16 = 9x - 63$$

$$8y = 9x - 47$$

$$y = \frac{9}{8}x - \frac{47}{8}$$

33. Find any values of the variable for which the rational expression is undefined. Write answer with \neq .

$$\frac{x^2 - 81}{x^2 - 7x + 12}$$

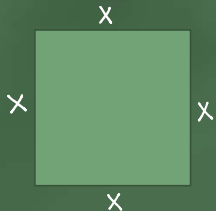
$$x^2 - 7x + 12 \neq 0$$

$$(x - 4)(x - 3) = 0$$

$$x \neq 4, x \neq 3$$

34. Use a formula to solve the problem.

A square plywood platform has a perimeter which is 8 times the length of a side, decreased by 12. Find the length of the side.



$$P = 4x \quad \text{and} \quad P = 8x - 12$$

$$4x = 8x - 12$$

$$-8x \quad -8x$$

$$-4x = -12$$

$$\div 4 \quad \div 4$$

$$x = 3$$

35. Factor completely. If the polynomial is prime, say so.

$$x^4 - 16$$

difference of squares

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

difference of squares

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

36. Multiply, then simplify the product. Assume that all variables represent positive real numbers.

$$(2 - 3\sqrt{2})^2$$
$$(2 - 3\sqrt{2})(2 - 3\sqrt{2})$$
$$4 - 6\sqrt{2} - 6\sqrt{2} + 9\sqrt{4}$$
$$4 - 12\sqrt{2} + 18$$
$$22 - 12\sqrt{2}$$

37. Factor completely. If the polynomial is prime, say so.

$$x^2 + 36$$

Sum of Squares

$$\text{Prime}$$

38. Determine whether the relation defines y as a function of x . Give the domain.

$$y = \sqrt{2x - 7}$$

Square root function

Domain

$$2x - 7 \geq 0$$
$$2x \geq 7$$
$$x \geq \frac{7}{2}$$

Domain $[\frac{7}{2}, \infty)$

39. Perform the indicated operation. Give answer in standard form.

$$(5 + 6i)(4 + 8i)$$
$$20 + 40i + 24i + 48i^2$$
$$20 + 64i + 48(-1)$$
$$20 + 64i - 48$$
$$-28 + 64i$$

40. Write the rational expression in lowest terms.

$$\frac{y^2 + 2y - 24}{y^2 - 2y - 48} \quad \text{Factor}$$

$$\frac{(y+6)(y-4)}{(y-8)(y+6)} = \boxed{\frac{y-4}{y-8}}$$

41. For the given pair of functions, find the requested function.

Let $f(x) = 2x^2 - 3x + 3$ and $g(x) = x - 1$; $(f \circ g)(x)$.

$$\begin{aligned} (f \circ g)(x) &= 2(x-1)^2 - 3(x-1) + 3 \\ &= 2(x^2 - 2x + 1) - 3x + 3 + 3 \\ &= 2x^2 - 4x + 2 - 3x + 6 \\ &= \boxed{2x^2 - 7x + 8} \end{aligned}$$

42. Find an equation of the line satisfying the conditions. Write the equation in slope-intercept form.

Through $(-3, 8)$; perpendicular to $-3x + 4y = -23$

$$y - y_1 = m(x - x_1)$$

$$y - 8 = -\frac{4}{3}(x + 3)$$

$$y - 8 = -\frac{4}{3}x - 4$$

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

Find Slope

$$4y = 3x - 23$$

$$y = \frac{3}{4}x - \frac{23}{4}$$

$$m = \frac{3}{4}$$

$$m_{\perp} = -\frac{4}{3}$$

43. Solve the system by substitution or elimination. If a system is inconsistent or has dependent equations, say so.

$$-5(x + 3y) = -115$$

$$5x + 2y = -2$$

$$-5x - 15y = -115$$

$$5x + 2y = -2$$

$$-13y = -117$$

$$y = 9$$

$$x + 3(9) = 23$$

$$x + 27 = 23$$

$$x = -4$$

$$\boxed{\{(-4, 9)\}}$$

44. Decide whether or not the ordered pair is a solution of the system.

$$\begin{array}{l} (6, -16) \\ y + 2x = -4 \\ x + y = -10 \end{array}$$

$-16 + 2(6) = -4$
 $-16 + 12 = -4$
 $-4 = -4$ ✓

$6 + (-16) = -10$
 $-10 = -10$ ✓

YES

45. For the polynomial function, find the requested value.

$$f(x) = 8x + 8; f(2)$$

$$\begin{aligned} f(2) &= 8(2) + 8 \\ &= 16 + 8 \\ &= 24 \end{aligned}$$

46. Find the slope of the line.

$$x = -10$$

horizontal line

Undefined Slope

47. Evaluate.

$$\begin{aligned} &\sqrt[3]{-64} \\ &-\sqrt[3]{64} \\ &\begin{array}{c} \swarrow \quad \searrow \\ 8 \quad 8 \\ \swarrow \quad \searrow \quad \swarrow \quad \searrow \\ (2 \cdot 2 \cdot 2) \quad (2 \cdot 2 \cdot 2) \end{array} \\ &\mathbf{-4} \end{aligned}$$

