1. Solve the system of equations.
$$2x + y = 12$$
$$4x - 4y = -24$$
   a) (-2, 16)
   b) (2, -8)
   c) (2, -4)
   d) (2, 8)
   e) (2, 16)

2. Given $g(x) = x^2 + 1$, evaluate $g(x + h)$.
   a) $x^2 + h + 1$
   b) $x^2 + h^2 + 1$
   c) $x^2 + 1 + x + h$
   d) $x^2 - 2xh + h^2 + 1$
   e) $x^2 + 2xh + h^2 + 1$

3. Simplify $\dfrac{x^3}{2-x} \div \dfrac{x}{-2x+4}$

   a) x^2

   b) $2x^2$

   c) $-2x^2$

   d) $\dfrac{x^2(-2x+4)}{2-x}$

   e) $\dfrac{x^4}{(2-x)(-2x+4)}$

4. Write the equation of the line passing through $(-3, 2)$ and perpendicular to the line $4x - y = -3$ in slope-intercept form.

   a) $y = -4x - \dfrac{11}{4}$

   b) $y = -\dfrac{1}{4}x - \dfrac{11}{4}$

   c) $y = -\dfrac{1}{4}x + \dfrac{11}{4}$

   d) $y = -\dfrac{1}{4}x + \dfrac{5}{4}$

   e) $y = 4x + 10$

5. Find the midpoint of the line segment $\overline{AB}$ where the points A and B are $A(-4,-3)$ and $B(4,0)$.

   a) $\left(-4, -\frac{3}{2}\right)$

   b) $\left(-2, -\frac{3}{2}\right)$

   c) $\left(-\frac{3}{2}, 0\right)$

   d) $(0, -3)$

   e) $\left(0, -\frac{3}{2}\right)$

6. Write the equation of the line parallel to $-3x - 2y = 1$ passing through the point $(-2,5)$ in standard form.

   a) $3x + y = -1$
   b) $3x - y = 1$
   c) $3x + 2y = 4$
   d) $3x - 2y = 4$
   e) $3x - 2y = 1$

7. Solve the inequality. Write the solution set in interval notation.
$$-4 < \frac{x-7}{5} \leq -2$$

   a) $(-20, -10]$
   b) $(-13, -3]$
   c) $(-13, -3)$
   d) $[-3, -13)$
   e) $(15, 25]$

8. Given that the point $(-2,4)$ is the midpoint of a line segment and $(-4,7)$ is one of the endpoints, find the second endpoint.

   a) $(-1, 2)$
   b) $(0, -1)$
   c) $(0, 1)$
   d) $(4, 1)$
   e) $(8, 1)$

9. Simplify the radical expression.

$$\sqrt[3]{135} - \sqrt[3]{320}$$

    a) $-\sqrt[3]{5}$

    b) $\sqrt[3]{5}$

    c) $7\sqrt[3]{5}$

    d) $\sqrt[3]{185}$

    e) $5\sqrt[3]{3} - 5\sqrt[3]{4}$

10. Find the distance between the points $(-6, -3)$ and $(2, 4)$.

    a) 3

    b) $\sqrt{15}$

    c) $\sqrt{17}$

    d) $\sqrt{113}$

    e) 113

11. Two functions f and g are related by the given equation. Use the numerical representation of f to make a numerical representation of g.

$$g(x) = f(x-1) + 3$$

x	7	8	9	10	11
$f(x)$	19	21	23	25	27

a)

x	20	7	8	9	10
$g(x)$	22	24	26	28	30

b)

x	8	9	10	11	12
$g(x)$	16	18	20	22	24

c)

x	6	7	8	9	10
$g(x)$	22	24	26	28	30

d)

x	8	9	10	11	12
$g(x)$	22	24	26	28	30

e)

x	6	7	8	9	10
$g(x)$	16	18	20	22	24

12. Simplify the expression.

$$\frac{x}{2x+3} \cdot \frac{x+3}{5}$$

a) $\frac{1}{5}$

b) $\frac{x}{5}$

c) $\frac{x}{10}$

d) $\frac{2x+3}{2x+8}$

e) $\frac{x^2+3x}{10x+15}$

13. From the airport you decided to take an UberX to your hotel which has an initial fee of $0.40 to which a charge of $0.97 per mile is added. Later when going out to dinner you decide to take an UberSELECT which has an initial fee of $4.02 to which a charge of $2.17 per mile is added. Find an equation, for each type of Uber, that can be used to determine the cost, $C(x)$, of an x-mile Uber ride. Use these equations to determine the total cost of both Uber rides, not including tip, if the mileage from the airport to the hotel is 12 miles and the dinner trip was a total of 6 miles.

