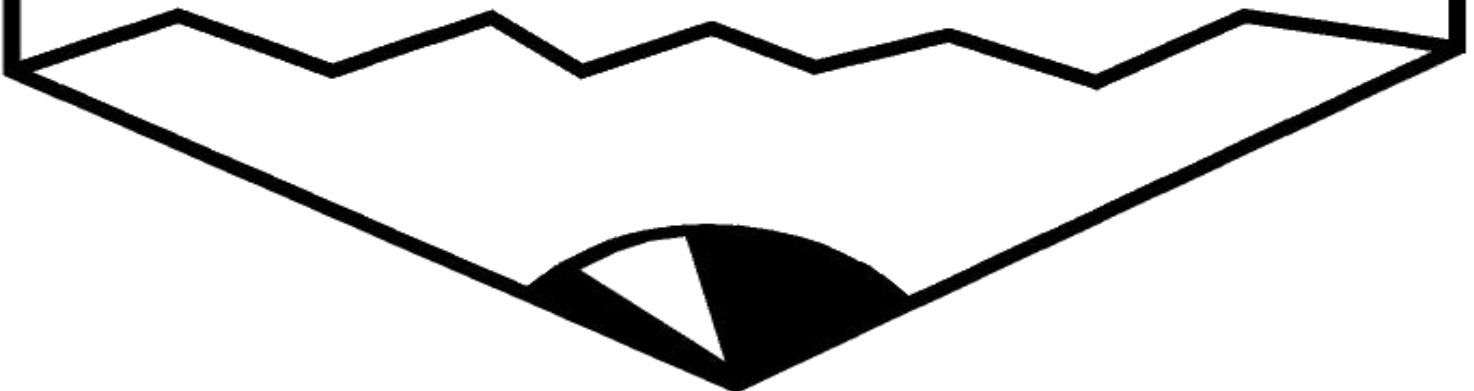


SUMMER MATH PACKET

INCOMING
Eighth Graders

NAME _____



Directions

- Complete each problem.
- Do NOT use a calculator.
- Show all work neatly in the actual packet whenever possible. If you need to use additional paper, make sure your work is clearly labeled and attached to the packet.
- All answers must be clearly labeled in the packet.
- All problems must be attempted. If you are stuck on a particular problem, you could ask an adult or classmate for assistance. If you are still unable to solve the problem, circle it and be prepared with questions for class in September.
- This packet will be graded on completion. You will also be assessed on this information after it has been reviewed in your math class.

Helpful Websites:

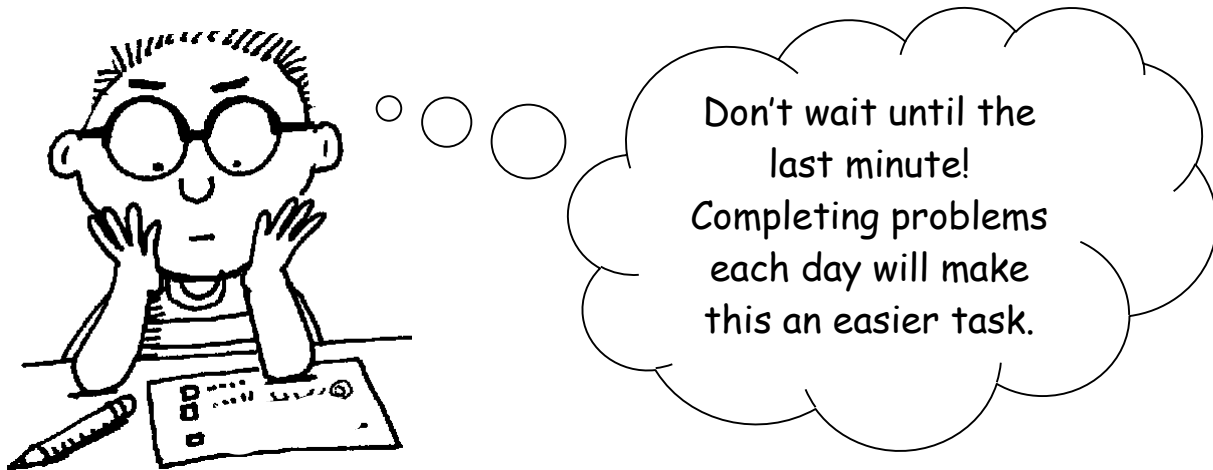
www.coolmath.com

www.aplusmath.com

www.amathsdictionaryforkids.com

www.funbrain.com

www.math.com



Integer OperationsAdding Integers

- If the signs are the same, add the numbers and keep the sign.
(Same signs, find the Sum)