48. Graph the linear equation. Give the x - and y - intercepts.

$$2x + y = -4$$

x-intercept

Set $y=0$

$$2x + 0 = -4 \quad \boxed{(-2, 0)}$$

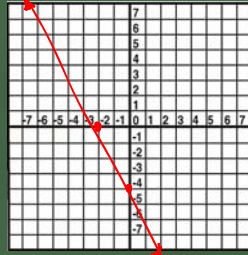
$$x = -2$$

y-intercept

Set $x=0$

$$2(0) + y = -4 \quad \boxed{(0, -4)}$$

$$y = -4$$



49. Write the expression in the form $a + bi$ (conjugate) $i^2 = -1$

$$\begin{aligned} & \overbrace{(6+2i)(9+3i)} \\ & \underbrace{(9-3i)(9+3i)} \end{aligned}$$

$$\frac{54 + 18i + 18i + 6i^2}{81 - 9i^2} = \frac{54 + 36i - 6}{81 + 9}$$

$$= \frac{48 + 36i}{90}$$

$$= \frac{8}{15} + \frac{36i}{90} = \frac{8}{15} + \frac{2i}{5} \quad \boxed{\frac{8}{15} + \frac{2i}{5}}$$

50. Express the radical in simplified form. Assume that all variables represent positive real numbers.

$$-\sqrt[3]{64x^4y^5}$$

$$\underbrace{x \cdot x \cdot x} \times \underbrace{y \cdot y \cdot y} \cdot y \cdot y$$

$$\boxed{-4xy^3\sqrt[3]{xy^2}}$$

51. Solve the system by substitution or elimination. If a system is inconsistent or has dependent equations, say so.

$$\begin{aligned} x - 4y &= 1 \\ x &= 4 + 4y \end{aligned}$$

$$4 + 4y - 4y = 1$$

$$4 \neq 1$$

False

No Solution
Inconsistent

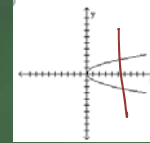
52. Solve, giving the correct solution to four decimal places. (Hint: Use logarithms.)

$$\log 14^x = \log 22$$
$$x \frac{\log 14}{\log 14} = \frac{\log 22}{\log 14}$$
$$x = \frac{\log 22}{\log 14} \approx 1.1713$$

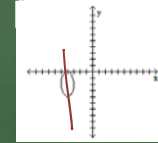
53. Provide an appropriate response.

Which one of the following is the graph of a function?

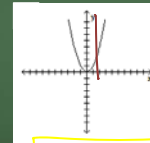
A)



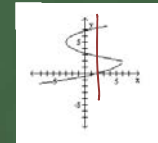
B)



C)



D)



FUNCTION

54. Write the number in scientific notation.

The earth is approximately 92,900,000 miles from the sun.

$$9.29 \times 10^7$$

55. Evaluate the composition of functions.

Let $f(x) = 7x + 4$ and $g(x) = x + 8$. Find $(f \circ g)(3)$.

$$(f \circ g)(3) = f(3+8)$$

$$= f(11) = 7(11) + 4$$

$$= 77 + 4$$

$$= 81$$

56. Evaluate the expression

$$4^{-1} + 3^{-1}$$

$$\frac{1}{4 \cdot 3} + \frac{1}{3 \cdot 4}$$

$$\frac{3}{12} + \frac{4}{12}$$

$$\boxed{\frac{7}{12}}$$

57. Multiply or divide as indicated. Write the answer in lowest terms.

$$\frac{2t^2 - 5t - 12}{3t^2 - 3t - 6} \cdot \frac{3(t^2 + 4t - 12)}{3t^2 + 12t - 36}$$

$\begin{matrix} -24 & \wedge & \text{sum} \\ -8 & & -5 \\ 2 & \boxed{\frac{3}{2}} & \\ -4 & & \\ 1 & & \end{matrix}$

$$\frac{(t-4)(2t+3)}{3(t-2)(t+1)} \cdot \frac{3(t+6)(t-2)}{(t+6)(t-4)}$$

$$\boxed{\frac{2t+3}{t+1}}$$

58. Simplify. Write the answer using only positive exponents. Assume all variables represent nonzero numbers.

$$\frac{(x^{-6})^{-6}(x^{-1}y)^3}{(xy^{-6})^3}$$

$$\frac{X^{36} \cdot X^{-3} y^3}{X^3 y^{-18}}$$

$$\frac{X^{36} y^3 y^{18}}{X^3 X^3} = \frac{X^{36} y^{21}}{X^6} = \boxed{X^{30} y^{21}}$$

59. Solve the inequality. Write the solution set in interval notation and graph it.

$$6x - 6 > 2(2x + 2)$$

$$6x - 6 > 4x + 4$$

$$2x - 6 > 4$$

$$\frac{2x}{2} > \frac{10}{2}$$

$$x > 5$$

$$\boxed{(5, \infty)}$$



60. Find the vertex of the parabola. (complete the square or vertex formula)

$$f(x) = 4x^2 - 32x + 61$$

Complete the Square

OR

vertex formula

$$f(x) = (4x^2 - 32x) + 61$$

$$f(x) = 4(x^2 - 8x + 16) + 61 - 64$$

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

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

Vertex (4, -3)

