

ALGEBRA 1 KEYSTONE EXAM – Module 1 Review

Operations with Real Numbers Linear Equations & Inequalities

Evaluate the following expressions:

1. The product of 4 and 8. $4 \cdot 8$

2. One half of thirteen
 $\frac{1}{2}(13)$

3. eight increased by the product of 2 and 6

$$8 + (2 \cdot 6)$$

4. Six less than thirty-three

$$36 - 6$$

5. 35 more than the number of tickets sold

$$35 + x$$

6. The difference of 6 times a number and 10

$$6x - 10$$

7. Twice the sum of a number and 15

$$2x + 15$$

8. The quotient of a number and 45

$$\frac{x}{45}$$

Evaluate the following expressions:

$x - y + 6$ if $x = 27$ and $y = 12$

$$27 - 12 + 6$$

$$15 + 6$$

$$\boxed{9}$$

$5z - (x + 4y) + 15$ if $x = 3$, $y = 4$, $z = 7$

$$5(7) - (3 + 4 \cdot 4) + 15$$

$$35 - (19) + 15$$

$$26 + 15 = \boxed{31}$$

Evaluate each expression using the Order of Operations (PEMDAS):

$$-8 - -27 \div |-5 - -8| (-8)$$

$$-8 + 27 \div |-5 + 8| (-8)$$

$$-8 + 27 \div (3)(-8)$$

$$-8 + 9(-8)$$

$$-8 + -72 = \boxed{-80}$$

$$\frac{|-52 + 1| (-1) + 4^2}{-84 \div 7 + 5}$$

$$\frac{|-51| (-1) + 16}{-12 + 5} = \frac{-51 + 16}{-7} = \frac{-35}{-7} = \boxed{5}$$

$$\frac{(-55 - -10) + (-3)^2}{-3(-4) - 6} = \frac{(-45) + 9}{12 - 6} = \frac{-36}{6} = \boxed{-6}$$

Identify the following Properties of Addition:

$$b + c = c + b$$

Commutative

$$(a + h) + s = a + (h + s)$$

associative

$$y + -y = -y + y = 0$$

additive inverse

If $x = 36$, the value of which choice below would be a perfect square?

a. $\sqrt{x} + 17$

$$\begin{array}{r} \sqrt{36} + 17 \\ 6 + 17 \\ 23 \end{array}$$

b. $87 - \sqrt{x}$

$$\begin{array}{r} 87 - \sqrt{36} \\ 87 - 6 \\ 81 \end{array}$$

c. $5\sqrt{x}$

$$\begin{array}{r} 5\sqrt{36} \\ 5 \cdot 6 \\ 30 \end{array}$$

d. $8\sqrt{x} + 2$

$$\begin{array}{r} 8\sqrt{36} + 2 \\ 8(6) + 2 \\ 50 \end{array}$$

Your friend is comparing two six-sided cubic storage bins.

The yellow bin has a surface area of 9600 square centimeters & costs \$25.

The blue bin has a surface area of 7350 square centimeters & costs \$20.

a. Find the edge length of each bin.

Edge length of Bin A: _____

Edge length of Bin B: _____

skip

b. Which bin costs less when comparing unit rates?

Given the following expression: $-3x^2 + 2x - 4x + 7 - 4xy + 8yx$

a. How many terms are in the expression? 6

b. Combine all of the like terms. $-3x^2 - 2x + 4xy + 7$

c. What are the **coefficients** of the original expression? $-3, 2, -4, 7, -4, 8$

d. What is the **constant term** in the original expression? 7

Order the numbers from least to greatest.

$$\begin{array}{l} \cancel{-4.99}, \cancel{-\frac{16}{3}}, \cancel{-5.1}, \frac{2}{3}, 0.6, \cancel{-\sqrt{11}} \\ -4.99, -5.\bar{3}, -5.1, 0.\bar{6}, 0.6, -3.32 \end{array}$$

$$\begin{array}{l} -\frac{16}{3}, -5.1, -4.99, -3.32 \\ 0.6, \frac{2}{3} \end{array}$$

Solve each equation below for the missing variable:

