Math 8
Final Exam Review

Name:____________________________

Teacher:________________________

Period: ________

Properties of Addition and Multiplication

1) **Commutative Property of addition and multiplication: (Commutative,x; Commutative,+)**

Changing the order of the numbers without changing the answer. **(#'s commute)**

Examples: A) $2 + 3 = 3 + 2$ B) $4(5) = 5(4)$

2) **Associative Property of addition and multiplication: (Associative,x; Associative,+)**

Moving the **grouping** symbols without changing the answer. **(groups change)**

Examples: A) $6 + (2 + 3) = (6 + 2) + 3$ B) $7(4 \cdot 6) = (7 \cdot 4)6$

3) **Additive Identity Property: (Identity,+) Identity of # does not change**

Any number plus zero equals that number. ***The identity element of addition is zero.***

Examples: $9 + 0 = 9$ $x + 0 = x$

4) **Multiplicative Identity Property: (Identity,x) Identity of # does not change**

Any number times one is that number. *** The identity element of multiplication is one.***

Examples: $4 \cdot 1 = 4$ $x \cdot 1 = x$

5) **Multiplicative Property of Zero: (Zero,x) (Everything becomes zero)**

Any number times zero is zero Example: $10 \cdot 0 = 0$ $x \cdot 0 = 0$

6) **Additive Inverse Property; (inverse,+) (Opposites)**

Any number plus it's opposite equals zero. Example: $12 + -12 = 0$ $x + -x = 0$

7) **Multiplicative Inverse Property; (inverse,x) (Reciprocal)**

Any number times it's reciprocal equals one. Example: $\frac{1}{2} \bullet \frac{2}{1} = 1$

8) **Distributive Property (over addition or subtraction)**

Multiplying a group by a number (term)

Example: $4(x + y) = 4x + 4y$ $2(3x + 4) = 2(3x) + 2(4) = 6x + 8$

Name the property for each of the following:

1) $(13 + 7) + 8 = 13 + (7 + 8)$ ______________________________

2) $0 \bullet (x + 3) = 0$ ______________________________

3) $9 \bullet 5 = 5 \bullet 9$ ______________________________

4) $(62 + 3) + 0 = (62 + 3)$ ______________________________

5) $2(4x + 9) = 8x + 18$ ______________________________

6) $(19 + 8) + 6 = (8 + 19) + 6$ ______________________________

7) $(2 \bullet 3) \bullet 7 = 2 \bullet (3 \bullet 7)$ ______________________________

8) $56 \bullet 1 = 56$ ______________________________

9) $2x + 6y = 2(x + 3y)$ ______________________________

10) $-5 + 5 = 0$ ______________________________

INTEGERS - **ALL** the **whole** numbers **AND** their **opposites**.

Opposite numbers are the same distance from zero on a number line in opposite directions.
For example 5 and -5 are opposites.
Zero is a special integer because it is neither positive nor negative.

Name a number that is not an integer? **Any fraction or decimal**

Name the largest negative integer. **-1**

Name the smallest positive integer. **1**

Absolute Value measures the distance a number is from zero on the number line.

Distance is always POSITIVE, therefore, Absolute Value is ALWAYS POSITIVE.

The symbol for absolute value is "| |."

****Absolute value bars are evaluated like parenthesis. Do whatever is inside the bars first, and then find the absolute value.**

The negative symbol "-" means **opposite**. For example the "opposite of 4" is -4.

ADDING AND SUBTRACTING INTEGERS

Use the same rules for adding and subtracting integers!
Remember: the sign in front of the number goes with the number.
BEWARE OF DOUBLE SIGNS!!
Double negatives = **POSITIVE** Negative w/ a positive = **NEGATIVE**

Same Signs → **ADD AND KEEP** **Different Signs** → **SUBTRACT AND THINK**

MULTIPLYING AND DIVIDING INTEGERS

When MULTIPLYING and DIVIDING **TWO** integers with:
SAME SIGNS your answer will be **POSITIVE**. **DIFFERENT SIGNS** answer will be **NEGATIVE.**

Integer Review

State the additive inverse for each of the following.

1) 24 __________ 2) -44 __________ 3) $\frac{1}{4}$ __________

Compare using > or <.

4) -5 _______ 0 5) 12 _______ 15 6) -15 _______ 15 7) -9 _______ -15

Find the absolute value for each of the following.

8) $|5 + -8|$ = ________ 9) $|-8 + 10|$ = ________ 10) $|7| + |-7|$ = ________

11) Is -7 an integer? ___________ Why or why not? ___________________________________

12) Is 0 an integer? ___________ Why or why not? ____________________________________

13) Is $-\frac{1}{3}$ an integer? _________ Why or why not? ____________________________________

14) When **adding** integers with the **same signs** you _________ the numbers and keep the sign.

15) When **adding** integers with **different signs** you ______________________ the numbers. Keep the sign of the number with the largest absolute value.

16) When **subtracting** integers **follow the rules for** ______________________ integers.

BEWARE of DOUBLE _______________. Change them to addition.

17) When **multiplying/dividing 2** integers with the **same sign** the answer will be _____________.

18) When **multiplying/dividing 2** integers with **different signs** the answer will be ___________.

19) What number is the only integer that is neither positive nor negative? _______

Simplify each of the following.

20) 2 - 5 = ______ 21) -7 + 4 = ______ 22) 20 - 15 = ______ 23) -11 - 20 = ______

24) -6 + 10 = ______ 25) -8 - 12 = ______ 26) -8 + 6 = ______ 27) -7 - 5= ______

28) 10 - -12 = ______ 29) -4 - -9 = ______ 30) -5 • -5 = ______ 31) $\frac{-20}{-4}$ = ______

32) $\frac{-35}{7}$ = ______ 33) -6 • -7 = ______ 34) 2 • -9 = ______ 35) $\frac{-64}{8}$ = ______

Order the integer in order from least to greatest.

46) -42, 53, 8, -31, -5, 11 _______________ 47) -56, -102, 98, -58, 114 _______________

Evaluate each expression.

48) $|-22 + 22|$ _____ 49) $|-22| + |22|$ _____ 50) $-14 - |102|$ _____

Laws of Exponents

Multiplication of Exponents (The bases MUST be the same)
$a^m \bullet a^n = a^{m+n}$

If the bases are the same: **KEEP** the bases and **ADD** the exponents.

When multiplying monomials:

1st) MULTIPLY THE COEFFCIENTS

2nd) ADD THE EXPONENTS OF LIKE BASES

Power of a Power
For any whole numbers a, m, and n:
$(a^m)^n = a^{mn}$

A power raised to another power: **KEEP** the base and **MULTIPLY** the exponents.

Division of Exponents (The bases MUST be the same)
$\frac{a^m}{a^n} = a^{m-n}$

If the bases are the same: **KEEP** the base **SUBTRACT** the exponents.

What happens if the exponents are the same? You subtract the exponents and get 0?
Ex. $\frac{x^3}{x^3} = x^0 = ?$ The final answer will be 1. if $x \neq 0$

What happens if the smaller exponent is on top and the larger on the bottom?
You subtract the exponents and you get a negative exponent?

EX. $\frac{x^4}{x^7} = x^{4-7} = x^{-3}$ **DO NOT leave your answer with a NEGATIVE EXPONENT!**

Leave your answer as a fraction. $\frac{x^4}{x^7} = \frac{\cancel{x} \bullet \cancel{x} \bullet \cancel{x} \bullet \cancel{x}}{\cancel{x} \bullet \cancel{x} \bullet \cancel{x} \bullet \cancel{x} \bullet x \bullet x \bullet x} = \frac{1}{x^3}$

The general rule is $a^{-n} = \frac{1}{a^n}$

Answer the following.

1) Write the standard numeral for each of the following exponential expressions:

a) 2^5 ______ b) $(-3)^4$ ______ c) 2^1 ______ d) 2^3______

e) $(.4)^2$ ______ f) $(-5)^3$ ______

2) Evaluate each of the following expressions if: **x= 3, y= -2, and z = 4**

a) y^2 b) $2xy^2$ c) $y^3 + 2x$ d) $(xy)^2$ e) $3x^4 - 4z$

3) Simplify each of the following. Write your answers in exponential form, with no negative exponents!

a) $x^4 \bullet x^6$______ b) $a^5 \bullet a$ ______ c) $5^8 \bullet 5 \bullet 5^{-4}$ ______

d) $(7^2)(7^4)$ ______ e) $(3^3)(3^{-2})$ ______ f) $(8^{-3})(8^3)$ ______

4) Express each of the following with positive exponents:

a) 3^{-6} ______ b) x^{-2} ______ c) 3^{-4} ______ d) 5^{-2} ______

e) $(4^2)^3$ _______ f) $(5^5)^3$ ______ g) $(9^{-4})^2$ ______ h) $(3^3)^3$ _______

i) $3^6 \div 3^2$ ______ j) $7^{-2} \div 7^{-4}$ ______ k) $\frac{4^5}{4^3}$ _______ l) $\frac{13^{-2}}{13^{-7}}$ _______

Scientific Notation

Scientific notation: Rewrite a number as a product of two factors.

<u>Factor #1</u>: Must be a number greater than or equal to 1, but less than 10.
<u>Factor #2</u>: Must be a power of 10.

The exponent tells you how many places to move the decimal point.
(Numbers greater than 1 have positive exponents.)
(Numbers less than 1, but greater than 0, have negative exponents.)

Standard Form:

Remember the exponent tells you: <u>How many places to move the decimal</u>.

Positive exponents are numbers greater than or equal to <u>1</u>.

Negative exponents are small numbers, numbers between 0 and 1, decimals.

A. Comparing numbers in scientific notation.

Compare the powers of 10 first, if they are the same than compare the decimal number.

B. Adding & Subtracting Numbers in scientific notation.

Example 1: $(2.6 \times 10^7) - (6.9 \times 10^4)$	notice they have different order of magnitude
$(2.6 \times 10^3 \times 10^4) - (6.9 \times 10^4)$	break down a power of 10
$(2600 \times 10^4) - (6.9 \times 10^4)$	write in standard form
$(2600 - 6.9) \times 10^4$	distributive property
2593.1×10^4	evaluate
25,931,000	standard form
2.5931×10^7	scientific notation

Example 2: $(2.3 \times 10^{-27}) + (3.1 \times 10^{-26})$

$(2.3 \times 10^{-1} \times 10^{-26}) + (3.1 \times 10^{-26})$

$(0.23 \times 10^{-26}) + (3.1 \times 10^{-26})$

$(0.23 + 3.1) \times 10^{-26}$

3.33×10^{-26} scientific notation

B. Multiplying numbers in scientific notation.

Multiply the decimal numbers first, than multiply the powers of 10 using the laws of exponents. Be sure your final answer is in scientific notation!