    a) $27.58

    b) $29.08

    c) $36.28

    d) $42.10

    e) $60.94

14. Solve for x.
$$x = \sqrt{4x + 5}$$

    a) $(-5,1)$

    b) $(-1, 5)$

    c) $-\dfrac{5}{3}$

    d) $-\dfrac{5}{4}$

    e) 5

15. Simplify.
$$\left(a^3 b^{-1} c^{\frac{1}{2}}\right)^2$$

    a) $\dfrac{a^6 c}{b^2}$

    b) $\dfrac{a^3}{b}$

    c) $a^8 b c^{\frac{5}{2}}$

    d) $a^6 b^2 c$

    e) $a^5 b c^{\frac{5}{2}}$

16. Simplify.

$$\sqrt{xy^3} \cdot \sqrt{x^3 y^5}$$

a) $x^2 y^4$

b) $\sqrt{x^2 y^4}$

c) $\sqrt{x^4 y^8}$

d) $xy^7 \sqrt{xy}$

e) $y\sqrt{xy} \cdot x\sqrt{xy^5}$

17. Solve the expression for x.

$$y - 1 = \frac{x + y}{x}$$

a) $x = \frac{y}{y-2}$

b) $x = \frac{y-2}{y}$

c) $x = \frac{2+y}{y}$

d) $x = -1$

e) $x = 2y - 1$

18. Multiply.

$$(x^2 - 3)(x^3 - 2x^2 - 6)$$

a) $x^5 - 2x^4 - 6x^2$
b) $x^5 - 2x^4 - 6x^2 - 3$
c) $x^5 - 2x^4 - 3x^3 + 18$
d) $x^6 - 2x^4 - 3x^3 - 18$
e) $x^5 + x^4 - 3x^3 - 6x^2 + 18$

19. Find all solutions for x. Express answers in exact form.

$$-2x^3 - 7x^2 + 30x = 0$$

a) $\left\{-6, 0, \frac{5}{2}\right\}$

b) $\left\{-6, \frac{5}{2}\right\}$

c) $\{-3, 10\}$

d) $\{0, -5, 6\}$

e) $\{5, 6, 0\}$

20. Factor completely.

$$6x^3 - 5x^2 + x$$

   a) $(x - 2)(x - 3)$

   b) $(2x - 1)(3x - 1)$

   c) $x(x - 1)(5x - 1)$

   d) $x(2x + 1)(3x + 1)$

   e) $x(2x - 1)(3x - 1)$

21. There are three consecutive odd integers such that three times the second, increased by the first is one less than three times the third. What is the largest of the 3 consecutive odd integers?

   a) 5

   b) 9

   c) 11

   d) 13

   e) 21

22. $\left(\dfrac{3p^{-2}q}{3^{-1}m^3} \right)^2 = ?$ Write without negative exponents.

   a) $\dfrac{9q^2}{m^6 p^4}$

   b) $\dfrac{9q^2}{m^3 p^2}$

   c) $\dfrac{81q^4 p}{m^6}$

   d) $\dfrac{81q^2}{m^6 p^4}$

   e) $81m^3 p^2 q^4$

23. Subtract and simplify: $\dfrac{3x-4}{2x^2-3x-20} - \dfrac{x+7}{x^2+2x-24}$

a) $\dfrac{x^2-5x-59}{(2x+5)(x+6)}$

b) $\dfrac{x^2-5x-59}{(2x+5)(x-4)(x+6)}$

c) $\dfrac{x^2+33x+11}{(x-4)(x+6)(2x+5)}$

d) $\dfrac{x^2-5x+11}{(x+4)(x-6)(2x-5)}$

e) $\dfrac{x^2+33x+11}{(x+4)(x-6)(2x-5)}$

24. The length of one leg of a right triangle is 2ft longer than the other leg. If the hypotenuse is 10 ft., find the length of both legs. If the lengths of the legs are added, the result is:
a)   8
b)   10
c)   14
d)   15
e)   16

25. If $5^{4x-3} = 125$, then $x =$

a) $\dfrac{2}{3}$

b) 1

c) $\dfrac{3}{2}$

d) $\dfrac{5}{4}$

e) 7

26. Simplify: $\dfrac{1+\dfrac{6}{x}-\dfrac{7}{x^2}}{1+\dfrac{4}{x}-\dfrac{5}{x^2}}$

    a) $\dfrac{x+7}{x+5}$

    b) $\dfrac{6x-7}{4x-5}$

    c) $\dfrac{1-6x-7x^2}{1+4x-5x^2}$

    d) $\dfrac{x^2+6x+7}{x^2+4x+5}$

    e) $\dfrac{(x+1)(x-7)}{(x-1)(x+5)}$

27. If John worked alone, he could have stained his entire house in 6 hours. But he talked Margaret into helping him and together they did the job in 4 hours. How long would it have taken Margaret to stain the house alone?

    a) 2 hours

    b) 2.4 hours

    c) 5.75 hours

    d) 6 hours

    e) 12 hours

28. A plane flew 840 miles into a head wind in the same time that it could have flown 1080 miles in the opposite direction. If the plane's speed in still air is 640 mph, what is the speed of the wind?