$5 + 9 = 14$

$-3 + -6 = -9$

- If the signs are different, find the difference between the numbers and keep the sign of the number with the greater absolute value.
(Different signs, find the Difference)

$-12 + 5 = -7$

$-11 + 12 = 1$

Subtracting Integers

- Change the subtraction sign to an addition and change the sign of the second number to its opposite. Then follow the rules for addition.
(Add a line, change the sign)

$6 - 4 \rightarrow 6 + -4 = 2$

$-10 - -8 \rightarrow -10 + 8 = -2$

Multiplying and Dividing Integers

- Multiply or divide.
- If there are an odd number of negatives, your answer will be negative.
(Unlike signs = negative)
- If there is an even number of negative signs, your answer will be positive.
(Same/Like signs = positive)

$-5 \cdot -3 = 15$ (2 neg. signs = pos. answer) $(-1)(5)(2) = -10$ (1 neg. sign = neg. answer)

$-56 \div -8 = 7$ (2 neg. signs = pos. answer) $\frac{-16}{4} = -4$ (1 negative sign = neg. answer)

1) $50 - -10 =$ _____

2) $(-3)(7)(-4) =$ _____

3) $26 + -48 =$ _____

4) $240 \div -8 =$ _____

5) $(0)(-77) =$ _____

6) $-221 - 93 =$ _____

$$7) -3 + -14 = \underline{\hspace{2cm}}$$

$$8) -288 \div -24 = \underline{\hspace{2cm}}$$

$$9) -39 + -22 + 11 = \underline{\hspace{2cm}}$$

$$10) -54 - -54 = \underline{\hspace{2cm}}$$

$$11) -9 \bullet -5 \bullet -3 = \underline{\hspace{2cm}}$$

$$12) 17 - -36 - 63 - 29 = \underline{\hspace{2cm}}$$

$$13) \frac{-360}{12} = \underline{\hspace{2cm}}$$

$$14) -38 + 20 + -12 + -46 + 80 = \underline{\hspace{2cm}}$$

$$15) -28 \bullet -52 = \underline{\hspace{2cm}}$$

$$16) -76 - 1 = \underline{\hspace{2cm}}$$

$$17) 0 \div -4 = \underline{\hspace{2cm}}$$

Absolute Value

Absolute Value -

The distance a number is from zero on the number line. (Always positive!)

Ask yourself: How far is the number from zero?

$$|22| = 22$$

$$|-45| = 45$$

$$|-18 + 8| = |-10| = 10$$

18) $|-6543| = \underline{\hspace{2cm}}$

19) $|37| = \underline{\hspace{2cm}}$

20) $|62 + -62| = \underline{\hspace{2cm}}$

21) $|-8| + |12| = \underline{\hspace{2cm}}$

Order of Operations

PEMDAS- Please Excuse My Dear Aunt Sally

Parentheses (), Brackets [], Braces { }

Exponents

M } Multiply and divide from left to right

D

A } Add and subtract from left to right

S

22) $15 \div 3 + 8 \div 4 = \underline{\hspace{2cm}}$

23) $(35 \div 7 + 4) \cdot 11 = \underline{\hspace{2cm}}$

24) $144 \div 12(4) \div 2^2 = \underline{\hspace{2cm}}$

25) $\frac{36 - 21}{9 + 6} = \underline{\hspace{2cm}}$

26) $2 + 6^2 - 8 = \underline{\hspace{2cm}}$

27) $7[(13 + 5) - 3(4)] = \underline{\hspace{2cm}}$

$$28) 80 \div 16 \cdot 9 \div 3 = \underline{\hspace{2cm}}$$

$$29) -21 - 8 + -4 - -9 = \underline{\hspace{2cm}}$$

$$30) (20 - 9 + 28 - 17 + 7 - 24)^2 \div (99 \div 33 + 2) = \underline{\hspace{2cm}}$$