Example: $(4.5 \bullet 10^3) \bullet (6.3 \bullet 10^7) \rightarrow 4.5 \bullet 6.3 = 28.35$

$\rightarrow 10^3 \bullet 10^7 = 10^{10}$

$28.35 \bullet 10^{10}$ → This is **NOT** in scientific notation because 28.35 is greater than 10.

$2.835 \bullet 10^{11}$ → This is in scientific notation because 2.835 is ≥ 1 and less than 10.

C. Dividing numbers in scientific notation.

Divide the decimal numbers first, then divide the powers of 10 using the laws of Exponents (keep the base, subtract the exponents).

Be sure your final answer is in scientific notation!

1) Write the following in scientific notation.

a) 56,000,000,000 ______________

b) 0.000434 ______________

c) 32.7×10^{5} ______________

d) 231×10^{-3} ______________

2) Write the following in standard form.

a) 5.16×10^{-4} ___________

b) 2.13×10^{7} _____________

3) Perform each operation. Make sure your answer is in scientific notation!

a) $(8 \times 10^{-2})(2 \times 10^{8})$

b) $(2.5 \times 10^{9})(4.8 \times 10^{-3})$

c) $(5.2 \times 10^{-9})(2.3 \times 10^{-2})$

d) $\dfrac{6 \times 10^{5}}{2 \times 10^{2}}$

e) $(1.5 \times 10^{5}) \div (5 \times 10^{2})$

f) $\dfrac{9 \times 10^{6}}{3 \times 10^{3}}$

4) Mars is approximately 6×10^{7} km away from Earth. If the moon is approximately 3×10^{5}, how much greater is the distance to Mars than the distance to the moon?

Equation Solving

When Solving Equations the Goal is to Get the Variable by Itself.
Solving equations our **GOAL** is to get the **VARIABLE** by itself.

What separates one side of the equation from the other side? =

Get rid of any parentheses. How do we get rid of parentheses? **DISTRIBUTIVE PROPERTY**

You need to simplify each side of the equation by **COMBINE LIKE TERMS.**

We need all VARIABLE TERMS on one side & **CONSTANT** TERMS on the OPPOSITE SIDE.

We move terms to OPPOSITE sides using **INVERSE** operations
3-Step Check: 1) Rewrite 2) Replace 3) PROVE
Literal Equation -- an equation in which known quantities are expressed with letters

Formula -- A type of literal equation that shows a relationship between quantities
- When you use a literal equation you may be asked to solve it for one variable in terms of the others
- To do this--pretend that all the other variables except for the one you are solving for are numbers and proceed by following the steps for solving equations.

Sometimes, a linear equation can also have **no solution**, or **infinite number of solutions**.

One Solution	**No Solution**	**Infinite Number of Solutions**
$2x = x + 1$ $-x \quad -x$ $x = 1$ Only one number makes the equation true.	$x + 1 = x + 2$ $-x \quad -x$ $1 \neq 2$ Since $1 \neq 2$ can never be true, there are NO numbers that can make the equation true. This type of equation is called a **CONTRADICTION**.	$x + 3 = x + 3$ $-x \quad -x$ $3 = 3$ Since 3 = 3 is always true, you can substitute ANY number for x and the equation will be true. This type of equation is called an **IDENTITY**.

An **Identity**—An equation that is true for all values of the unknown. It has an **infinite number of solutions**.

A **Contradiction**—An equation having **no solution.**

Equations Review

Solve the following equations algebraically.

1) $4x - 7 = 2x + 15$

2) $11(2c + 8) = -22$

3) $4(-5x + 4) - 2x = -7(2x + 4)$

4) $\frac{3}{7}x - 12 = -27$

5) $\frac{2x-5}{3} = 5$

6) $\frac{1}{4}(-16x + 32) = \frac{1}{2}(4x - 32)$

7) $3.2x - 7.1 = 6.8 - 1.8x$

8) $0.4(y - 9) = 0.3(y + 4)$

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

Solve each equation algebraically for the given variable.

10) Solve for **w**: $v = l \bullet w \bullet h$

11) Solve for **s**: $\frac{r+s}{9} = y$

12) Solve for **x**: $y + xb = 12$

Solve each equation for *x* in terms of the other variables

13) $a + x = bc$

14) $bx - a = 5a + c$

15) $3(2x - h) = v$

Solve each equation if possible. State whether the equation is an Identity or a Contradiction and explain what that means in terms of the solution.

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

17) $2x + 9 = 2(x + 4) + 1$

Define a variable(s), write an equation and solve each word problem. Final answer is a sentence.

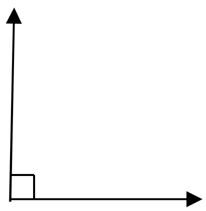
18) When four times a number is decreased by 12, the result is -36. Find the number.

19) Together two items cost \$130. One item costs \$8 more than the other. Find the cost of each item.

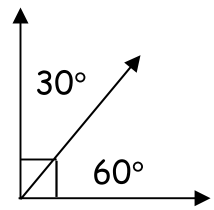
<u>**Geometry**</u>

Angle Relationships

Complementary Angles – Two angles are complementary if the **SUM** of their angle measures is 90°. Complementary angles form corners (right angles).



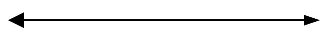
Right angle



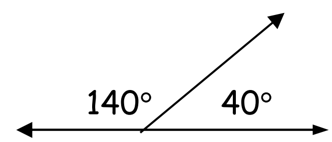
Adjacent **complementary angles**

30° and 60° angles are **complementary** because 30° + 60° = 90°

Supplementary Angles - Two angles are supplementary if the **SUM** of their angle measures is 180°. Supplementary angles form straight lines.



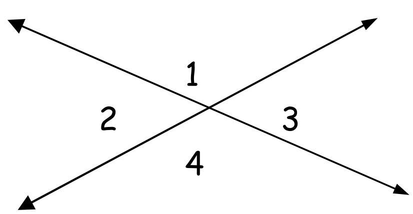
Line 180°



Adjacent **supplementary angles**

40° and 140° angles are **supplementary** because 40° + 140° = 180°.

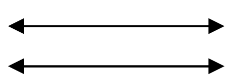
Vertical Angles – Vertical angles are congruent (≅) angles formed by the intersection of two lines. They are opposite each other and have congruent (≅) measurements.



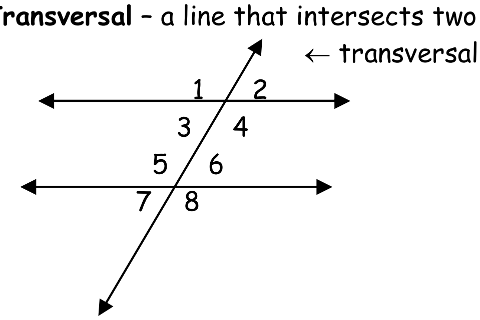
$\angle 1 \cong \angle 4$ and $\angle 2 \cong \angle 3$

Why? **They are vertical angles.**

Parallel Lines – lines in the same plane that **DO NOT** intersect



Transversal – a line that intersects two lines to form eight angles



Interior Angles: ∠3, ∠4, ∠5, ∠6 (inside parallel lines)

Exterior Angles: ∠1, ∠2, ∠7, ∠8 (outside parallel lines)

Alternate Interior Angles – Interior angles found on opposite sides of the transversal.
When two parallel lines are cut by a transversal the alternate interior angles are congruent.
Examples: $\angle 3$ & $\angle 6$, $\angle 4$ & $\angle 5$
Alternate Exterior Angles - Exterior angles found on opposite sides of the transversal.
When two parallel lines are cut by a transversal the alternate exterior angles are congruent.
Examples: $\angle 1$ & $\angle 8$, $\angle 2$ & $\angle 7$
Corresponding Angles – angles that hold the same position on two different lines cut by the transversal. When two parallel lines are cut by a transversal the corresponding angles are congruent. Examples: $\angle 1$ & $\angle 5$, $\angle 2$ & $\angle 6$, $\angle 3$ & $\angle 7$, $\angle 4$ & $\angle 8$
Vertical Angles – angles formed by the intersection of two lines. They are opposite each other and have congruent angle measurements.
Examples: $\angle 1$ & $\angle 4$, $\angle 2$ & $\angle 3$, $\angle 5$ & $\angle 8$, $\angle 6$ & $\angle 7$
Supplementary Angles – two angles whose sum is $180°$. Supplementary angles form straight lines.
Examples: $\angle 1$ & $\angle 2$, $\angle 3$ & $\angle 4$, $\angle 5$ & $\angle 6$, $\angle 7$ & $\angle 8$, $\angle 3$ & $\angle 1$, $\angle 4$ & $\angle 2$, $\angle 7$ & $\angle 5$, $\angle 8$ & $\angle 6$
Consecutive Interior Angles - The pairs of angles on one side of the transversal but inside the two lines are called Consecutive Interior Angles. Consecutive Interior Angles are supplementary.
Examples: $\angle 4$ & $\angle 6$, $\angle 3$ & $\angle 5$

Triangles

The **sum** of the measure of the angles of a triangle is equal to ___________ degrees.

$m\angle 1 + m\angle 2 + m\angle 3 =$ _______

The **Triangle Inequality** states that the third side must measure between the sum and difference of the other two sides.

Example 1: Could 7 m, 8 m, & 5 m be the three sides of a triangle?

Pick any two sides of the triangle:

8 – 7 = 1 AND 8 + 7 = 15 AND the third side, 5 is between 1 and 15

OR 7 - 5 = 2 AND 7 + 5 = 12 AND the third side, 8, is between 2 and 12

OR 8 - 5 = 3 AND 8 + 5 = 13 AND the third side, 7 is between 3 and 13

Yes, 7 m, 8 m, and 5 m could be the three sides of a triangle.

Example 2: Could 4 m, 2 m, & 6 m be the three sides of a triangle?