$$x = \frac{-b}{2a}$$

$$x = \frac{-(-32)}{2(4)} = 4$$

$$f(4) = 4(16) - 128 + 61 = -3$$

61. Multiply or divide as indicated. Write the answer in lowest terms.

$$\frac{z^2 + 13z + 36}{z^2 + 17z + 72} \div \frac{z^2 + 4z}{z^2 + 14z + 48}$$

COPY • FLIP

$$\frac{(z+9)(z+4)}{(z+8)(z+9)} \cdot \frac{(z+6)(z+8)}{z(z+4)}$$

$$\frac{z+6}{z}$$

62. Solve by using the square root property.

$$\sqrt{(9x+9)^2} = \pm\sqrt{49}$$

$$9x+9 = \pm 7$$

$$9x+9 = 7$$

$$9x+9 = -7$$

$$9x = -2$$

$$9x = -16$$

$$x = \frac{-2}{9}$$

$$x = \frac{-16}{9}$$

$\left\{ \frac{-16}{9}, \frac{-2}{9} \right\}$

63. Solve the problem.

A woman has \$1.70 in dimes and nickels. She has 5 more dimes than nickels. How many nickels does she have?

Item	#	Value	Total
dimes	x+5	0.10	0.1(x+5)
nickels	x	0.05	0.05x

$$0.1(x+5) + 0.05x = 1.70$$

$$0.1x + 0.5 + 0.05x = 1.70$$

$$0.15x + 0.5 = 1.70$$

$$\frac{0.15x}{0.15} = \frac{1.2}{0.15}$$

x = 8 nickels

64. Graph the inequality or compound inequality.

$$6x + 3y > -2$$

Solve for y.

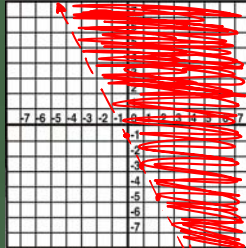
$$\cancel{6x} + 3y > -2$$

$$\cancel{-6x} \quad \quad \quad -6x$$

$$\frac{3y}{3} > \frac{-6x - 2}{3} \quad \frac{-6x}{3} \quad \frac{-2}{3}$$

$$y > -2x - \frac{2}{3}$$

dashed
shade above



65. Solve the equation.

$$\frac{1}{x-1} + \frac{4}{2x-2} = 3 \quad x \neq 1$$

$$\frac{1 \cdot 2}{(x-1) \cdot 2} + \frac{4}{2(x-1)} = \frac{3 \cdot 2(x-1)}{1 \cdot 2(x-1)}$$

$$2 + 4 = 6(x-1)$$

$$\underset{+6}{6} = \underset{+6}{6x} - \underset{+6}{6}$$

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

$$2 = x$$

{2}

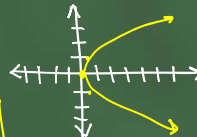
66. Determine whether the relation defines y as a function of x.
Give the domain.

$$y^2 = 5x$$

Not a function.

x	y
0	0
1/5	1
4/5	2
1/5	-1
4/5	-2

domain
[0, ∞)



67. Solve the problem.

$$d = rt \quad t = \frac{d}{r}$$

A plane flies 410 miles with the wind and 350 miles against the wind in the same length of time. If the speed of the wind is 30 mph, what is the speed of the plane in still air? → x

	r	t	d
w/wind	x+30	$\frac{410}{x+30}$	410
against	x-30	$\frac{350}{x-30}$	350

Same

$$\frac{410}{x+30} = \frac{350}{x-30}$$

$$410(x-30) = 350(x+30)$$

$$410x - 12300 = 350x + 10500$$

$$-350x + 12300 \quad -350x + 12300$$

380 miles per hour

$$60x = 22800$$

$$x = 380$$

68. Solve the equation for the indicated variable. (Leave \pm in your answer, when appropriate.)

$$c^2 + \frac{d^2}{-d^2} + \frac{f^2}{-f^2} = g^2, \text{ for } c.$$

$$\sqrt{c^2 \pm g^2 - d^2 - f^2}$$

$$c = \pm \sqrt{g^2 - d^2 - f^2}$$

69. Solve the equation.

$$x^2 - x = 56$$

$$x^2 - x - 56 = 0$$

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

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

$$\{-7, 8\}$$

70. Simplify. Assume that all variables represent positive real numbers.

$$\frac{-33(\sqrt{13}-\sqrt{2})}{(\sqrt{13}+\sqrt{2})(\sqrt{13}-\sqrt{2})}$$

$$\frac{-33(\sqrt{13}-\sqrt{2})}{13-2}$$

$$\frac{-33(\sqrt{13}-\sqrt{2})}{11} = -3(\sqrt{13}-\sqrt{2})$$

71. Solve the equation.

$$36x^4 - 85x^2 + 49 = 0$$

$$u = x^2$$

$$36u^2 - 85u + 49 = 0$$

$$(u-1)(36u-49) = 0$$

$$u=1 \quad u = \frac{49}{36}$$

$$x^2 = 1 \Rightarrow x = \pm 1$$

$$x^2 = \frac{49}{36} \Rightarrow x = \pm \frac{7}{6}$$

$$\{-\frac{7}{6}, -1, 1, \frac{7}{6}\}$$

72. Graph the linear equation. Give the x - and y - intercepts.

$$x + 4 = 0$$

$$x = -4$$

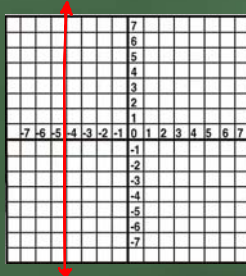
vertical line

x -intercept

$$(-4, 0)$$

y -intercept

none



73. Solve the equation.

$$\frac{-4}{m-4} - \frac{4}{m+4} = \frac{8}{m^2-16}$$

$$m \neq -4, 4$$

$$\frac{-4(m+4)}{(m-4)(m+4)} - \frac{4(m-4)}{(m+4)(m-4)} = \frac{8}{(m-4)(m+4)}$$