$$31) (-81 \div 9)(-16 \div -4) = \underline{\hspace{2cm}}$$

$$32) -2[3 - (-225 \div 15) \cdot 3] = \underline{\hspace{2cm}}$$

$$33) (62 + -84 \cdot 3)(8 - 2^3) = \underline{\hspace{2cm}}$$

$$34) \frac{-81 \div 3^2}{87 - 90} = \underline{\hspace{2cm}}$$

$$35) 32 \div 8 - 4 \cdot 6 + 7 = \underline{\hspace{2cm}}$$

Fractions

Adding and Subtracting Fractions

- You may want to rewrite the problem vertically.
- Find a common denominator.
- For subtraction, you may have to change a mixed number to an improper fraction.
- Add/subtract the numerators.
- Simplify your answer.

Example: $\frac{1}{6} + \frac{1}{3} = \frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$

$1\frac{1}{2} - \frac{7}{8} = 1\frac{4}{8} - \frac{7}{8} = \frac{12}{8} - \frac{7}{8} = \frac{5}{8}$

$$\frac{1}{6} = \frac{1}{6}$$

$$1\frac{1}{2} = 1\frac{4}{8} = \frac{12}{8}$$

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

$$-\frac{7}{8} = -\frac{7}{8} = -\frac{7}{8}$$

$$\frac{3}{6} = \frac{1}{2}$$

$$\frac{5}{8}$$

Mixed #
to
Improper
Fraction:
 $1\frac{4}{8} = \frac{12}{8}$

Multiplying and Dividing Fractions

- Remember, when multiplying and dividing fractions there is no need to have a common denominator.
- Change all whole and mixed numbers to improper fractions.
- If it is a division problem, don't forget to change it to multiplication, and flip the 2nd fraction. (KCF- Keep, Change, Flip)
- Cross cancel then multiply straight across (numerator x numerator, then denominator x denominator).

Multiplication: $2\frac{1}{4} \cdot \frac{2}{3} = \frac{9}{4} \cdot \frac{2}{3} = \frac{9}{\cancel{4}^2} \cdot \frac{\cancel{2}^1}{3} = \frac{3}{2} = 1\frac{1}{2}$

Examples:

K C F

Division: $3\frac{2}{3} \div 4\frac{1}{2} = \frac{11}{3} \div \frac{9}{2} = \frac{11}{3} \cdot \frac{2}{9} = \frac{22}{27}$

36) $\frac{8}{9} - \frac{4}{5} = \underline{\hspace{2cm}}$

37) $\frac{1}{6} + 3\frac{1}{4} = \underline{\hspace{2cm}}$

38) $-\frac{8}{25} + \frac{3}{5} = \underline{\hspace{2cm}}$

39) $10\frac{1}{3} + -4 = \underline{\hspace{2cm}}$

40) $-\frac{4}{5} \cdot -\frac{5}{4} = \underline{\hspace{2cm}}$

41) $8 \cdot 2\frac{4}{5} = \underline{\hspace{2cm}}$

42) $-\frac{6}{9} \cdot \frac{1}{4} \cdot \frac{2}{9} = \underline{\hspace{2cm}}$

43) $\frac{3}{7} \div \frac{4}{7} = \underline{\hspace{2cm}}$

44) $4\frac{1}{2} \div -\frac{2}{5} = \underline{\hspace{2cm}}$

45) $-9 \div \frac{1}{3} = \underline{\hspace{2cm}}$

Ordering Fractions and Decimals

- Write the following numbers in order from **least to greatest**.
- Writing all fractions with a common denominator or using number line might be helpful.