Pick any two sides of the triangle:

4 - 2 = 2 **and** 4 + 2 = 6 the third side, 6 is not between 2 and 6

6 - 4 = 2 **and** 6 + 4 = 10 the third side, 2 is not between 2 and 10

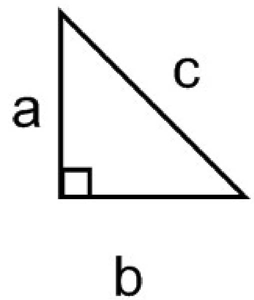
6 - 2 = 4 **and** 6 + 2 = 8 the third side, 4 is not between 4 and 8

No, 4 m, 2 m, & 6 m could NOT be the three sides of a triangle.

IMPORTANT FACTS

- The number of congruent sides is equal to the number of congruent angles and vice versa.
- Largest angle is opposite the longest side and vice versa.
- Smallest side is opposite smallest angle and vice versa.

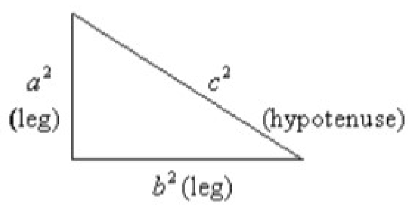
Right Triangles



- In a right triangle, the sides that form the right angle are called the legs. (sides a and b)
- The side opposite the right angle is called the hypotenuse. (Side c)
- The hypotenuse is always the longest side of a right triangle.

The Pythagorean Theorem

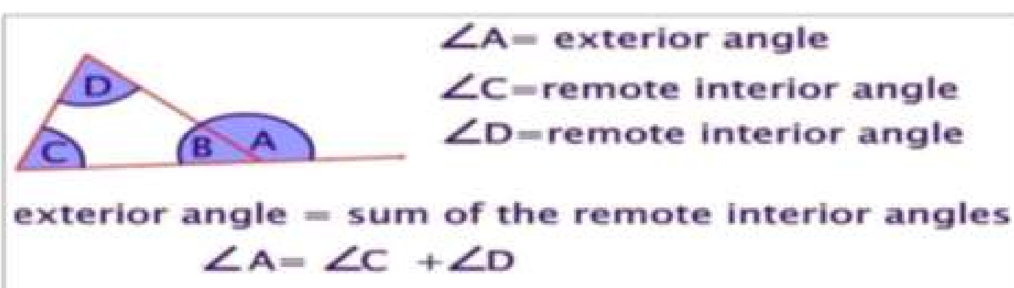
A triangle is a right triangle if and only if the sum of the squares of two sides of the triangle is equal to the square of the measure of the third side of the triangle.



$$a^2 + b^2 = c^2$$

$$(\text{leg})^2 + (\text{leg})^2 = (\text{hypotenuse})^2$$

Remote Interior Angles

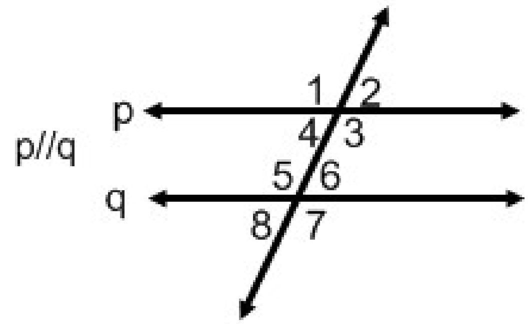


Geometry Review

Important Vocabulary:

Point, line, plane, line segment, ray, angle, obtuse, acute, straight angle, vertical angles, congruent, perpendicular, adjacent angles, complementary, supplementary, parallel, transversal, alternate interior angles, alternate exterior angles, corresponding angles,
Triangles (acute, obtuse, right, scalene, isosceles, equilateral), triangle inequality
Pythagorean Theorem,

Use the diagram to the right to name a pair of:



1) Vertical angles

2) Corresponding angles

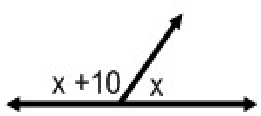
3) Alternate interior angles

4) Alternate exterior angles

5) Supplementary

6) If $m\angle 1$ is 123°, state the measure of all the other angles.

Each pair of angles is either complementary or supplementary.
Solve for x. Then find the measure of each angle.

7)


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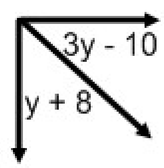

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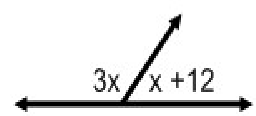
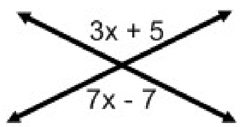


Determine the relationship shown. Solve for x. Then find each angle measure.

10) 

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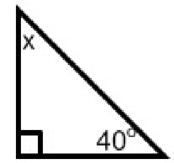
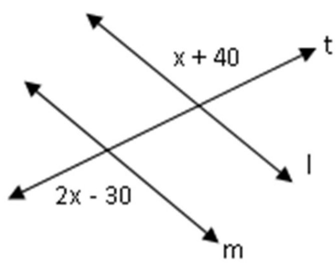
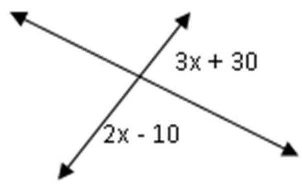
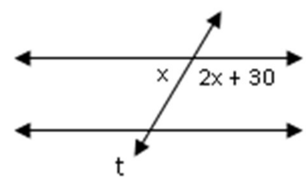
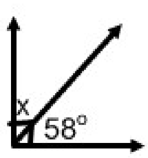
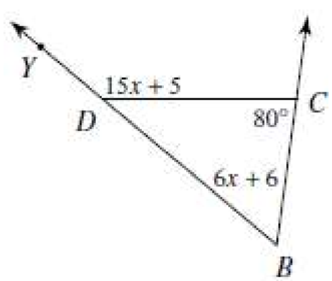
12) 

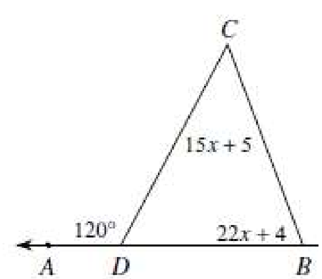
13) 

14) 

15) 

16) 

17) 

18) 

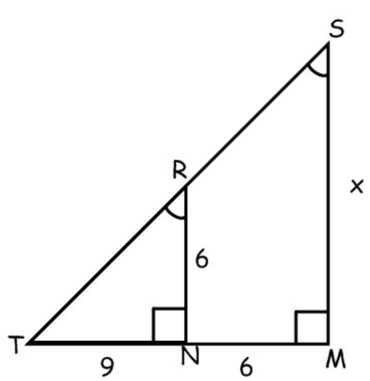
19) Could 48°, 37°, 111° be measures of angles of a triangle?

20) The measure of an acute angle in a right triangle is 32^0. Find the measure of the other acute angle.

21) State whether 8, 6, 9 could be the three sides of a triangle. Show work to support your answer.

22) The lengths of two sides of a triangle are 6 in. and 9 in. What can you say about the length of the third side?

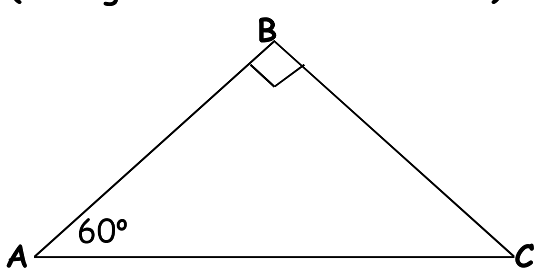
23) The following triangles are similar. Solve for the missing side.



24) A 6-foot man casts a 7-foot shadow. Find how tall a nearby building is if casts a 21-foot shadow?

25) A 50-foot tree fell towards a house. The base of the tree was 40 feet from the house. How high up did the tree hit the house?

Use the following triangle to answer questions 26-31.
(Triangle Not Drawn To Scale.)



26) Name the smallest side = ________

27) Name the smallest angle = ________

28) Name the largest side = __________

29) Name the largest angle = _________

30) Classify Δ by it **sides**. ____________________

31) Classify Δ by it **angles**. ___________________

Use ΔABC to answer questions 32-37.
(Triangle Not Drawn To Scale.)

32) Name the smallest side. ______________

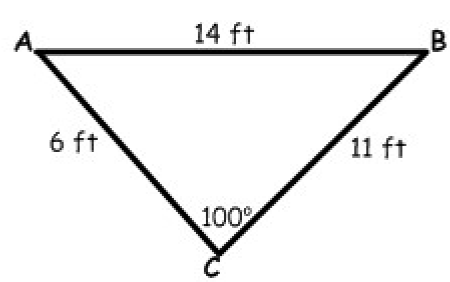
33) Name the smallest angle. _____________

34) Name the longest side. _______________

35) Name the largest angle. _______________

36) Classify by its sides. _________________

37) Classify by its angles. _______________



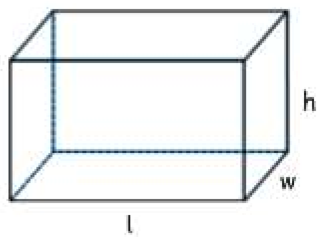
Volume: the amount of space a 3-dimensional object holds.