$$-4(m+4) - 4(m-4) = 8$$

$$-4m - 16 - 4m + 16 = 8$$

$$-8m = 8$$

$$m = -1$$

$$\{-1\}$$

74. Solve the problem.

Thompsons Hardware spent \$44,820 this year on utility costs alone. If total sales were \$432,000, what percent of total sales was spent on utility costs? Round to the nearest tenth of a percent, if necessary.

$$\text{percent} = \frac{\text{partial amount}}{\text{base}}$$

$$\text{percent} = \frac{44,820}{432,000}$$

$$\text{Percent} = 0.10375 \approx 10.4\%$$

75. Solve the equation.

$$\frac{(2x-5)}{5} - \frac{4x+2}{4}$$

$$4(2x-5) = 5(4x+2)$$

$$8x - 20 = 20x + 10$$

$$-50 = 12x$$

$$-\frac{25}{6} = x$$

$$\left\{-\frac{25}{6}\right\}$$

76. Solve the inequality and graph the solution set.

$$-3x + 5(x - 2) \geq 7x - (5 + 2x) - 14$$

$$-3x + 5x - 10 \geq 7x - 5 - 2x - 14$$

$$\frac{2x}{-2x} - 10 \geq \frac{5x}{-2x} - 19$$

$$\frac{2}{3} \geq \frac{3x}{3}$$

$$2 \geq 3x \quad \text{OR} \quad \boxed{x \leq 3}$$



77. Solve the equation.

Common denom - WIPE OUT

$$\frac{2(x+3)}{3x(x+3)} - \frac{3 \cdot 3x}{3x(x+3)} = \frac{1 \cdot 3x(x+3)}{3x(x+3)} \quad x \neq 0, -3$$

$$\frac{2(x+3)}{3x(x+3)} - \frac{3 \cdot 3x}{3x(x+3)} = \frac{3x(x+3)}{3x(x+3)} \quad \text{WIPE OUT}$$

$$2x + 6 - 9x = 3x^2 + 9x$$

$$\frac{-7x + 6}{+7x - 6} = \frac{3x^2 + 9x}{+7x - 6}$$

$$\overset{-18}{\wedge} \text{sum } \overset{16}{\text{}} \quad \textcircled{3x^2 + 16x - 6} = 0$$

$$\boxed{x = \frac{-8 \pm \sqrt{82}}{3}}$$

$$x = \frac{-16 \pm 2\sqrt{82}}{6 \cdot 3}$$

$$x = \frac{-16 \pm \sqrt{(16)^2 - 4(3)(-6)}}{2(3)}$$

$$x = \frac{-16 \pm \sqrt{256 + 72}}{6}$$

$$x = \frac{-16 \pm \sqrt{328}}{6}$$

78. Solve the problem.

Mardi received an inheritance of \$70,000. She invested part at 7% and deposited the remainder in tax-free bonds at 8%. Her total from the investments was \$5,200. Find the amount invested at 7%.

P	r	t	I
x	0.07	1	0.07x
70000-x	0.08	1	0.08(70000-x)
			5200

$$0.07x + 0.08(70000 - x) = 5200$$

$$0.07x + 5600 - 0.08x = 5200$$

$$\frac{-0.01x}{-0.01} + \frac{5600}{-0.01} = \frac{5200}{-0.01}$$

$$-x + 5600 = -5200$$

$$x = 40,000$$

$\boxed{\$40,000 @ 7\%}$

79. Solve the equation.

$$4 - (x - 2) = -5x + 4(x + 4)$$

$$4 - x + 2 = -5x + 4x + 16$$

$$\frac{-x + 6}{+x} = \frac{-x + 16}{+x}$$

$$6 = 16$$

False

$\boxed{\text{No Solution}}$

80. Solve the problem.

In the previous baseball season, team A won the most games of any major league team. Team A won 9 less than twice as many games as they lost. They played 162 regular-season games. How many wins and losses did team A have?

$$\begin{aligned} \text{win} &= 2x - 9 \\ \text{loss} &= x \end{aligned}$$

$$2x - 9 + x = 162$$

$$3x - 9 = 162$$

$$3x = 171$$

$$x = 57$$

57 losses
105 wins

81. Solve the equation.

$$\frac{x}{14} + \frac{4.2(x-6)}{7.2} = \frac{2(x-6)}{7.2}$$

$$\frac{x}{14} + \frac{8}{14} = \frac{2(x-6)}{14}$$

$$\begin{array}{r} x+8 = 2x-12 \\ -x \quad -x \end{array}$$

$$\begin{array}{r} 8 = x-12 \\ +12 \quad +12 \end{array}$$

$$20 = x$$

{20}

82. Solve the problem.

A plane flies 440 miles with the wind and 320 miles against the wind in the same length of time. If the speed of the wind is 30 mph, what is the speed of the plane in still air? =x