46) $\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{2}{3} \underline{\hspace{2cm}}$

47) $-8.202, -8.02, -8.022 \underline{\hspace{2cm}}$

One-Step Equations

One-Step Equations

- Find the side of the equation that has the variable.
- What operation do you see?
- Perform the inverse (opposite) operation to both sides of the equation using the number that is on the same side as the variable.

Example 1:

$$\begin{array}{r|l} x + 5 & = 62 \\ -5 & -5 \\ \hline x & = 57 \end{array}$$

← (+) What operation do you see? (÷) →
(-) What is the inverse operation? (•)

Example 2:

$$\begin{array}{r|l} \frac{w}{2} & = 37 \\ 2 \cdot \frac{w}{2} & = 37 \cdot 2 \\ \hline w & = 74 \end{array}$$

Solve for the given variable.

48) $a + 13 = 5$

49) $m - 86 = 109$

50) $35 \cdot p = 210$

51) $\frac{y}{21} = -210$

52) $n + 10 = -10$

53) $d - 106 = 4$

54) $b \cdot 11 = -44$

55) $\frac{h}{7} = 50$

Two-Step Equations

Two-Step Equations

- Find the side of the equation that has the variable.
- What operations do you see? You will need to work backwards through the order of operations in reverse in order to solve a two-step equation.
- Perform the inverse (opposite) operation to both sides of the equation using the number that is on the same side as the variable.

Example:

$$5x + 22 = 87$$

$$\begin{array}{r} -22 \\ -22 \end{array}$$

$$\underline{5x} = \underline{65}$$

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

$$x = 13$$

(•/+) What operation do you see?

(+) What operation should you undo first?

(-) What is the inverse operation?

(•) What operation do you see?

(÷) What is the inverse operation?

Solve each equation below. Remember to use the order of operations in reverse.

56) $3x + 21 = 72$

57) $\frac{x}{6} - 42 = -16$

58) $-14n - 67 = -11$

59) $-12 + \frac{n}{2} = -19$

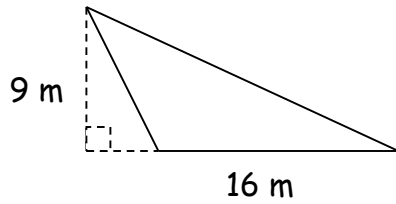
60) $\frac{3}{4}x + 6 = 16$

61) $-2(1 + 6k) = 22$

Basic Geometry

Use the formula sheet to find the area (A) AND perimeter (P) of each shape. Round to the nearest hundredths place when necessary. Use 3.14 for π (pi).

Example:



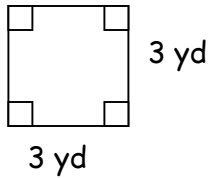
Triangle

$$A = \frac{1}{2} b h$$

$$A = \frac{1}{2} \cdot 16 \cdot 9$$

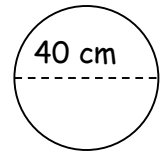
$$A = 72 \text{ m}^2$$

62) $A =$ _____



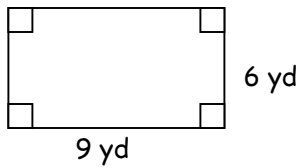
63) $P =$ _____

64) $d =$ _____ $A =$ _____



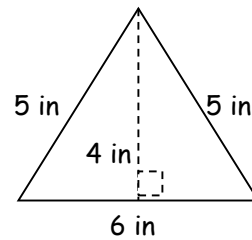
65) $r =$ _____ $C =$ _____

66) $A =$ _____



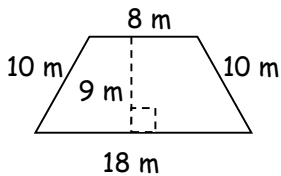
67) $P =$ _____

68) $A =$ _____



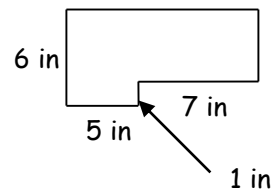
69) $P =$ _____

70) $A =$ _____



71) $P =$ _____

72) $A =$ _____



73) $P =$ _____

Surface Area and Volume

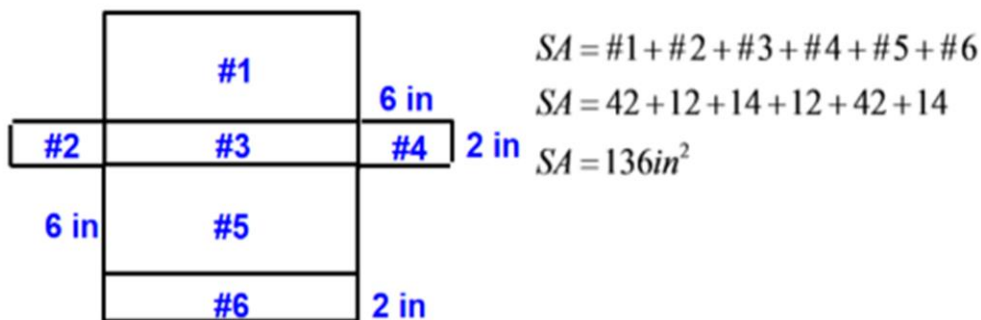
Use the formula sheet to find the surface area (SA) OR volume (V) of each shape. Round to the nearest hundredths place when necessary. Use 3.14 for π (pi).

Surface area is the **sum** of the areas of all the outside faces of a 3-D figure. To find the surface area, you must find the area of each face of the figure then add them together. The label for surface area is **square units**.

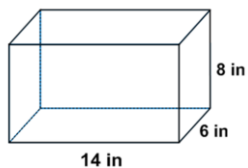
Volume is the amount of space **inside** a 3-D figure or the amount of cubic units it takes to **fill** a 3-D figure. The label for volume is **cubic units**.

Surface Area Example:

Example



Volume Example:



$$V = lwh$$

$$V = 14in(6in)(8in)$$

$$V = 672 in^3$$

$$V = Bh, \text{ where } B = \text{area of base}$$

$$V = 14in(6in)(8in)$$

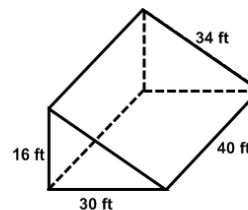
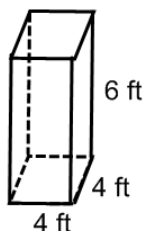
$$V = 672 in^3$$

74) SA = _____

76) SA = _____

75) V = _____

77) V = _____



Similar Figures

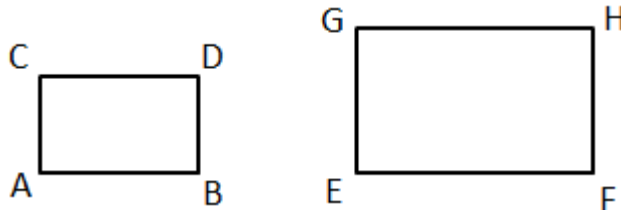
Similar figures have the same **shape** but are not necessarily the same **size**.

Similar figures have the following properties:

- Corresponding angles are congruent
- Corresponding side lengths are proportional

Example:

Rectangle ABCD and Rectangle EFGH are similar.



This means that if $\angle C = 90$ degrees, the corresponding angle on the other rectangle, $\angle G = 90$ degrees.

If the side length of \overline{CD} is 5 cm, \overline{GH} is 10 cm, \overline{CA} is 3 cm, then what is \overline{GE} ?

$$\begin{array}{l} \text{Left Shape} \\ \text{Right Shape} \end{array} \quad \frac{CD}{GH} = \frac{CA}{GE} \quad \text{Set up a proportion comparing corresponding sides}$$

$$\frac{5}{10} = \frac{3}{GE} \quad \text{Substitute values in for the side lengths}$$

$$5(GE) = 3(10) \quad \text{Cross multiply}$$

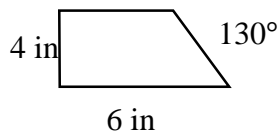
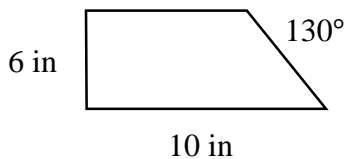
$$5(GE) = 30 \quad \text{Simplify}$$

$$GE = 6 \quad \text{Solve using division}$$

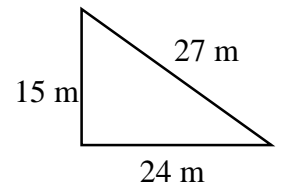
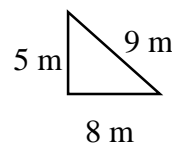
$$\overline{GE} = 6 \text{ cm}$$

Use the properties of similarity to determine whether the figures are similar.