FORMULAS

V = Bh, where B is the area of the base and h is the height of the solid

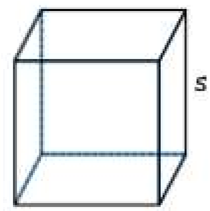
Right Rectangular Prism

$V = lwh$



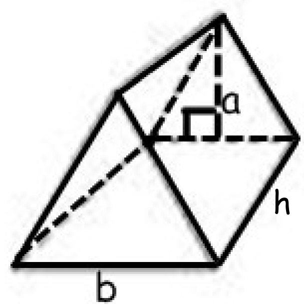
Cube

$V = s^3$



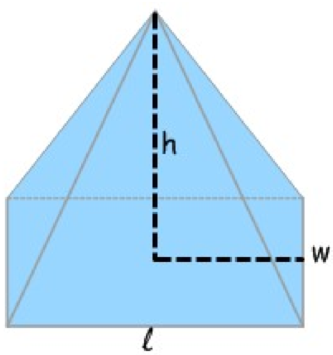
Right Triangular Prism

$V = \frac{1}{2} abh$



Rectangular Pyramid

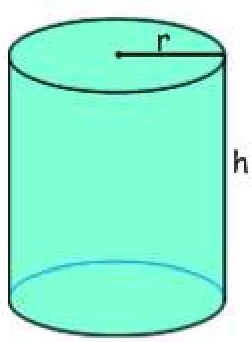
$V = \frac{Bh}{3}$ $\quad V = \frac{1}{3} Bh$ Remember, B is the area of the base



Right Circular Cylinder

(Exact & Approximate)

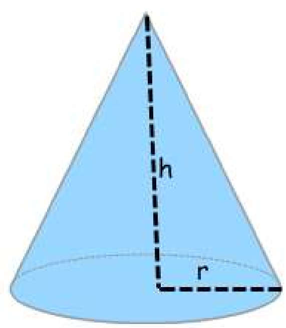
$V = \pi r^2 h$



Cone

(Exact & Approximate)

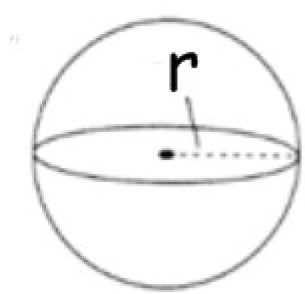
$V = \frac{\pi r^2 h}{3}$



Sphere

(Exact & Approximate)

$V = \frac{4}{3}\pi r^3$

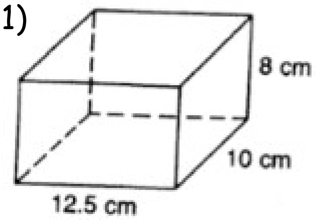


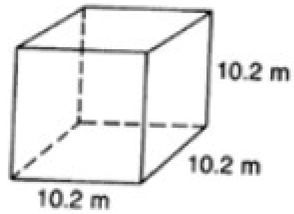
Exact volume means leave your answer in terms of π.

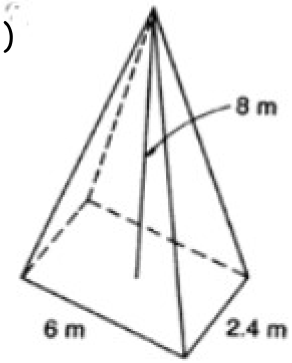
Approximate volume means use you're the π button on your scientific calculator.

Volume Review

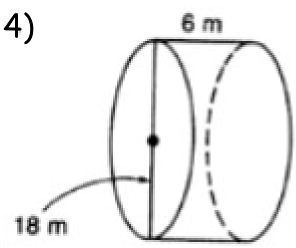
Find the volume of each of the following; show all work step – by – step.

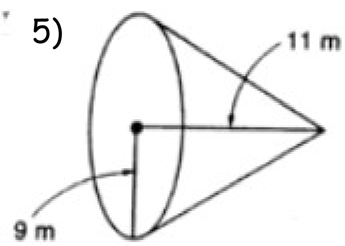
1) 

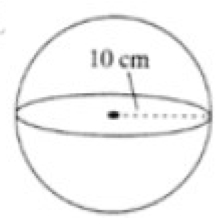
2) 

3) 

Find the exact AND approximate volume. Round to the nearest tenth.

4) 

5) 

6) 

Exact Volume ____________ Exact Volume ____________ Exact Volume __________

Approximate Volume _______ Approximate Volume_______ Approximate Volume______

7) A store keeps about 240 boxes of crayons in its inventory. If each box of crayons measures 6 inches by 2.5 inches by 4 inches, how many cubic inches is needed to store ALL of the boxes in its inventory?

8) A cylindrical storage tank has a diameter of 6m and a height of 5m. What is the volume of the storage tank? Round your answer to the nearest tenth.

9) If the volume of a cylinder with a radius of 3m is 81π m^3, what is the height?

10) The volume of a rectangular prism is 40 m^3. If the width is 2m and the length is 4m, what would the height be for the rectangular prism?

Transformations

(Flips, Slides & Turns)

A **transformation** is a change of position, shape or size of a figure.
The figure you get after a transformation is called the **image.**
To name the image of a point you use **prime notation**. Ex. A to A'

<u>4 Types of Transformations:</u>

1) Reflection – a change of position. It FLIPS a figure over a line of reflection (x axis or y axis).

2) Translation – MOVES points the same distance and in the same direction.

3) Dilations – changes the SIZE of an image. The image can be either larger or smaller than the original figure.

4) Rotations – TURNS a figure about a fixed point called the center or rotation.
Reflections, Translations and Rotations **do not affect the size or shape. The images are congruent to the original figure.**

<u>Transformation Rules</u>

Reflection over the x – axis: $(x, y) \rightarrow (x, -y)$

Reflection over y – axis: $(x, y) \rightarrow (-x, y)$

Reflection over line y = x: $(x,y) \rightarrow (y, x)$

Rotate 90° clockwise: $(x, y) \rightarrow (y, -x)$

Rotate 90° counter-clockwise: $(x, y) \rightarrow (-y, x)$

Rotate 180° $(x, y) \rightarrow (-x, -y)$

Dilation: $(x, y) \rightarrow (Kx, Ky)$, where K is the scale factor

Translations $P(x, y) \rightarrow P'(x + a, y + b)$

Remember, negate means to take the opposite

A **rigid transformation** or an **isometry** does not change the size of the figure. The image and pre-image are congruent.

Transformation Review

Transformation Rules:

Reflection over the x-axis P (x, y) $\rightarrow$ P' (______, ______)

Reflection over the y-axis P (x, y) $\rightarrow$ P' (______, ______)

Reflection over the line y = x P (x, y) $\rightarrow$ P' (______, ______)

Translations P (x, y) $\rightarrow$ P' (x + a, y + b)

Dilations P (x, y) $\rightarrow$ P' (______, ______)

Rotations of 90° clockwise P (x, y) $\rightarrow$ P' (______, ______)

Rotations of 90° counterclockwise P (x, y) $\rightarrow$ P' (______, ______)

Rotations of 180° P (x, y) $\rightarrow$ P' (______, ______)

Fill in the blank.

1) An __________________ is a transformation in which the pre-image and the image are congruent.
2) Which transformation(s) are an isometry? ____
3) Which transformation(s) are NOT an isometry? ____
4) Which transformation is a slide in the coordinate plane? ________________________________
5) Which transformation is a flip in the coordinate plane? ________________________________
6) Which transformation is a turn in the coordinate plane? ________________________________
7) Which transformation changes the size of the figure? _________________________________
8) In a dilation if the scale factor is greater than one then the image will get ______________.
9) In a dilation if the scale factor is less than one then the image will get ______________.
10) In a dilation, what operation is used with the scale factor? ______________
11) If point A(-2, 7) is reflected over the **x-axis** what is A'? A'_______________
12) What quadrant will A' (from #11) lie in? ___________
13) If point B(2, 2) is reflected over the **y-axis** what is B'? B' _______________
14) What quadrant will B' (from #13) lie in? ___________
15) If point C(-5, -3) is dilated with a scale factor of 3 what is C'? C' _____________
16) If point D(-8, 4) is dilated with a scale factor of 0.5 what is D'? D' _____________

17) Find the scale factor of the dilation given:

A (2, 0) B (2, 2) C(4, 0) ⇒ A′ (5, 0) B′ (5, 5) C′ (10,0) __________

18) If point E (6, -7) is translated using the translation rule (x - 3, y + 9) what is E′ _______ and in what quadrant will E′ lie? ________

19) Point G (2, -5) is translated $T_{-3, 8}$ what is G′? G′ ______________

20) Point H (8, 4) is translated 5 units to the right and 7 units up what is H′? H′_____________

21) Rotation 90° clockwise turns **once** to the _______________.

22) Rotation 90° counterclockwise turns **once** to the _______________.

23) Rotation 180° turns _______________.

24) Point J (7, 2) is rotated 90° clockwise what is J′? J′ __________

25) Point K (-3, 15) is rotated 90° counterclockwise what is K′? K′ ____________

26) Point L (-12, 7) is rotated 180° what is L′? L′ _____________

27) If point A (8, -4) is rotated 90° counterclockwise what is A′ ? ________

28) If point A (8, -4) is rotated 90° clockwise what is A′ ? ________

29) If point B (5, 6) is rotated 180° what is B′ ? ________ What quadrant will B′ lie in? _______

30) If point C (-3, 2) is dilated with a scale factor of 3 in what quadrant will C′ lie? ________

31) If point C (5,-2) is reflected over the line y = x what is C′ ? ________

32) If point D (10, -5) is reflected over the line y = x what is D′? ________

33) Triangle *A′B′C′* is the image of Δ*ABC* under a dilation such that Δ*A′B″C′* is 3 times the size of ΔABC . Triangles *ABC* and *A′B′C′* are

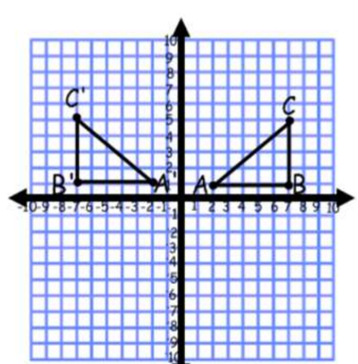
A) congruent but not similar
B) similar but not congruent
C) both congruent and similar
D) neither congruent nor similar

34) Find the translation rule A (5, 7) A′ (2, -1) __________________________

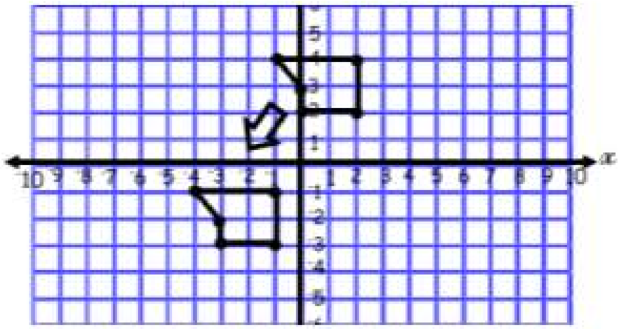
35) Find the translation rule B (2, 3) B′ (5, 1) __________________________

36) Find the scale factor of the following dilation: A (-8, 6) → A′ (-12, 9) ______________