	r	t	d
w/wind	x+30	$\frac{440}{x+30}$	440
against	x-30	$\frac{320}{x-30}$	320

Same

$$r = \frac{d}{t}$$

$$\frac{440}{x+30} = \frac{320}{x-30}$$

$$440(x-30) = 320(x+30)$$

$$440x - 13200 = 320x + 9600$$

$$-320x + 13200 \quad -320x + 13200$$

$$\frac{120x}{120} = \frac{22800}{120}$$

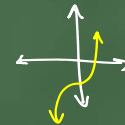
$$x = 190$$

190 mph

83. If the following defines a one-to-one function, find its inverse. If not, write "Not one-to-one."

$$f(x) = x^3 - 10$$

one-to-one



* swap x and y → solve for y

$$\begin{array}{r} x = y^3 - 10 \\ +10 \quad +10 \\ \sqrt[3]{x+10} = \sqrt[3]{y^3} \end{array}$$

$$y = \sqrt[3]{x+10}$$

$$f^{-1}(x) = \sqrt[3]{x+10}$$

84. Use the quadratic formula to solve the equation.

$$7x^2 - 3x + 4 = 0$$

$$a=7 \quad b=-3 \quad c=4$$

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4(7)(4)}}{2(7)}$$

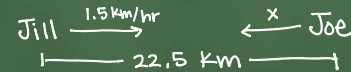
$$x = \frac{3 \pm \sqrt{9 - 112}}{14}$$

$$x = \frac{3 \pm \sqrt{-103}}{14}$$

$$\left\{ \frac{3 \pm i\sqrt{103}}{14} \right\}$$

85. Solve the problem.

Jill is 22.5 km away from Joe. Both begin to walk toward each other at the same time. Jill walks at 1.5 km per hour. If they meet in 5 hours, how fast is Joe walking?



	r	t	d
Jill	1.5	5	7.5
Joe	x	5	5x
			22.5

$$7.5 + 5x = 22.5$$

$$-7.5 \quad -7.5$$

$$5x = \frac{15}{5}$$

$$x = 3$$

$$\text{Joe} = 3 \text{ km/hr}$$

86. Sketch the graph of the parabola.

$$y = 2x^2 - 8x + 7$$

Opens up $\uparrow\uparrow$

Vertex: $x = \frac{-b}{2a}$

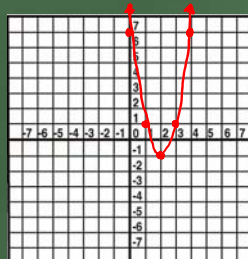
$$x = \frac{-(-8)}{2(2)} = 2$$

$$(2, -1)$$

$$y = 2(2)^2 - 8(2) + 7$$

$$y = 8 - 16 + 7 = -1$$

x	y
2	-1
1	1
3	1
0	7
4	7

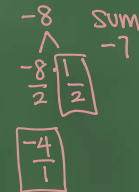


87. Factor completely. If the polynomial is prime, say so.

$$12y^4 - 42y^3 - 24y^2$$

$$6y^2(2y^2 - 7y - 4)$$

$$6y^2(y-4)(2y+1)$$



88. Solve the equation.

$$\frac{5}{4} + \sqrt{\frac{1}{4} + \frac{42}{1.4}} = 7 + \frac{3}{4}$$

$$\frac{5}{4} + \sqrt{\frac{169}{4}} = \frac{28}{4} + \frac{3}{4}$$

$$\frac{5}{4} + \frac{13}{2} = \frac{31}{4}$$

$$\frac{31}{4} = \frac{31}{4} \checkmark$$

$$35 + \sqrt{49} = 7 + 21$$

$$35 + 7 = 28$$

$$42 = 28 \text{ false}$$

$$5x + \sqrt{x+42} = 7 + 3x$$

$$\sqrt{x+42} = (7-2x)^2$$

$$x+42 = 49 - 28x + 4x^2$$

$$0 = 4x^2 - 29x + 7$$

$$0 = (4x-1)(x-7)$$

$$x = \frac{1}{4} \quad x = 7$$

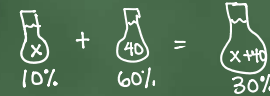
check

$\left\{ \frac{1}{4} \right\}$

$\begin{array}{r} 28 \text{ SUM} \\ -29 \\ \hline -1 \\ \frac{-28}{4} \\ \hline -7 \\ 1 \end{array}$

89. Solve the problem.

How many liters of a 10% alcohol solution must be mixed with 40 liters of a 60% solution to get a 30% solution?