Solve for V: $-13 = -11V + 8$
 $\quad \quad \quad -8 \quad \quad \quad -8$

$$\frac{-21}{-11} = \frac{-11V}{-11} \quad \boxed{V = \frac{21}{11}}$$

Solve for X: $10 - X = 7$
 $\quad -10 \quad \quad -10$

$$-X = -3$$
$$\boxed{X = 3}$$

Solve for P: $8(5P - 3) = -227 + 3$

$$40P - 24 = -224$$
$$\quad +24 \quad \quad +24$$

$$\frac{40P}{40} = \frac{-200}{40}$$

$$\boxed{P = -5}$$

Solve each equation below by isolating the variable:

Solve for M: $\frac{-3V + 4}{11} = \frac{11M}{11}$

$$\boxed{M = \frac{-3V + 4}{11}}$$

Solve for Y: $4 = 4Y + 3X$

$$\frac{4 - 3X}{4} = \frac{4Y}{4}$$

$$\boxed{\frac{4 - 3X}{4} = Y}$$

A boxing club charges the following fees:

Nonmembers: \$4 per day to work out and \$10 per day for equipment rental

Members: pay a one-time fee of \$405 and a daily fee of \$5 for equipment rental.

- a. Write an expression for NONMEMBERS for the cost of x days.

$$4x + 10x = \boxed{14x}$$

- b. Write an expression for MEMBERS for the cost of x days.

$$405 + 5x$$

- c. After how many days will the cost for nonmembers be equal to the cost for members?

$$\begin{array}{r} 14x = 405 + 5x \\ -5x \qquad \qquad -5x \\ \hline \end{array}$$

$$\frac{9x}{9} = \frac{405}{9}$$

$$\boxed{x = 45 \text{ days}}$$

John works as a salesman for a cellular telephone service. He is paid a flat fee of \$250 per week plus \$15 for each contract a customer signs. He needs to earn a total of \$450 per week in order to meet his living expenses.

How many contracts does he need to sell each week to meet his living expenses?

$$\begin{array}{r} 250 + 15x = 450 \\ -250 \qquad \qquad -250 \\ \hline \end{array}$$

$$\frac{15x}{15} = \frac{200}{15}$$

$$x = 13.3$$

$$\boxed{\text{so } 14 \text{ days}}$$

The information shown is the number of guests at Bonnie's Bed and Breakfast for the years 1994 to 1997. Find the **percent of increase** from 1996 to 1997.

Round your answer to the nearest whole percent.

Year	1994	1995	1996	1997
Guests	334	380	437	507

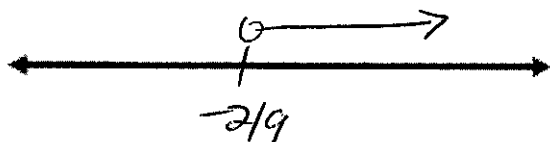
$$\frac{\text{new} - \text{original}}{\text{original}} = \frac{507 - 437}{437} \times 100 = 16.7\%$$

Solve and graph on a number line: $9x - 5 > -7$

$$+5 \quad +5$$

$$\frac{9x > -2}{9 \quad 9}$$

$$x > -2/9$$



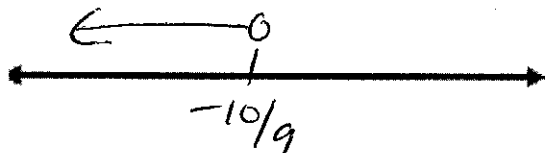
Solve and graph on a number line: $6x + 1 < -9 - 3x$

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

$$\frac{9x + 1 < -9}{-1 \quad -1}$$

$$\frac{9x < -10}{9 \quad 9}$$

$$x < -10/9$$



Solve: $-2(2 - 6x) \leq 5$

$$-2(2 - 6x) \leq 5$$

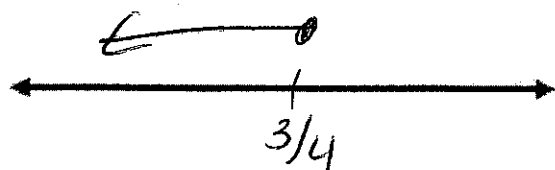
$$-4 + 12x \leq 5$$

$$+4 \quad +4$$

$$\frac{12x \leq 9}{12 \quad 12}$$

$$x \leq 9/12$$

$$x \leq 3/4$$



Joel sells ice cream cones at the county fair. He has to rent the equipment for a total of \$36 and spend \$0.52 on ingredients for each cone.