    a) 15 mph

    b) 75 mph

    c) 80 mph

    d) 150 mph

    e) 640 mph

29. The table represents the theoretical stopping distance on dry asphalt road with ABS brakes.

Vehicle speed, km/hr	Theoretical stopping distance, m
30	1.07
40	2.7
50	4.2
60	5.9
80	9.07

Find the linear model (round values to 4 decimal places) represented by the data in the table and determine the theoretical stopping distance (round to two decimal places), when the vehicle's speed is 67 km/hr.

a) 6.67 m

b) 6.95 m

c) 6.99 m

d) 7.29 m

e) 7.47 m

30. Solve for b: $27^b = 81$

a) $\dfrac{1}{3}$

b) $\dfrac{2}{3}$

c) $\dfrac{3}{4}$

d) $\dfrac{4}{3}$

e) 3

31. The area of a rectangle is 76 m². The length is 3 more than 4 times its width. What is the perimeter of the rectangle?

a) 23 m²

b) 46 m

c) 46 m²

d) $53\frac{1}{2}$ m

e) 76 m

32. An accurate graph of $y = x^2 + 4x + 2$ would show that the x-intercepts are approximately:
   a) -2, -4

   b) -1, -4

   c) -0.8, -2.1

   d) -0.6, -3.4

   e) There are no x-intercepts

33. Find all numbers for which this is true: Eight decreased by twice a number is less than twelve.
   a) $\{n \mid n < -10\}$

   b) $\{n \mid n < -2\}$

   c) $\{n \mid n > -2\}$

   d) $\{n \mid n < 2\}$

   e) $\{n \mid n > 10\}$

34. Simplify and write without negative exponents: $\dfrac{\left(4x^{-4}\right)^2}{\left(y^3 z^{-3}\right)^3}$

   a) $\dfrac{8z^6}{y^6 x^6}$

   b) $\dfrac{8z^9}{y^9 x^8}$

   c) $\dfrac{16z^6}{x^6 y^6}$

   d) $\dfrac{16z^9}{x^8 y^9}$

   e) $\dfrac{8x^{16}}{y^{27} z^{27}}$

35. $\dfrac{2x^2 - x + 4}{36 - x^2} - \dfrac{40 - 7x}{36 - x^2} = ?$

   a) x

   b) $\dfrac{-2x - 6}{x + 6}$

   c) $\dfrac{6 - 2x}{6 - x}$

   d) $\dfrac{2x - 6}{6 - x}$

   e) $\dfrac{6 - 2x}{x + 6}$

36. Factor as the difference of two squares: $c - 25b$
   a) $(c + 5b)\,(c - b)$

   b) $(c + 5b)\,(c - 5b)$

   c) $(\sqrt{c} + 5b)(\sqrt{c} - 5b)$

   d) $(\sqrt{c} + 5\sqrt{b})(\sqrt{c} - 5\sqrt{b})$

   e) $(\sqrt{c} + \sqrt{5b})(\sqrt{c} - \sqrt{5b})$

37. Joel is five times as old as Justin, while Jason is only two years older than Justin. The product of Joel's and Jason's ages is 175. How old is Jason?

   a) 5
   b) 7
   c) 9
   d) 25
   e) 27

38. An office manager is buying filing cabinets. Small file cabinets cost $6 each and large file cabinets cost $10 each, and the manager cannot spend more than $76 on file cabinets. A small cabinet takes up 7 square feet of floor space and a large cabinet takes up 8 square feet, and the office has no more than 74 square feet of floor space for file cabinets. The manager must buy at least 7 file cabinets in order to get free delivery. Let x = the number of small file cabinets bought and y = the number of large file cabinets bought. Write a system of inequalities that describes these constraints.

a) $\begin{cases} 6x+10y \le 76 \\ 8x+7y \le 74 \\ x \ge 7 \end{cases}$

b) $\begin{cases} 6x+10y \le 76 \\ 7x+8y \le 74 \\ x+y \ge 7 \end{cases}$

c) $\begin{cases} 6x+10y \le 76 \\ 7x+8y \le 74 \\ x+y \le 7 \end{cases}$

d) $\begin{cases} 10x+6y \le 76 \\ 8x+7y \le 74 \\ y \ge 7 \end{cases}$

e) $\begin{cases} 10x+6y \ge 76 \\ 8x+7y \le 74 \\ x+y \ge 7 \end{cases}$

39. Given: $c(d-x)=a(2x-b)$, solve for x.

a) $x = \dfrac{cd+ab}{2a+c}$

b) $x = \dfrac{c+2a}{cd+ab}$

c) $x = \dfrac{cd+ab}{2ac}$

d) $x = \dfrac{cd+ab}{2a-c}$

e) $x = \dfrac{2a-ab+cd}{-c}$

40. A pet store owner wants to create a blend of two brands of Kitty Chow. The owner wants to mix enough of Brand A Kitty Chow which cost $0.85 per pound with 10 pounds of Brand B Kitty Chow costing $0.50 per pound to create a mixture costing $0.60 per pound. How many pounds of Brand A should be added?

   a) 4

   b) 5

   c) 6

   d) 15

   e) 25