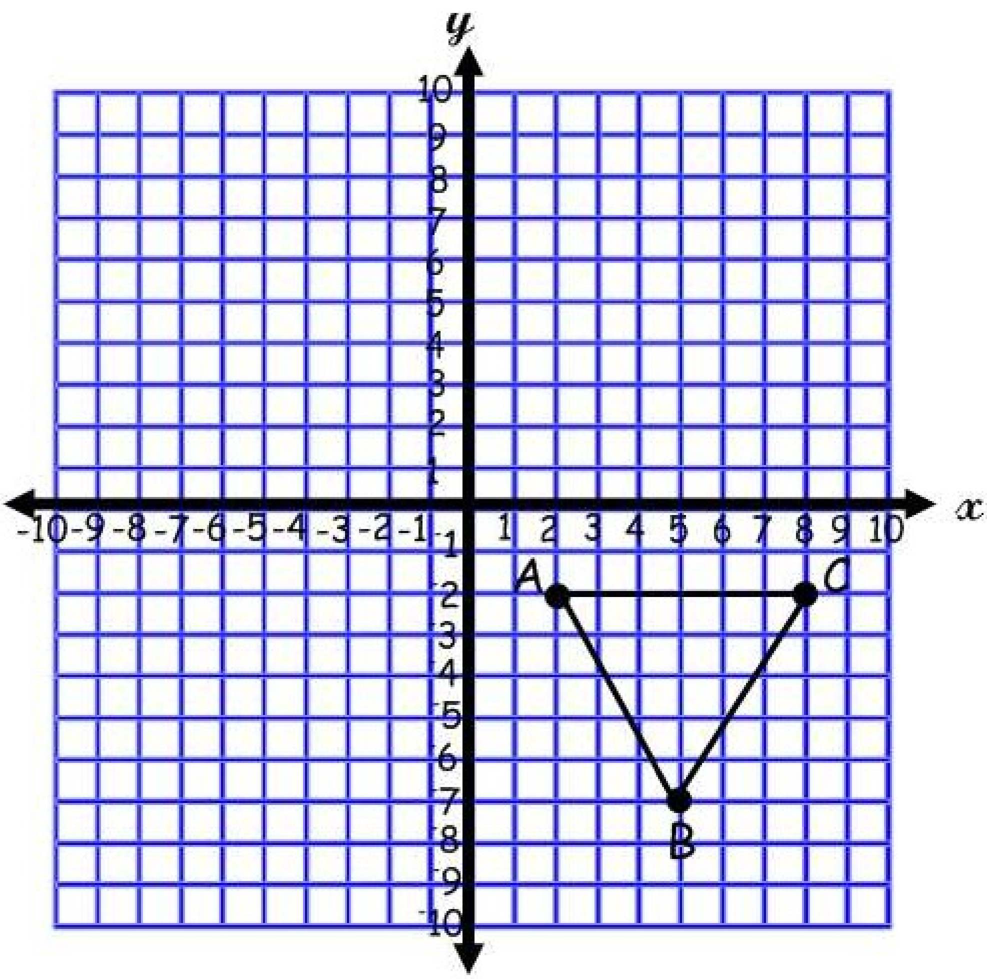
37) Identify the transformation to the right. Justify your answer.



38) Use the graph below to find the translation rule. Rule: ________________________



39) Given ΔABC A(2, -2), B(5, -7), C(8, -2) graph ΔA'B'C' after rotating ΔABC 180°clockwise, then reflect ΔA'B'C' over the x axis and graph ΔA"B"C"

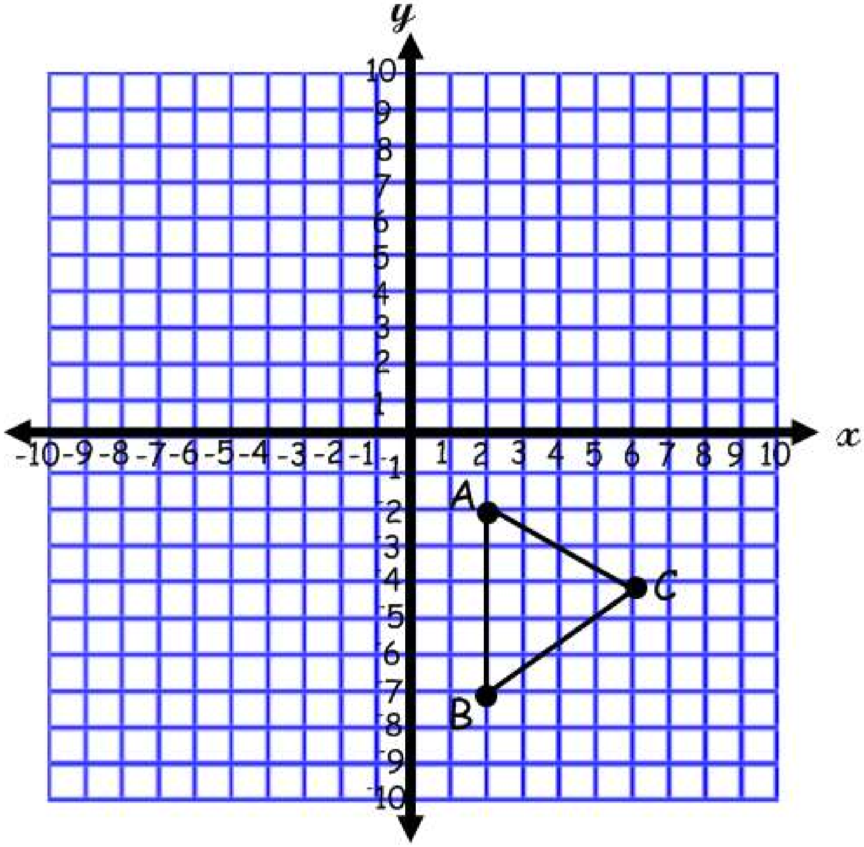


A' _________ A" _________

B' _________ B" _________

C' _________ C" _________

40) Given A(2, -2), B(2, -7), C(6, -4). Translate ΔABC left 6 units and to the up 8 units and then reflect ΔA'B'C' over the y axis and label ΔA"B"C".

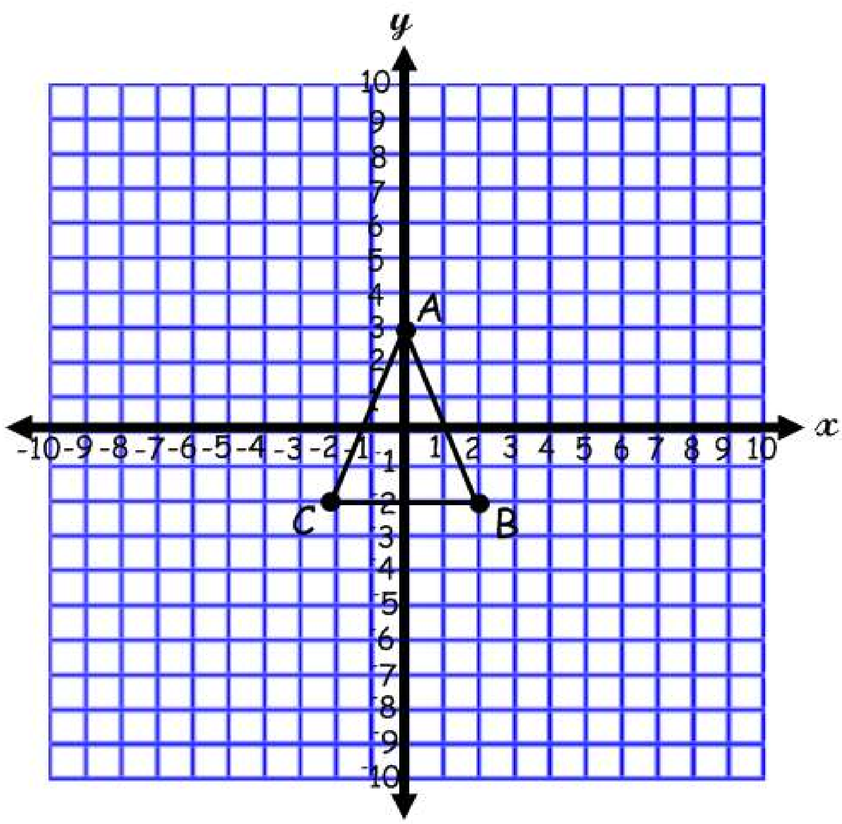


A' __________ A" __________

B' __________ B"' __________

C' __________ C" __________

41) Given ΔABC A(0, 3), B(2, -2) & C(-2, -2), find the coordinates in **prime notation**, of the image after a **dilation with a scale factor of 2**. Graph the image.



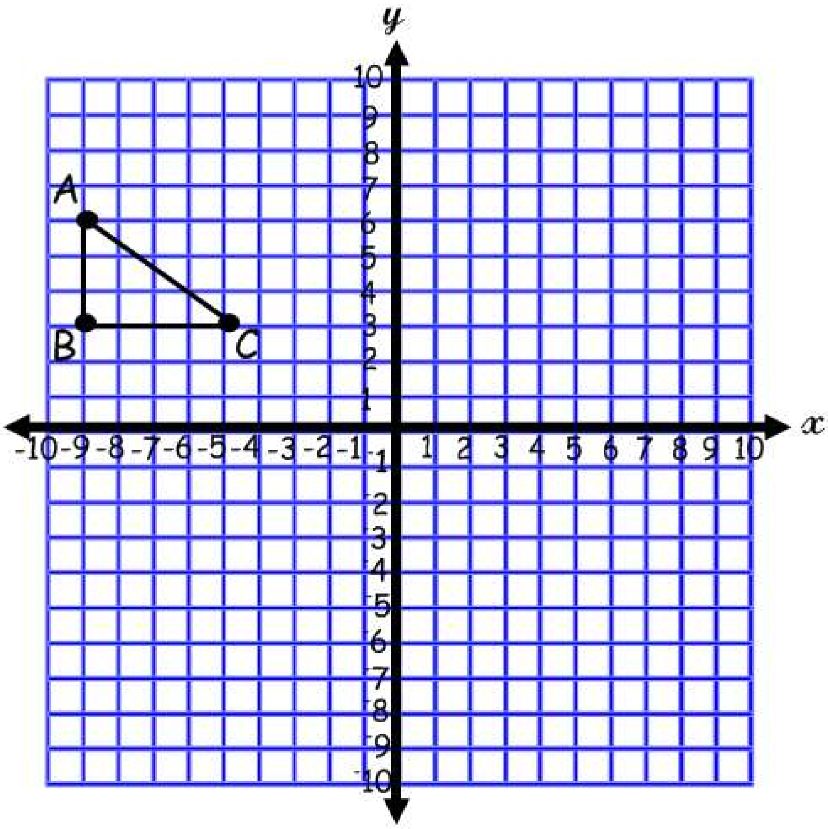
Coordinates of the Image

____

____

____

42) Given ΔABC, A(-9,6), B(-9, 3) & C(-5, 3). Rotate 90° clockwise and label. Then translate $\Delta A'B'C'$ using $T_{-5,-7}$ and label.