What is the **minimum number** of ice cream cones Joel must sell for \$1.40 each in order to make a profit?

a. 41

b. 39

c. 42

d. 40

$$0 \geq .88x - 36$$

$$\frac{36 \geq .88x}{.88 \quad .88}$$

$$x \geq 40.9$$

~~Profit~~

$$\text{Profit} = \text{Revenue} - \text{cost}$$

$$0 \geq 1.40x - (36 + .52x)$$

$$0 \geq 1.40x - 36 - .52x$$

41 cones

The middleweight division in boxing is centered at 160 pounds. Deviation from that must be less than or equal to 3 pounds either way.

What are the **maximum and minimum** weights in the sport?

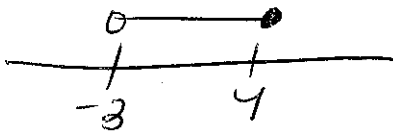
Maximum weight: 163

Minimum weight: 157

Solve $2 < x + 5 \leq 9$. Graph your solution.

$$\begin{array}{r} -5 \\ -5 \\ -5 \end{array}$$

$$-3 < x \leq 4$$



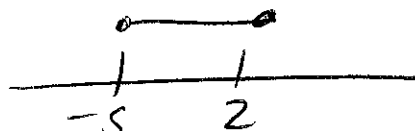
Solve $-5 \leq -x - 3 \leq 2$. Graph your solution.

$$\begin{array}{r} +3 \\ +3 \\ +3 \end{array}$$

$$\frac{-2 \leq -x \leq 5}{-1 \quad -1 \quad -1}$$

$$2 \geq x \geq -5$$

$$-5 \leq x \leq 2$$

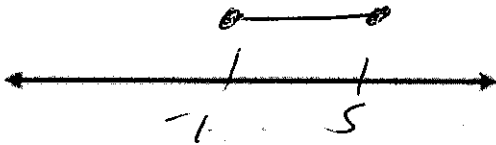


Solve and graph $|2x - 4| \leq 6$

$$\begin{array}{r} -6 \leq 2x - 4 \leq 6 \\ +4 \quad +4 \quad +4 \end{array}$$

$$\begin{array}{r} -2 \leq 2x \leq 10 \\ \frac{-2}{2} \quad \frac{2}{2} \quad \frac{10}{2} \end{array}$$

$$-1 \leq x \leq 5$$

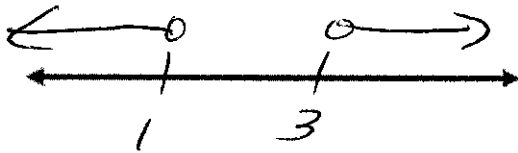


Solve and graph $|-x + 2| > 1$

$$\begin{array}{l} -x + 2 > 1 \quad \text{or} \quad -x + 2 < -1 \\ -2 \quad -2 \quad \quad \quad -2 \quad -2 \\ -x > -1 \quad \quad \quad -x < -3 \\ x < 1 \quad \quad \quad x > 3 \end{array}$$

~~$-x + 2 > 1$~~
 ~~$-2 \quad -2$~~
 ~~$-x > -1$~~
 ~~$x < 1$~~

~~$-x + 2 < -1$~~



Softball compression measures the hardness of a softball and affects the distance that the softball can travel upon contact with a bat. A softball organization requires that the compression of a softball be 350 pounds, but allows an absolute deviation of at most 50 pounds.

a. Write an inequality to represent this.

$$|x - 350| \leq 50$$

b. Find the maximum & minimum amounts of compression possible for softballs.

$$\begin{array}{l} -50 \leq x - 350 \leq 50 \\ 300 \leq x \leq 400 \end{array}$$

Solve the absolute value equations below. Be sure to include all possible solutions.

$$|x - 4| = 3$$

$$x - 4 = 3 \quad \text{or} \quad x - 4 = -3$$

$$\begin{array}{l} +4 \quad +4 \\ \hline \end{array}$$

$$x = 7 \quad x = -1$$

$$\frac{5|4x - 1|}{5} = \frac{15}{5}$$

$$|4x - 1| = 3$$

$$4x - 1 = 3 \quad \text{or} \quad 4x - 1 = -3$$

$$\begin{array}{l} +1 \quad +1 \\ \hline \end{array}$$

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

$$\frac{4x}{4} = \frac{-2}{4}$$

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

Simplify below using the Properties of Exponents:

$$(2k^3)^4$$

$$2^4 \cdot k^{12}$$

$$16k^{12}$$

$$(3a^{-3}b^2)^5$$

$$3^5 a^{-15} b^{10}$$

$$\frac{3^5 b^{10}}{a^{15}}$$

An adult male elephant weighs 6.35×10^3 kg in its prime. Adult male cheetahs can bring down an elephant, and they only weigh 5.75×10^1 in their prime.