$$0.1x + 0.6(40) = 0.3(x+40)$$

$$0.1x + 2.4 = 0.3x + 1.2$$

$$-0.1x \quad -1.2 \quad -0.1x \quad -1.2$$

$$1.2 = 0.2x$$

$$0.2 \quad 0.2$$

$$6 = x$$

6 liters

90. Perform the indicated operation and express in lowest terms.

$$\frac{z^2 + 10z + 21}{z^2 + 12z + 35} \div \frac{z^2 + 3z}{z^2 - 2z - 35} \quad \text{COPY \cdot FLIP (Factor)}$$

$$\frac{(z+7)(z+3)}{(z+7)(z+5)} \cdot \frac{(z-7)(z+5)}{z(z+3)}$$

$\frac{z-7}{z}$

91. Solve the equation.

$$6x + 7(3x - 2) = 16 - 3x$$

$$6x + 21x - 14 = 16 - 3x$$

$$27x - 14 = 16 - 3x$$

$$+3x \quad +3x$$

$$30x - 14 = 16$$

$$+14 \quad +14$$

$$\frac{30x}{30} = \frac{30}{30}$$

$$x = 1$$

$\{ 1 \}$

92. Solve the equation. Give the exact solution or solutions.

$$\log(x + 4) = \log(2x - 5)$$

$$\cancel{x} + 4 = 2x - \cancel{5}$$

$$4 = x - \cancel{5}$$

$$9 = x \rightarrow \text{check}$$

$$\{9\}$$

93. Perform the indicated operations.

$$\frac{30x^3 + 40x^2 - 15x + 4}{5x}$$

$$\frac{30x^3}{5x} + \frac{40x^2}{5x} - \frac{15x}{5x} + \frac{4}{5x}$$

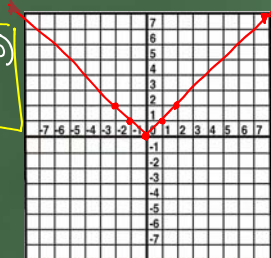
$$6x^2 + 8x - 3 + \frac{4}{5x}$$

94. Graph the function. Give the domain and range.

$$f(x) = |x| \quad \text{absolute value graph}$$

x	f(x)
0	0
1	1
2	2
-1	1
-2	2

$$\text{domain: } (-\infty, \infty)$$
$$\text{range: } [0, \infty)$$



95. Solve the problem.

$$r = \frac{1}{t}$$

Martha can rake the leaves in her yard in 2 hours. Her younger brother can do the job in 3 hours. How long will it take them to do the job if they work together?

$$3 \cdot \frac{1}{2}x + 2 \cdot \frac{1}{3}x = \frac{1}{1} \cdot 6$$

$$\frac{3x}{6} + \frac{2x}{6} = \frac{6}{6} \quad \text{WIPE OUT}$$

$$5x = 6$$

$$x = \frac{6}{5} \text{ hours}$$

96. Solve the equation.

$$\sqrt{2x-4} - 10 = 0$$

$$(\sqrt{2x-4})^2 = (10)^2$$

$$2x-4 = 100$$

$$2x = 104$$

$$x = 52 \quad \text{check}$$

$$\{52\}$$

$$\sqrt{2(52)-4} - 10 = 0$$

$$\sqrt{100} - 10 = 0$$

$$10 - 10 = 0$$

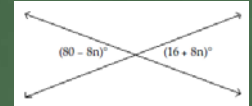
$$0 = 0$$

✓

97. Solve the problem.

Find the measure of the vertical angles.

vertical angles are equal



$$80 - 8n = 16 + 8n$$

$$+8n \quad +8n$$

$$80 = 16 + 16n$$

$$-16 \quad -16$$

$$\frac{64}{16} = \frac{16n}{16}$$

$$4 = n$$

$$80 - 8(4)$$

$$80 - 32$$

$$48^\circ$$

$$16 + 8(4)$$

$$16 + 32$$

$$48^\circ$$

98. Graph the function. Give the equation of its vertical and horizontal asymptotes.

$$f(x) = \frac{1}{x-3}$$

x	f(x)
3	undef.
4	1
5	1/2
6	1/3
3 1/2	2
3 1/3	3

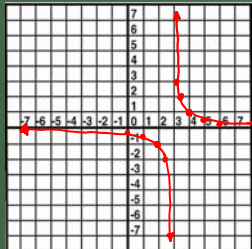
x	f(x)
2	-1
1	-1/2
0	-1/3
2 1/2	-2
2 2/3	-3

V.A.

$$x = 3$$

H.A.

$$y = 0$$



99. Solve the equation by factoring.

$$5x^2 - 7x = 0$$

$$x(5x-7) = 0$$

$$\downarrow \quad \downarrow$$

$$x=0 \quad 5x-7=0$$

$$5x = 7$$

$$x = \frac{7}{5}$$

$$\left\{0, \frac{7}{5}\right\}$$

100. Solve the system by graphing.

$$\begin{aligned} 6x + y &= -32 \\ x + 6y &= 18 \end{aligned}$$

$$\begin{aligned} 6x + y &= -32 \\ y &= -6x - 32 \end{aligned}$$

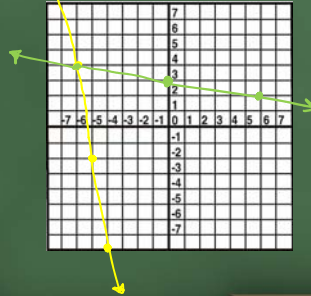
(because the y-int is off the graph use a t-chart)

x	y
-5	-2
-6	4
-4	-8

$$x + 6y = 18$$

x	y
0	3
6	2
-6	4

$$\{(-6, 4)\}$$



101. Simplify. Assume that all variables represent positive real numbers.

$$4\sqrt{5} + 9\sqrt{125}$$

$$\begin{array}{c} \wedge \\ 5 \quad 25 \\ \textcircled{55} \end{array}$$

$$4\sqrt{5} + 45\sqrt{5}$$

$$49\sqrt{5}$$

102. Solve the problem.

A rectangular Persian carpet has a perimeter of 184 inches. The length of the carpet is 18 inches more than the width. What are the dimensions of the carpet?