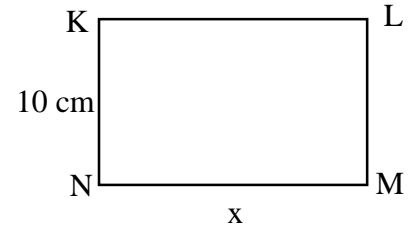
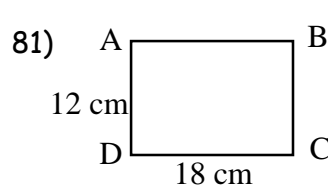
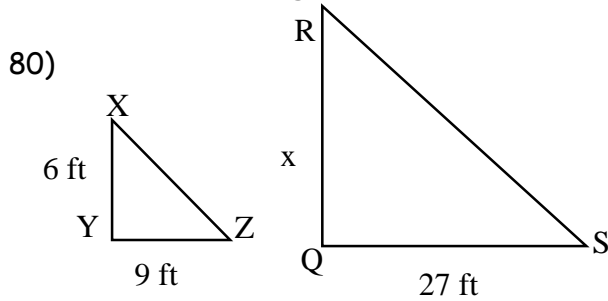
78)



79)

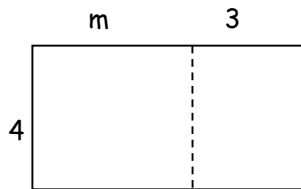


Find the unknown length. $\triangle XYZ \sim \triangle RQS$ and $\square ABCD \sim \square KLMN$



Distributive Property

Multiply the number on the outside of the parentheses by each term inside the parentheses. Don't forget the rules for negatives! Draw rectangles or arrows if you need to.



$$4(m + 3) = 4m + 12$$

82) $12(a - 3) =$ _____

83) $4(b + c) =$ _____

84) $10(9 - 5f) =$ _____

85) $-5(11g - 13h) =$ _____

86) $\frac{1}{2}(96j - 72k) =$ _____

87) $3(6m + -14n - 7p) =$ _____

Miscellaneous

- Suppose you have a bag of 24 marbles - 3 blue, 8 red, 12 yellow, 1 green. Use this information to complete the following 3 problems. *Write each answer as a fraction, decimal, and percent.*

88) What is the probability of pulling a red marble from the bag? _____

89) What is the probability of pulling a purple marble from the bag? _____

90) What is the probability of blue or green? _____

Proportions

• To find the missing values, use scale factor or cross multiplication.

Find the missing value. Round to the nearest hundredth when necessary.

91) $\frac{4}{3} = \frac{n}{24}$

92) $\frac{2.5}{5} = \frac{20}{x}$

93) $\frac{3}{2} = \frac{c}{8}$

94) $\frac{7}{2} = \frac{n}{6}$

Coordinate Graphing

x-axis - horizontal axis

y-axis - vertical axis

(x, y)

Plot the following points on the graph.

Be sure to label your points with the letter.

95) A (4, 9)

96) B (-3, 5)

97) C (0, -2)

Find the coordinates.