How many times bigger is a male elephant than a male cheetah?

SKIP

Find both the GCF & LCM of these two monomials:

$$36xy^4$$

$$\begin{array}{c} \wedge \\ 6 \quad 6 \\ \wedge \quad \wedge \\ 2 \quad 3 \quad 2 \quad 3 \end{array}$$

$$45y^2$$

$$\begin{array}{c} \wedge \\ 3 \quad 15 \\ \wedge \quad \wedge \\ 3 \quad 5 \end{array}$$

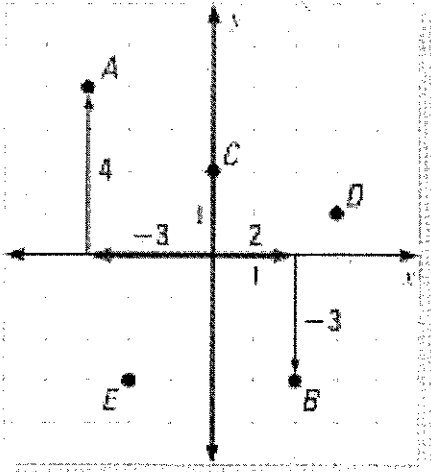
GCF: $9y^2$

LCM: $180xy^4$

ALGEBRA 1 KEYSTONE EXAM – Module 2 Review

Linear Functions Data Analysis & Probability

Give the coordinates & locations of the points shown.



A: $(-3, 4)$

B: $(1, -3)$

C: $(0, 1)$

D: $(3, 1)$

E: $(-2, -3)$

Which ordered pair is a solution of $3x - y = 7$?

~~a. $(3, 4)$~~

$9 - 4 \neq 7$

b. $(1, -4)$

$3 - (-4)$

$7 = 7$

~~c. $(5, -3)$~~

$15 - (-3) \neq 7$

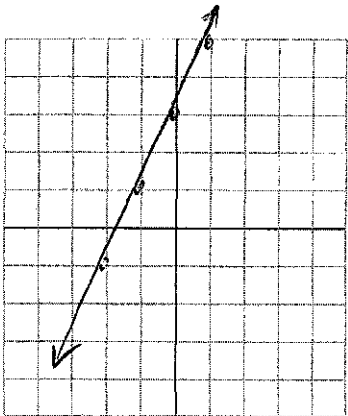
~~d. $(-1, -2)$~~

$3(-1) - (-2)$

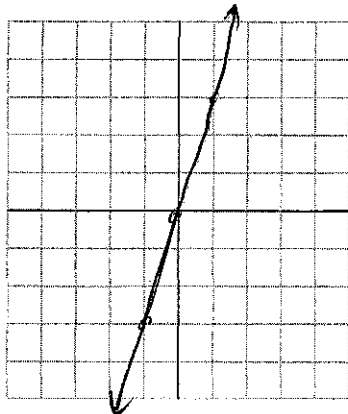
$-3 + 2 \neq 7$

Graph the equations.

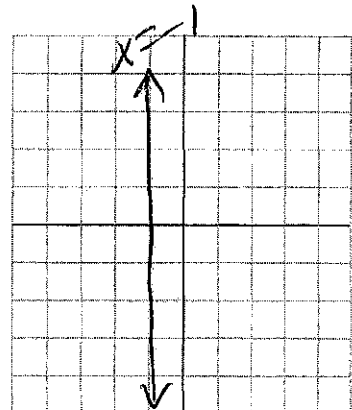
1. $y = 2x - 3$



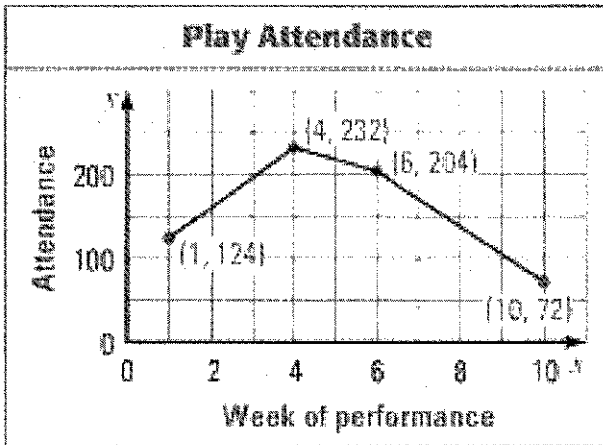
2. $y = 3x$



3. $x = -1$



A community theater performed a play each Saturday evening for 10 consecutive weeks. The graph shows the attendance for the performances in weeks 1, 4, 6, and 10. Describe the rates of change in attendance with respect to time.