$$\begin{array}{l} P = 184 \text{ in} \\ x \\ x + 18 \end{array}$$

$$P = 2L + 2W$$

$$184 = 2(x + 18) + 2x$$

$$184 = 2x + 36 + 2x$$

$$184 = 4x + 36$$

$$148 = 4x$$

$$37 = x$$

$$\begin{array}{l} \text{width} = 37 \text{ in} \\ \text{length} = 55 \text{ in} \end{array}$$

103. Perform the indicated operations. (Hint: Use long division.)

$$(2x^3 - 5x^2 - 7x - 12) \div (x - 4)$$

$$\begin{array}{r} 2x^2 + 3x + 5 \\ x-4 \overline{) 2x^3 - 5x^2 - 7x - 12} \\ \underline{\ominus 2x^3 + 8x^2} \\ 3x^2 - 7x \\ \underline{\ominus 3x^2 + 12x} \\ 5x - 12 \\ \underline{\ominus 5x + 20} \\ 8 \end{array}$$

$$2x^2 + 3x + 5 + \frac{8}{x-4}$$

104. Evaluate the expression.

$$-11^0$$

* any non-zero base raised to the zero power equals 1.

(the negative is not included to the power in this problem.)

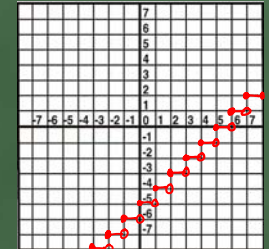
$$\boxed{-1}$$

105. Graph the step function.

$$f(x) = \lceil x - 5 \rceil$$

↳ Step function

x	f(x)	x	f(x)
0	-5	0.5	-4
1	-4	1.5	-3
2	-3	2.5	-2
3	-2	⋮	⋮
4	-1		
5	0		
6	1		



106. For the given pair of functions, find the requested function.

$$f(x) = 10x^2 + 17x + 6 \text{ and } g(x) = 2x^2 + 14x - 7; (f - g)(x)$$

$$\begin{aligned} (f-g)(x) &= (10x^2 + 17x + 6) - (2x^2 + 14x - 7) \\ &= 10x^2 + 17x + 6 - 2x^2 - 14x + 7 \\ &= \boxed{8x^2 + 3x + 13} \end{aligned}$$

107. Solve the problem involving consecutive integers.

If the first and third of three consecutive odd integers are added, the result is 45 less than five times the second integer. Find the third integer.

$$\#1 = x$$

$$\#2 = x+2$$

$$\#3 = x+4$$

$$x + x + 4 = 5(x+2) - 45$$

$$2x + 4 = 5x + 10 - 45$$

$$\begin{array}{r} 2x + 4 = 5x - 35 \\ -2x + 35 \quad -2x + 35 \\ \hline 39 = 3x \end{array}$$

$$\frac{39}{3} = \frac{3x}{3}$$

$$13 = x$$

$$\#3 = 13 + 4$$

$$= \boxed{17}$$

108. Factor

$$y^3 - 343$$

difference of cubes \triangleleft

$$(y-7)(y^2+7y+49)$$

109. Simplify the complex fraction.

$$\frac{a^{-2} - b^{-1}}{8a^{-1} + 3b^{-2}}$$

$$\begin{aligned} \frac{\frac{1}{a^2} - \frac{1}{b}}{\frac{8}{a} + \frac{3}{b^2}} &= \left(\frac{1 \cdot b}{a^2 \cdot b} - \frac{1 \cdot a}{b \cdot a} \right) \div \left(\frac{8 \cdot b^2}{a \cdot b^2} + \frac{3 \cdot a}{b^2 \cdot a} \right) \\ &= \frac{b-a^2}{a^2b} \div \frac{8b^2+3a}{ab^2} \quad \text{COPY \cdot FLIP} \\ &= \frac{b-a^2}{a^2\cancel{b}} \cdot \frac{\cancel{ab^2}}{8b^2+3a} = \frac{b(b-a^2)}{a(8b^2+3a)} \end{aligned}$$

110. Find the distance between the points.

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (-3, 8) & & (1, 5) \end{matrix}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(1 - (-3))^2 + (5 - 8)^2}$$

$$d = \sqrt{(4)^2 + (-3)^2}$$

$$d = \sqrt{16 + 9} = \sqrt{25} = 5 \text{ units}$$

111. Solve for the indicated variable.

$$2 \cdot A = \frac{h(B+b)}{2} \quad \text{for } B$$

$$\frac{2A}{h} = \frac{h(B+b)}{h}$$

$$\frac{2A}{h} - b = \frac{h(B+b)}{h} - b$$

$$B = \frac{2A}{h} - b$$

$$\frac{2A}{h} - b = B$$

112. Simplify the expression. Assume that all variables represent positive real numbers.

$$\left(\frac{x^{-7}y^{-3}}{x^{-4}y^5}\right)^{-\frac{3}{5}}$$

*bring outside exponent in.