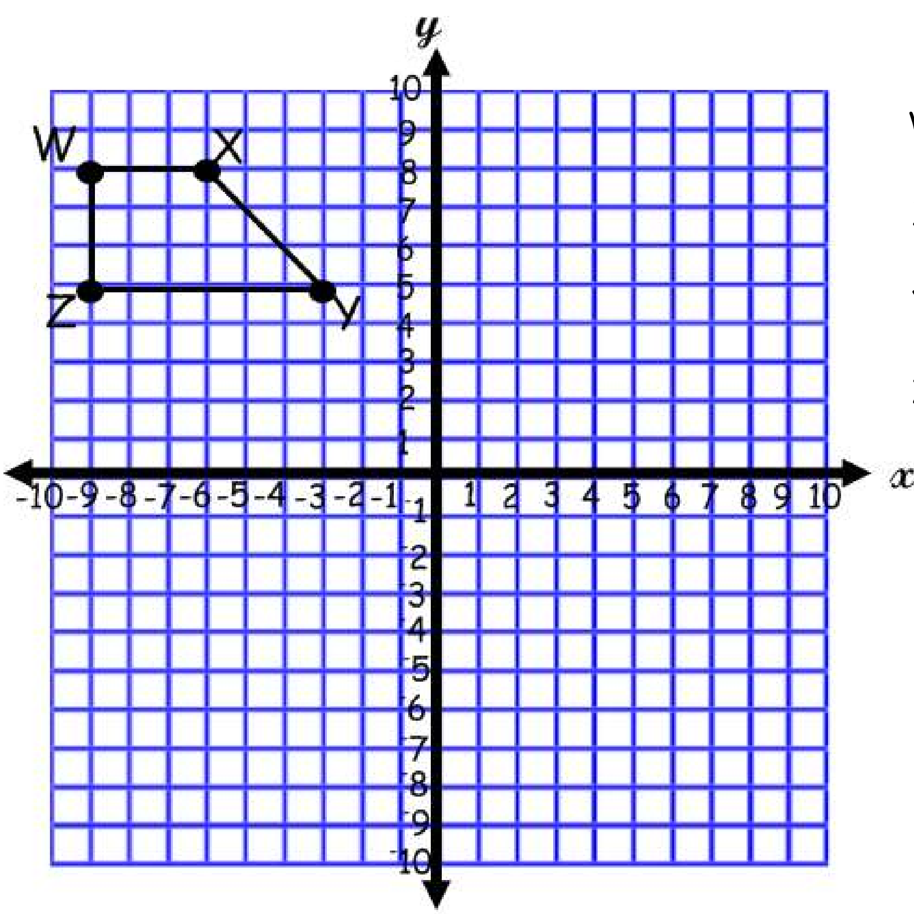
Coordinates of the Images

____________ ____________

____________ ____________

____________ ____________

43) Graph the image of trapezoid WXYZ after rotating it 180°, then translate trapezoid W'X'Y'Z (x – 10, y + 4). Write the coordinates of the images.



W' __________ W" __________

X' __________ X" __________

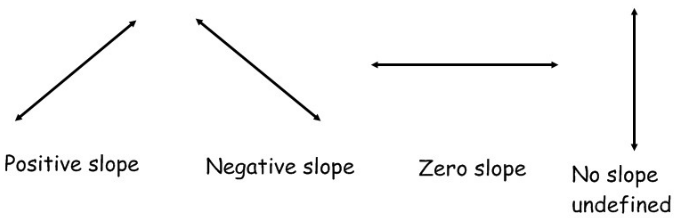
Y' __________ Y" __________

Z' __________ Z" __________

Graphing

Slope - measures the steepness of a line.

Vertical lines have **no slope** or **undefined slope.**



Slope is generally represented by the variable "**m**".

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{\Delta y}{\Delta x}$$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$, when you are finding the slope you should be CONSISTENT!

There are different methods for graphing linear equations:

T-Chart: If you choose this method use at least 4 values for x.

**** **Slope-Intercept**: **y = mx + b,** where m is slope and b is the y-intercept

x and y intercepts: to find the x-intercept let y = 0 and solve for x.
to find the y-intercept let x = 0 and solve for y.

$y = -2x + 3$

x	-2x + 3	y	(x, y)
2	−2(2) +3	−1	(2, -1)
1	−2(1) +3	1	(1, 1)
0	−2(0) +3	3	(0, 3)
-2	−2(−2) +3	7	(−2, 7)

$y = -2x + 3$

$m = \dfrac{-2}{1}$

y-intercept = 3

$y = -2x + 3$

y-intercept

$y = -2(0) + 3$

$y = 3$

(0, 3)

x-intercept

$0 = -2x + 3$

$-3 = -2x$

$\dfrac{3}{2} = x$

$(\dfrac{3}{2}, 0)$

SYSTEMS of EQUATIONS

A system of linear equations in two variables is a set of two linear equations with the **same** variables.

A **solution** of a linear system is an **ordered pair** that is a **solution of each equation** in the system.

If a system of linear equations has a solution, than the **graphs** of the equations **intersec**t.

Is (3, 2) a solution to the system: TEST (3, 2) IN EACH EQUATION

$2x + 4y = 14$

$3x - 5y = -1$

Graphically:

Write each equation in slope-intercept form and GRAPH them on the same coordinate plane.

a. If the lines intersect, the solution is the point of intersection. Check the point of intersection is by substituting it into **BOTH** equations. Intersecting lines have different slopes.
b. If the lines are parallel, there is no point of intersection, therefore there is no solution to the system. Parallel lines have the same slope, but different y-intercept.
c. If the lines are coincident (the same line), the solution to the system is any point on the line(s), therefore there are an infinite number of solutions. Coincident lines have the same slope and the same y-intercept.

Substitution Method

- Solve one of the equations for one of the variables.
- Substitute the resulting algebraic expression in the second equation.
- Solve the second equation for the second variable.
- Substitute the resulting value in either equation.
- Solve for the first variable.

Check by substituting both values in both equations.

Elimination:

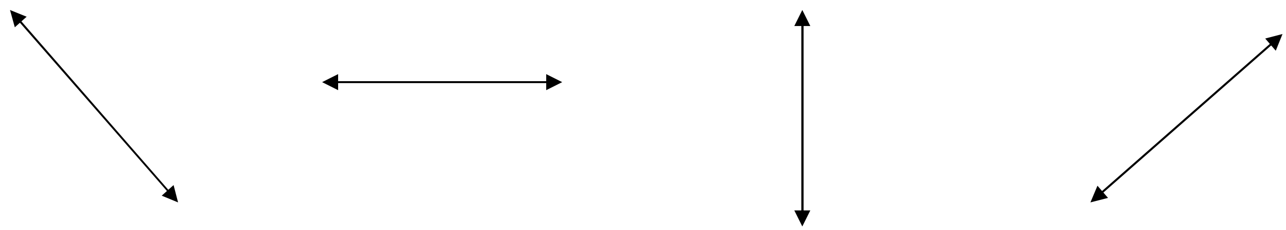
- Decide which variable you want to eliminate.
- Multiply one or both equations by constants so that the coefficients of the variable you want to eliminate are opposites.
- Add
- Solve the resulting equation.
- Substitute the solution into the either ORIGINAL equation.
- Solve

Check both solutions in both equations.

Graphing Review

1) What is the slope of the line that passes through the points (2, 4) and (5, -3). Show all work by using the formula.

2) Classify the slope of each line as positive, negative, zero, or undefined.



________________ ________________ ________________ ________________

3) Is (1, 3) a solution to the equation $2 = x - y$ ___________

4) Is (-1, 2) a solution to the system $y = -x + 1$ and $y = 2x + 4$ ___________

5) Given the equation $y = \frac{1}{3}x - 7$. The slope is ___________. The y-intercept is ___________.

6) Given the equation $2x + 5y = 10$. What is the slope? _____ What is the y-intercept? ____

7) The point (-2, -2) is associated with which quadrant or axis? _____________

8) The point (-5, 0) is associated with which quadrant or axis? _____________

9) Write the equation of a line with a slope of 2 and a y-intercept of -5. ______________

10) Given $m = -\frac{1}{2}$ and $b = -4$. Write the equation of a line in slope-intercept form ___________

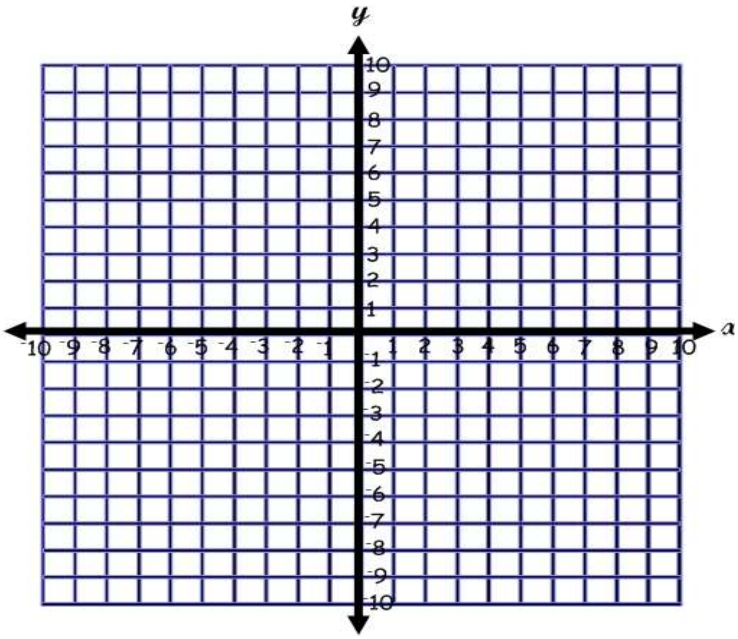
11) Find the slope and y intercept for the equation $y = 8$ ___________

12) Tell whether (-8, 3) is a solution of the equation $y = \frac{1}{2}x - 1$. Show work.