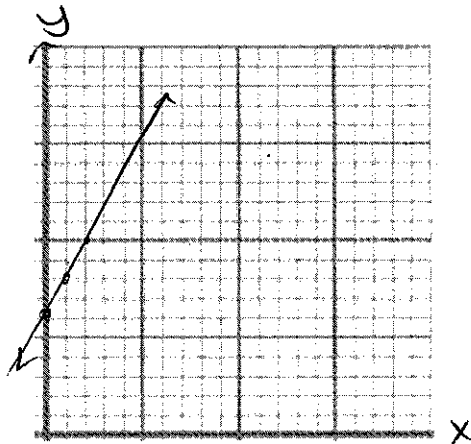


From week:

1 - 4 attendance went up
 4 - 6 went down
 6 - 10 went down more sharply

The body length y (in inches) of a walrus calf can be modeled by $y = 2x + 6$ where x is the calf's age (in months).

a. Graph the equation



b. Describe what the slope and y-intercept represent in this situation.

calf starts at 6 inches
 grows 2 inches/month

c. Use the graph to estimate the body length of a calf that is 10 months old.

$$y = 2x + 6$$

$$y = 2(10) + 6$$

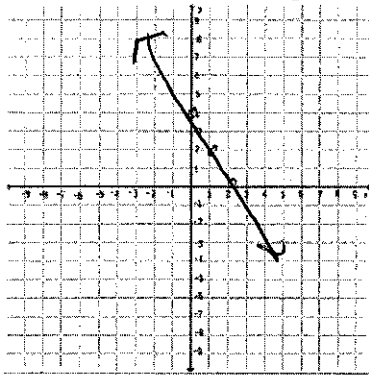
$y = 26 \text{ inches}$

Graph the following equations by first finding the x & y-intercepts. Then use those to graph the function.

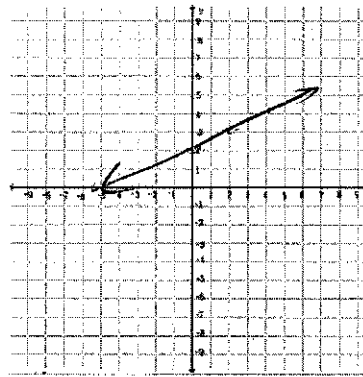
$$4x + 2y = 8$$

$$2y = -4x + 8$$

$$y = -2x + 4$$



$$-3x + 6y = 12$$



$$-3x + 6y = 12$$

$$\frac{6y}{6} = \frac{3x + 12}{6}$$

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

For the function $f(x) = 3x - 15$, find $f(-3)$.

$$f(-3) = -9 - 15$$

$$= -24$$

For the function $g(x) = 3x^2 - 2x$, find $g(8)$.

$$g(8) = 3(64) - 16$$

$$= 192 - 16$$

$$= 176$$

For the problems below, write the equation of the line in slope-intercept form given the information.

rate of change = 5, starting point: -8

$$\underline{y = 5x - 8}$$

$m = \frac{-1}{2}, (6, -4)$

$$y - (-4) = -\frac{1}{2}(x - 6)$$

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

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

$$\underline{y = -\frac{1}{2}x - 1}$$

goes through the points $(0, 4)$ and $(2, 3)$

$$m = \frac{3 - 4}{2 - 0} = -\frac{1}{2}$$

$$y - 4 = -\frac{1}{2}(x - 0)$$

$$y - 4 = -\frac{1}{2}x$$

$$y = -\frac{1}{2}x + 4$$

$$\underline{y = -\frac{1}{2}x + 4}$$

Use the information provided in the table below to write an equation estimating the total thousands of dollars of flower sales (y) in the given year (x).

FLOWER SALES

Year	Sales (in thousands)
2007	\$305
2008	\$330

$$m = \frac{330 - 305}{2008 - 2007} = \frac{25}{1} = 25$$

$$y - 305 = 25(x - 2007)$$

$$y - 305 = 25x - 50175$$

$$y = 25x - 49870$$

~~edge case error~~

~~year~~

$x = \text{year}$

The scatter plot below shows how the number of baseball caps sold each day at a tourist shop is related to the cost per baseball cap.