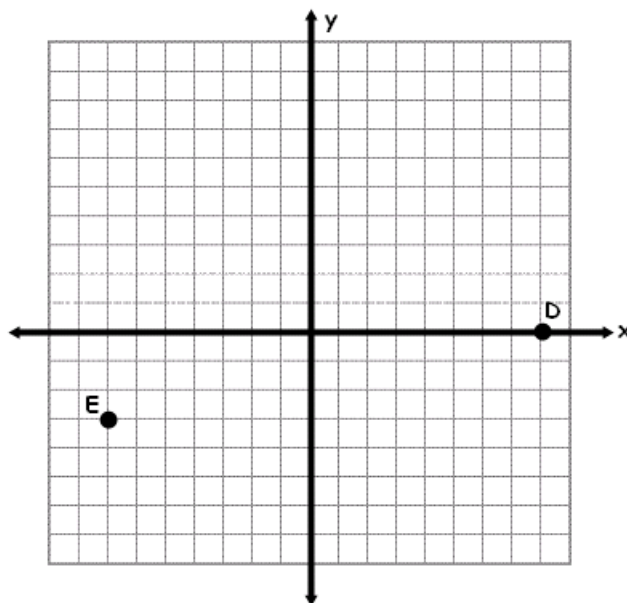
98) D (____, ____)

99) E (____, ____)

100) What are the coordinates of the origin? _____

101) What is the independent variable? _____

102) What is the dependent variable? _____



Linear Relationships

A linear relationship has a constant rate of change.
(This means that for a constant change in x , there is a constant change in y .)

$$y = mx + b$$

m = slope/rate of change/coefficient

b = y -intercept

Are the tables below linear relationships? Explain.

103)

x	y
0	7
1	8
2	9
3	10
4	11
5	12

104)

x	y
0	1
1	2
2	4
3	8
4	16
5	32

105)

x	y
0	27
2	23
4	19
6	15
8	11
10	7

106)

x	y
0	1
1	3
2	5
4	7
5	9
7	11

Identify the slope and y -intercept.

107) $y = 9x - 4$ slope = _____

y -intercept = _____

108) $y = 6 - 16x$ slope = _____

y -intercept = _____

109) $y = 83x$ slope = _____

y -intercept = _____

110) $y = 61$ slope = _____

y -intercept = _____

Percent Increase and Decrease

- Step 1: Calculate the change (subtract the original value from the new value)
Step 2: Divide the change by the original value (you will get a decimal number)
Step 3: Convert that to a percentage (by multiplying 100 and annexing a % sign)

Note: If the new value is greater than the original value, it is a percentage increase, otherwise it is a decrease.

You can also put the values into this formula:

$$\frac{|\text{New Value} - \text{Original Value}|}{\text{Original Value}} \times 100$$

The "|" symbols around the numerator mean **absolute value**, so negatives become positive.

Example: A pair of socks' price was changed from \$5 to \$6. What is the percent of change?

$$\frac{|\$6 - \$5|}{\$5} \times 100 = \frac{\$1}{\$5} \times 100 = 0.2 \times 100 = 20\% \text{ increase}$$

Find the percent of change for the following problems:

111) A price rose from \$5 to \$7. _____ 112) From 90 to 75 _____

113) An item on sale sold for \$13 from \$16 _____

114) At a supermarket, a certain item went from \$0.80/lb. to \$0.75/lb. _____

115) A computer game was purchased for \$24 but then was sold again for \$65 _____

116) Mr. Jacobs purchased a car for \$2800 and sold it for \$2300 _____

Comparing Data Sets

Students planted seeds on the same day and planted them in two different locations. Below are the stem and leaf plots displaying the heights of the plants. Compare the mean, median, and mode of each data set. What conclusions can you draw from the data?

Windowsill Group Heights (cm)

Stem	Leaf
0	5 6 7
1	3 4 5 6
2	0 0 1

Glow Light Group Heights (cm)

Stem	Leaf
0	5 6 7 8
1	7 7 9
2	0 1 5

Mean $\frac{5+6+7+13+14+15+16+20+20+21}{10} = 13.7$

Mean $\frac{5+6+7+8+17+17+19+20+21+25}{10} = 14.5$

Median 14.5

Median 18

Mode 20

Mode 17

The heights under the glow light are taller by about 1 to 3 centimeters.

Students in two different classes took a math test. The grades of the two classes are displayed below. What conclusions can you draw from the data? Which measure is the best representation of the students' grades and why?