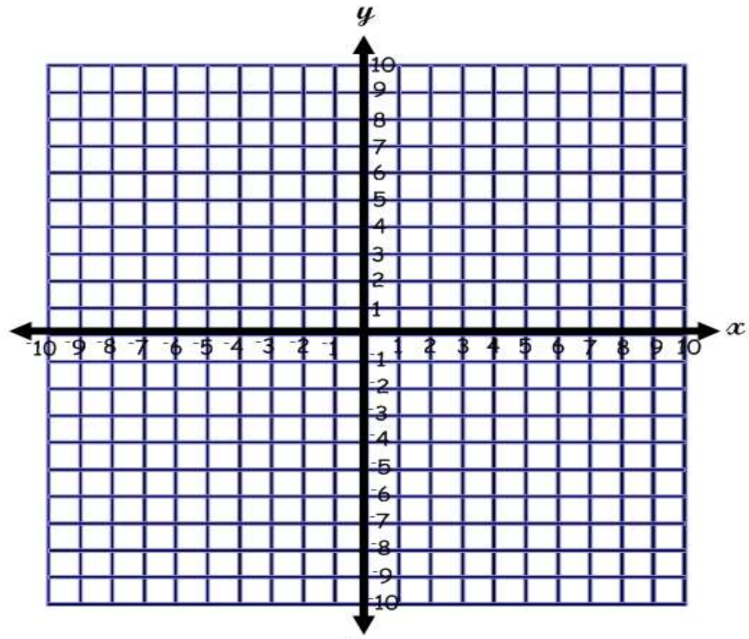
13) Find the corresponding value for y when x = 21 for $y = \frac{1}{3}x - 3$. Show work below. ________

Given a point and the slope of a line graph each line. Label the point.

14) (-3, 2) slope = $\frac{-3}{4}$



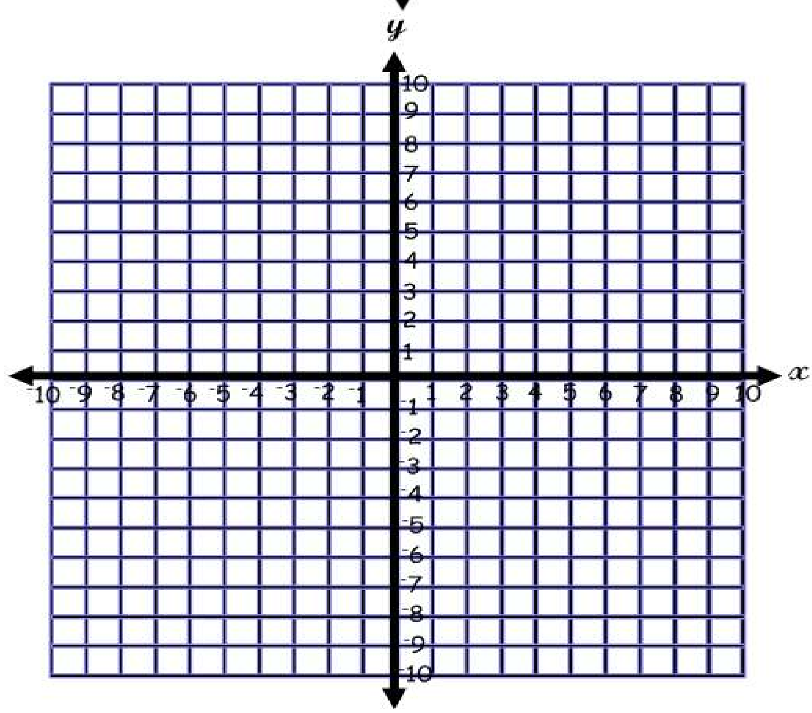
15) (5, -6) slope = 0



16) Graph y = -3x + 8 Show work and Label!!

Slope = ___________

Y intercept = __________



17) Use the graph to answer all questions.

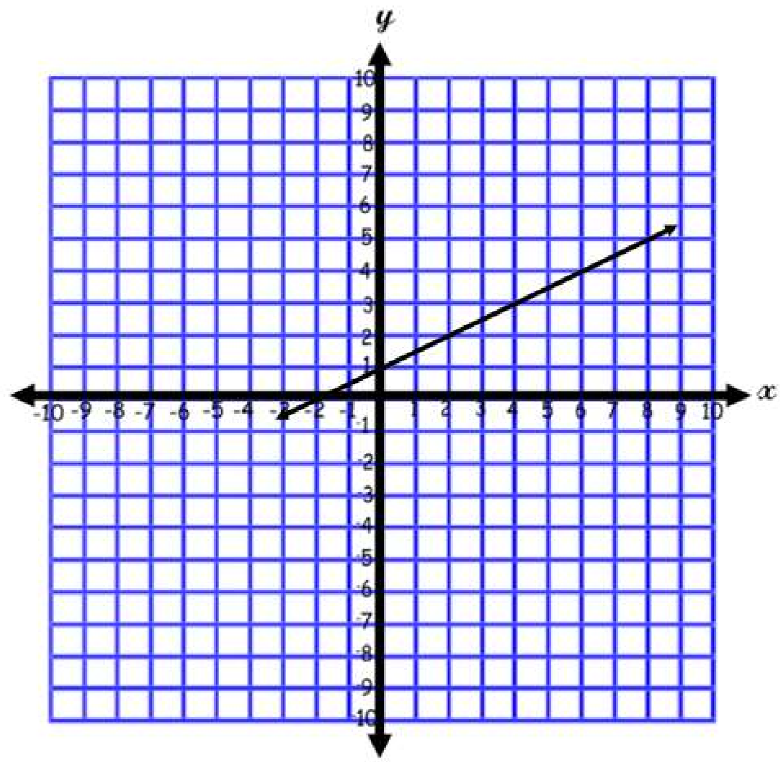
a) What is the y intercept? ________

b) What is the x intercept? ________

c) What is the slope of the line? ________

d) Write the equation of the line?

____



18) Solve the system of equations by graphing. Show all work and **<u>check</u>** the solution.

$y = -3x - 2$
$y = \frac{1}{2}x + 5$

Y = -3x - 2

Slope = ____

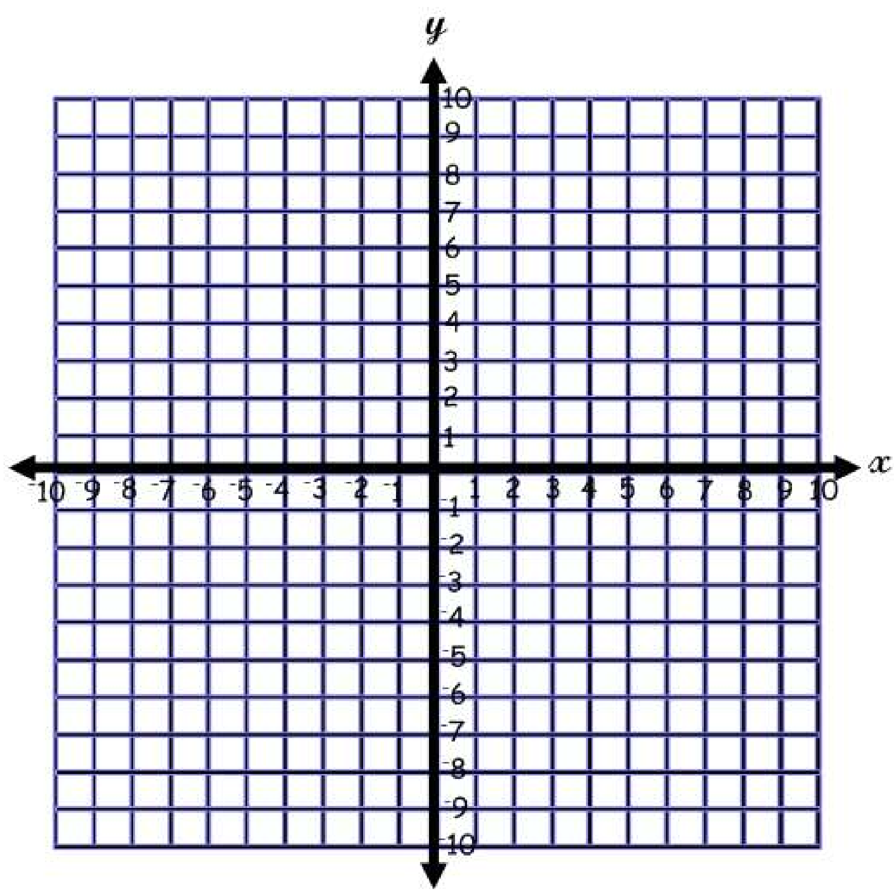
y intercept = ______

$y = \frac{1}{2}x + 5$

Slope = ______

y intercept = _____

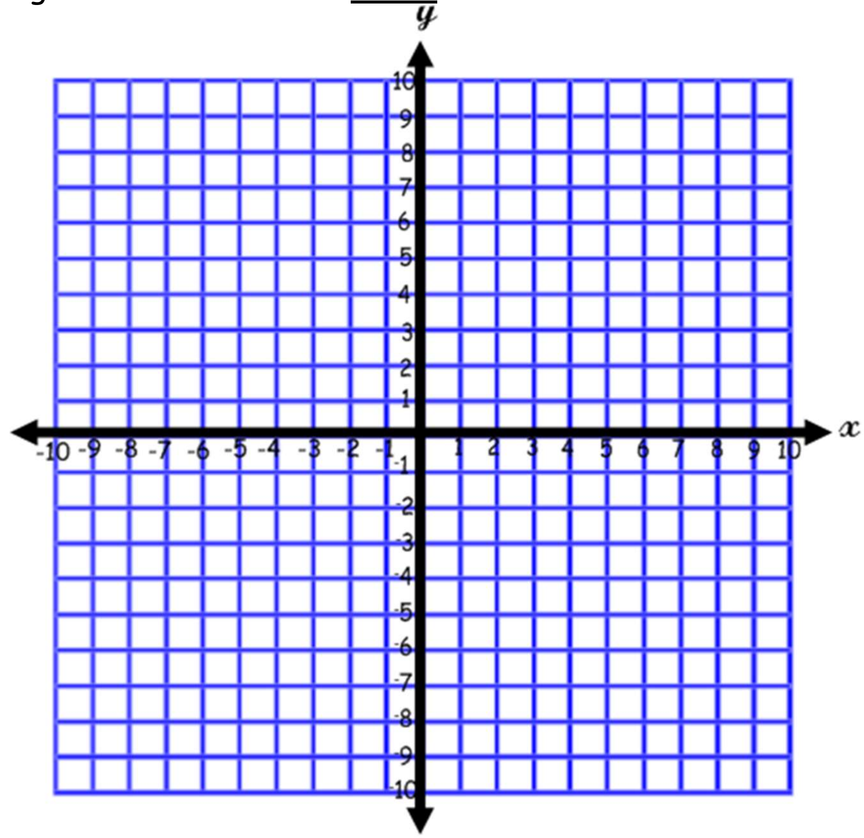
The solution is ______________



19) Solve the system of equations by graphing. Show all work and **check** the solution.