Which equation best describes the line of best fit?

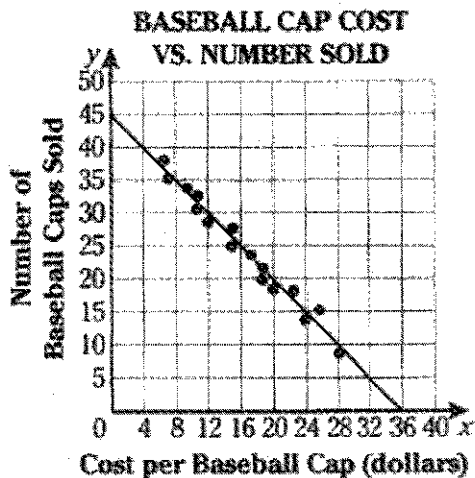
a. $y = \frac{-4}{5}x + 36$

b. $y = \frac{-4}{5}x + 45$

c. $y = \frac{-5}{4}x + 36$

d. $y = \frac{-5}{4}x + 45$

$$m = \frac{-5}{4}$$



Four years after a hedge maple tree was planted, its height was 9 feet.
Eight years after it was planted, the hedge maple tree's height was 12 feet.

a. Write an equation to represent this situation.

$(4, 9)$
 $(8, 12)$

$$m = \frac{12 - 9}{8 - 4} = \frac{3}{4}$$

$$y - 9 = \frac{3}{4}(x - 4)$$

$$y - 9 = \frac{3}{4}x - 3$$

$$+9 \qquad \qquad +9$$

$$y = \frac{3}{4}x + 6$$

b. What is the growth rate (rate of change) of the hedge maple & its initial height when planted?

growth rate = $\frac{3}{4}$ ft/year
initial height = 6 ft

Solve the systems of equations & write your answer as an ordered pair:

$$\begin{cases} y = -2x + 2 \\ y = -x + 7 \end{cases}$$

$$\begin{array}{r} -2x + 2 = -x + 7 \\ +x \quad \quad +x \\ \hline -x + 2 = 7 \\ -x = 5 \\ x = -5 \end{array}$$

$$\begin{aligned} y &= 5 + 7 \\ y &= 12 \end{aligned}$$

$$\boxed{(-5, 12)}$$

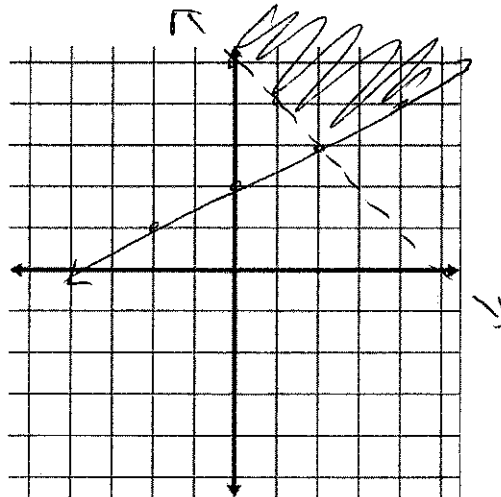
$$\begin{array}{r} 3(4x + 3y = -2) \quad 12x + 9y = -6 \\ -4(3x + 2y = -3) \quad -12x - 8y = 12 \\ \hline y = 6 \end{array}$$

$$\begin{aligned} 4x + 3(6) &= -2 \\ 4x + 18 &= -2 \\ -18 \quad -18 \\ \hline 4x &= -20 \\ x &= -5 \end{aligned}$$

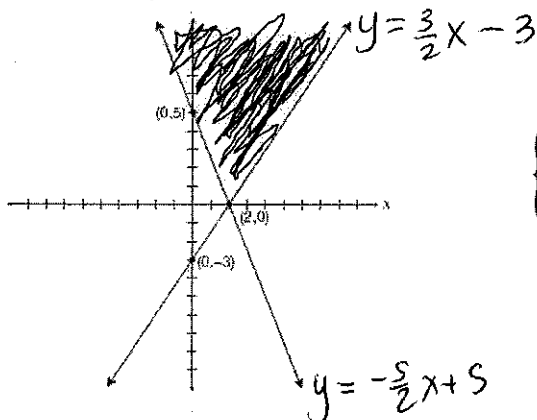
$$\boxed{(-5, 6)}$$

Graph the system of linear inequalities, & shade the feasible region.