Test Grades in Period 1

Stem	Leaf
6	5 8
7	4 6 6 9
8	3 4 7 9

Test Grades in Period 2

Stem	Leaf
7	0 6 7 8
8	2 2 6 9
9	3 4

117) Mean _____

118) Mean _____

119) Median _____

120) Median _____

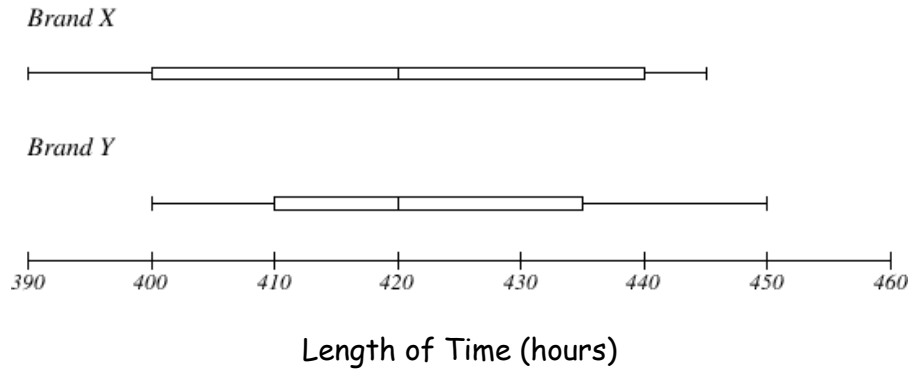
121) Mode _____

122) Mode _____

123) Conclusions:

Determine the median, range, lower and upper quartile for both sets of data and answer the questions that follow.

A researcher tested two different brands of batteries to see how long they lasted. The results are displayed in the double box and whisker plot below. Compare the variability of the two data sets.



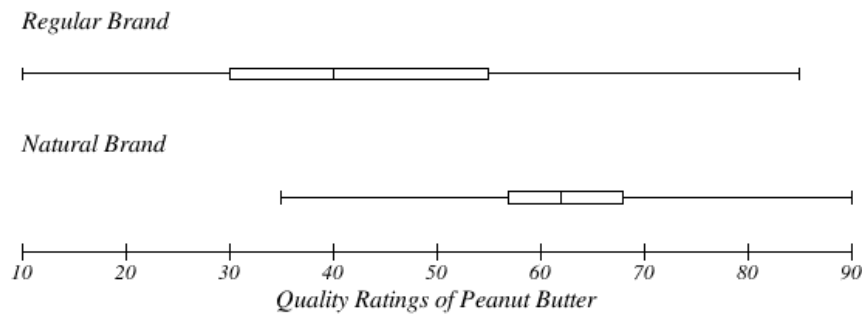
Brand X

Minimum = 390 hours
 Lower Quartile = 400 hours
 Median = 420 hours
 Upper Quartile = 440 hours
 Maximum = 445 hours
 Interquartile Range = 40 hours

Brand Y

Minimum = 400 hours
 Lower Quartile = 410 hours
 Median = 420 hours
 Upper Quartile = 435 hours
 Maximum = 450 hours
 Interquartile Range = 25

Brand X has a greater interquartile range, therefore the data is more variable. Brand Y is more consistent because its data varies less.



Regular Brand

124) Minimum _____
 126) Lower Quartile _____
 128) Median _____
 130) Upper Quartile _____

Natural Brand

125) Minimum _____
 127) Lower Quartile _____
 129) Median _____
 131) Upper Quartile _____

132) Maximum _____

133) Maximum _____

134) Interquartile Range _____

135) Interquartile Range _____

136) Use the measures above to compare the variability of the two data sets.

Extended-Constructed Response:

Please show your work and explain your answer to each of the following questions.

137) In each group, state which one does not belong. Justify your reasoning.

Group 1: 20% of 50; 0.5% of 200; 50% of 20

Group 2: 4% of 600; 60% of 40; 40% of 6

138) Red Cab charges \$4 plus \$2 per mile or $r = 2m + 4$. Blue Cab charges \$6 plus \$1 per mile or $b = m + 6$. For what distance does Red Cab charge the same as Blue Cab? When should you take a Red Cab? A Blue Cab? Justify your reasoning.