$$x^{\frac{21}{5}} y^{\frac{9}{5}}$$

$$x^{\frac{12}{5}} y^{-3}$$

$$x^{\frac{21}{5}-\frac{12}{5}} y^{\frac{9}{5}+(-3)}$$

$$x^{\frac{9}{5}} y^{-\frac{24}{5}}$$

113. Perform the indicated operation. Give answer in standard form.

$$(-5 + 2i) - (6 + 3i) - 11i$$

$$-5 + 2i - 6 - 3i - 11i$$

$$-11 - 12i$$

114. Solve the equation.

$$7(x + 7) = (7x - 49)$$

$$\cancel{7x} + 49 = \cancel{7x} - 49$$

$$49 = -49$$

False

No Solution

115. Solve the equation. Give the exact solution.

$$3^x = \frac{1}{81}$$

rewrite with the same base.

$$3^x = 3^{-4}$$

$$x = -4$$

$$\{-4\}$$

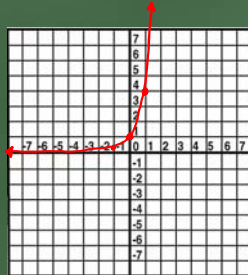
116. Graph the function.

$$f(x) = 4^x$$

x	f(x)
0	1
1	4
2	16
-1	1/4
-2	1/16

Domain:
 $(-\infty, \infty)$

Range:
 $(0, \infty)$



117. Solve the equation

$$\log_{\frac{1}{4}} x = -3$$

*write in exponential form

$$\left(\frac{1}{4}\right)^{-3} = x$$

$$\left(\frac{4}{1}\right)^3 = x$$

$$64 = x$$

$$\boxed{\{64\}}$$

118. Factor the polynomial completely.

$$49x^2 - 16$$

difference of two squares

$$\boxed{(7x-4)(7x+4)}$$

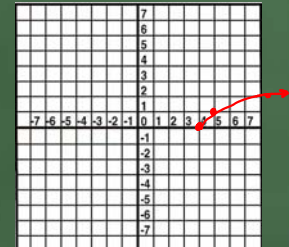
119. Graph the function and give its domain and its range.

$$f(x) = \sqrt{x-4}$$

x	f(x)
4	0
5	1
8	2
13	3

domain:
 $[4, \infty)$

range:
 $[0, \infty)$



120. Use properties of logarithms to write each expression as a single logarithm. Assume that variables represent positive real numbers, with base $\neq 1$.

$$5 \log_b t - \frac{2}{5} \log_b s + \frac{1}{2} \log_b v - 2 \log_b u$$

$$\log_b t^5 - \log_b s^{\frac{2}{5}} + \log_b v^{\frac{1}{2}} - \log_b u^2$$

$$\log_b \frac{t^5 v^{\frac{1}{2}}}{s^{\frac{2}{5}} u^2}$$

121. Add or subtract as indicated. Write the answers in lowest terms.

$$\frac{(x^2-4x+16)7}{(x^2-4x+16)(x+4)} + \frac{4(x+4)}{x^2-4x+16} - \frac{336}{\frac{x^3+64}{(x+4)(x^2-4x+16)}}$$

$$\frac{7x^2-28x+112+4x+16-336}{(x+4)(x^2-4x+16)}$$

$$\begin{array}{r} -1568 \\ \wedge \\ -56 \cdot 28 \\ \hline 7 \quad 7 \end{array} \quad \begin{array}{l} \text{sum} \\ -24 \end{array}$$

$$\frac{7x^2-24x-224}{(x+4)(x^2-4x+16)} =$$

122. Simplify the complex fraction.

$$\frac{\frac{25s^2-49t^2}{st}}{\frac{5}{t}-\frac{7}{s}} \quad \text{Rewrite as a division problem.}$$

$$\left(\frac{25s^2-49t^2}{st} \right) \div \left(\frac{5s-7t}{t \cdot s} \right)$$

$$\frac{(5s-7t)(5s+7t)}{st} \div \frac{5s-7t}{st} \quad (\text{copy \cdot flip})$$

$$\frac{(5s-7t)(5s+7t)}{st} \cdot \frac{st}{(5s-7t)} = 5s+7t$$

123. Evaluate the expression.

$$\lceil -20.7 \rceil$$

↳ Greatest Integer less than or equal to -20.7

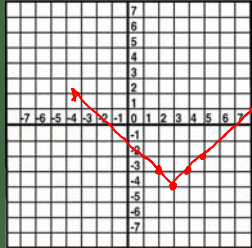
$$-21$$

124. Graph the function.

Absolute Value
function

$$f(x) = |x - 3| - 4$$

x	f(x)
3	-4
4	-3
5	-2
2	-3
1	-2



125. Simplify the complex fraction.

$$\frac{\frac{1}{a^2} - \frac{1}{b}}{\frac{6}{a} + \frac{5}{b^2}} = \frac{\frac{1 \cdot b}{a^2 \cdot b} - \frac{1 \cdot a^2}{b \cdot a^2}}{\frac{6 \cdot b^2}{a \cdot b^2} + \frac{5 \cdot a}{b^2 \cdot a}}$$
$$= \frac{b - a^2}{a^2 b} \div \frac{6b^2 + 5a}{ab^2}$$
$$= \frac{b - a^2}{a^2 b} \cdot \frac{ab^2}{6b^2 + 5a} = \frac{b(b - a^2)}{6b^2 + 5a}$$