$$\begin{cases} y \geq \frac{1}{2}x + 2 \\ y > -x + 5 \end{cases}$$



Write a system of inequalities that describes the shaded region in the system of inequalities below.



$$\begin{cases} y \geq -\frac{5}{2}x + 5 \\ y \geq \frac{3}{2}x - 3 \end{cases}$$

Identify all of the following for the polynomial below:

$$2x^4 + 5x^2 - 6x^3 - 9 + x$$

a) Degree = 4

b) Leading Coefficient = 2

c) Write the polynomial in Standard Form = $2x^4 - 6x^3 + 5x^2 + x - 9$

Add the polynomials:

$$(4x + 2 + 4x^2) + (5x - x^2 + 6)$$

$$4x + 2 + 4x^2 + 5x - x^2 + 6$$

$$\boxed{3x^2 + 9x + 8}$$

3. Simplify:

$$8x(-7x^2 + 8)$$

$$-56x^3 + 64x$$

Factor out the Greatest Common Factor of the polynomial below:

$$16a^2 - 40a - 24$$

$$8(2a^2 - 5a - 3)$$

Factor each of the polynomials below COMPLETELY:

$$y^2 + 6y + 5$$

$$(y+5)(y+1)$$

$$b^2 + b - 30$$

$$(b+6)(b-5)$$

Simplify each of the following radicals as much as possible.

$$\sqrt{12} = \sqrt{2 \cdot 2 \cdot 3} = 2\sqrt{3}$$

$$\sqrt{56} = \sqrt{2 \cdot 2 \cdot 2 \cdot 7} = 2\sqrt{14}$$

The number of home runs hit by the 20 baseball players with the best single-season batting averages in Major League Baseball since 1900 are listed below.

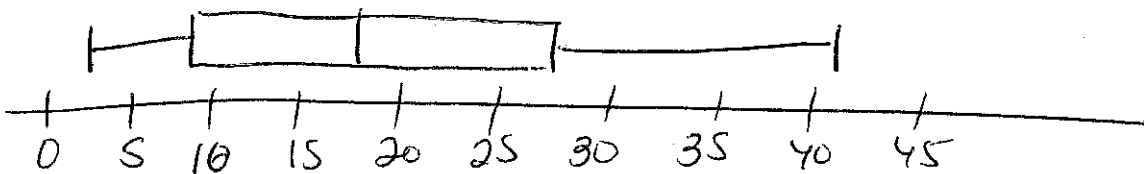
Find the mean, median, mode, & range of the data below.

~~14, 25, 8, 18, 17, 17, 18, 37, 39, 18, 42, 23, 4, 32, 14, 21, 3, 12, 19, 41~~
~~3, 4, 7, 7, 8, 8, 12, 14, 14, 18~~ | ~~19, 19, 21, 23, 28, 32, 37, 39, 41, 42~~

mean : 19.65
 Median : 18.5
 Mode : 7, 8, 14, 19
 Range = 39

Make a box & whisker plot of the data above.

min: 3 Q1: 8 med: 18.5 Q3: 28.5 max: 42



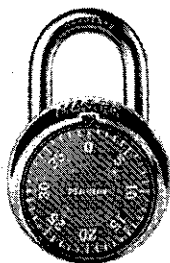
Pennsylvania license plates are traditionally composed of 7 characters total – 3 letters of the alphabet followed by 4 numbers (digits from 0-9).

How many different combinations are there for traditional license plates in PA?



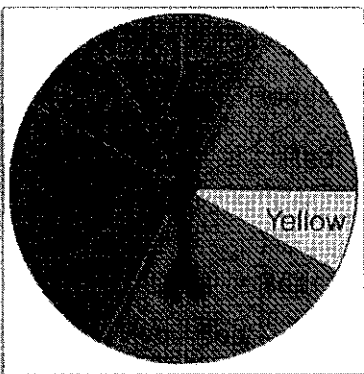
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How many different possibilities are there for a traditional combination lock, like the ones used on the lockers here at school (shown in the picture)? Numbers ARE allowed to be repeated.



skip

• Using the spinner below, what is the probability of landing on:



- Green: $3/12$
- Blue: $3/12$
- Yellow: $1/12$
- Red: $5/12$