$y = x - 2$

$2y = -3x + 6$



20) Use the substitution method to solve the following system of equations. Check your answer.

$y = 5x - 6$

$y = x + 2$

21) Use the substitution method to solve the following system of equations. Check your answer.

$y = 2x - 8$

$y + 4x = 10$

22) Use the elimination method to solve the following system of equations. Check your answer.

$$2y + 2x = 10$$
$$y - 2x = -4$$

23) Use the elimination method to solve the following system of equations. Check your answer.

$$2y + 10x = 32$$
$$8y + 5x = 23$$

Use system of equations to solve the following word problem. Define a variable(s).

24) At a store, 3 notebooks and 2 pencils cost $2.80. At the same prices, 2 notebooks and 5 pencils cost $2.60. Find the cost of one notebook and one pencil.

Functions:

Relation— Any pairing of the elements in one set (domain) with the elements in another set (range). A relation is usually represented by a set of ordered pairs (x, y) where the domain is x and the range is y.

Function— A special type of relation in which each value of the domain is paired with exactly one value of the range

VERTICAL Line Test—A vertical line (like the edge of a pencil) is moved across the graph from left to right. If the graph of the relation is intersected by the vertical line in **MORE** than one place **AT A TIME**, the graph is a **RELATION (NOT A FUNCTION)**. If the vertical line intersects the graph in **ONLY ONE** point **AT A TIME**, the graph is a **RELATION & A FUNCTION**.

Statistics

Univariate Statistics: statistics involving a single set of numbers.

EX: Finding the average test grade on a final exam.

Bivariate Statistics: statistics used to study the relationship between 2 different sets of values. Ex: number of calories in a person's diet and cholesterol levels

number of hours studied and grade on an exam.

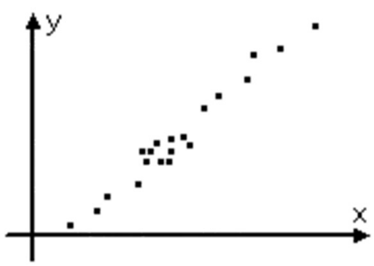
Scatter Plots: graphs that display the bivariate data in a coordinate plane. The ordered pairs are the values in the data.

The relationship or CORRELATION or ASSOCIATION between the variables can be seen on the scatter plot.

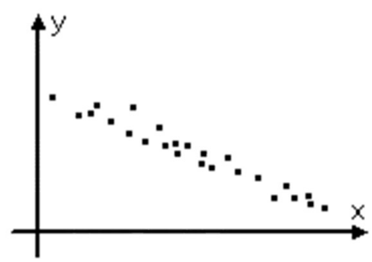
An association or correlation refers to the data overall, *not* specific points on the scatter plot.

Types of correlations:

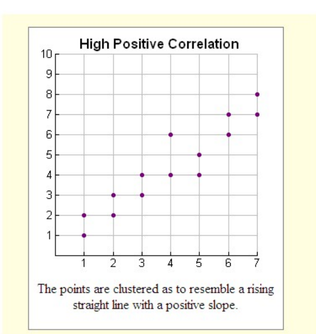
Positive

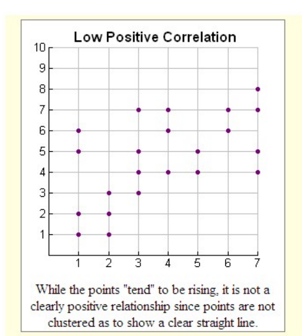


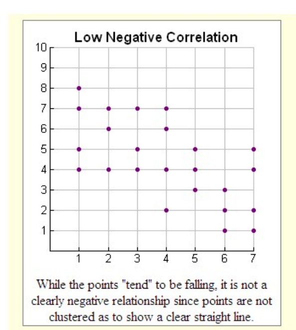
Negative

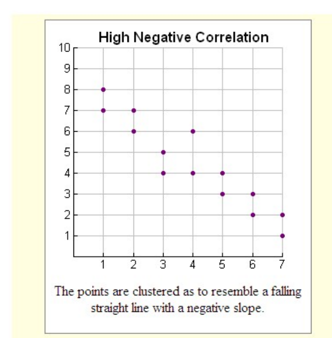


In a high positive correlation the points seem to be clustered close together whereas a low positive correlation has the points clustered not as closely together but still having a positive slope. There can also be a high negative or low negative correlation.



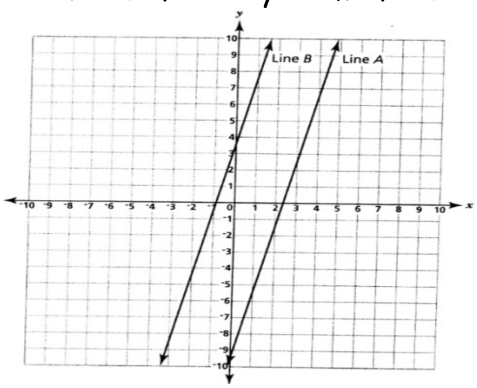






Functions and Linear Equations

1) What is the solution of the system of linear equations below?



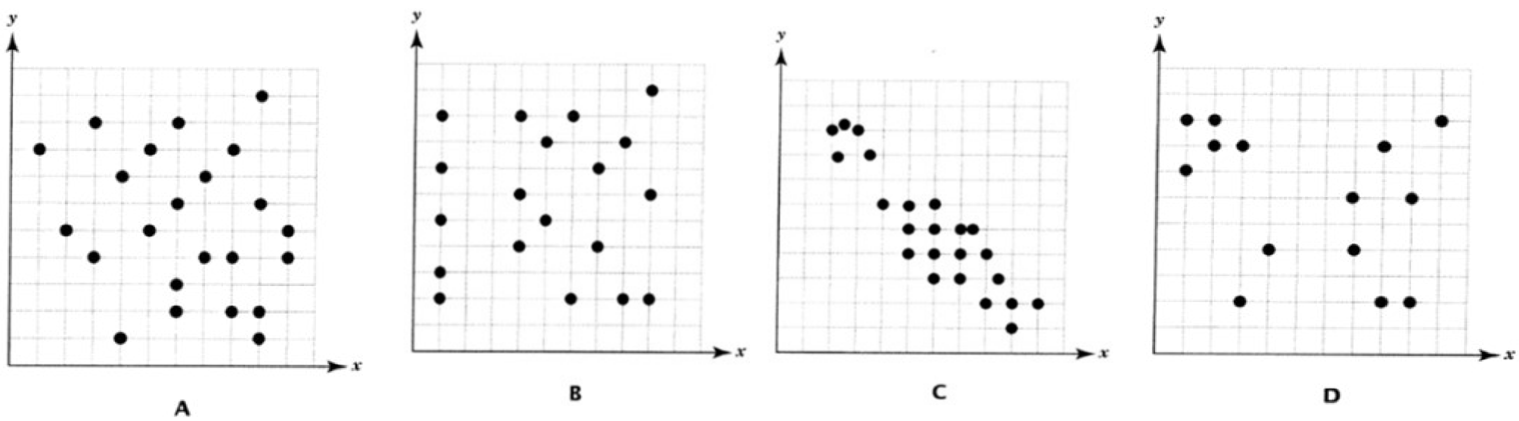
A) no solution

B) one solution

C) only positive solutions

D) infinitely many solutions

2) In which scatter plot are the data clustered?



3) The table models the amount of a certain medicine taken each day. What is the rate of change?

Day	Dosage (mg)
0	60
2	50
4	40

A) -5 mg per day B) -10 mg per day C) 10 mg per day D) 5 mg per day

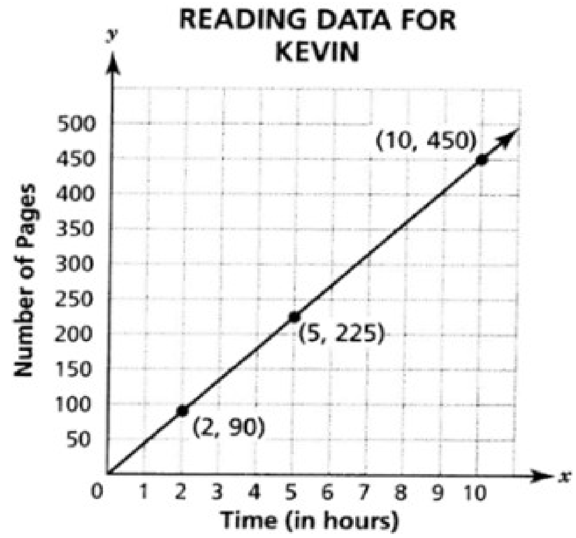
4) The graph of y = 3x + 5 belongs to which category?

A) circle B) curve C) nonlinear D) linear

5) The table and graph below show data about time spent reading and the number of pages read by Danika and Kevin.

READING DATA FOR DANIKA

Time (hours)	Number of Pages
3	120
6	240
4	160



Which of the following comparisons is true?

A) Each hour, Kevin reads 10 pages less than Danika.

B) Each hour, Kevin reads 10 pages more than Danika.

C) Each hour, Kevin reads 5 pages less than Danika.

D) Each hour, Kevin reads 5 pages more than Danika.

6) Bryce is deciding whether a graph is a function. What feature of the graph assures that the graph is a function?

A) The graph has a vertical line of symmetry.

B) The graph has a horizontal line of symmetry.

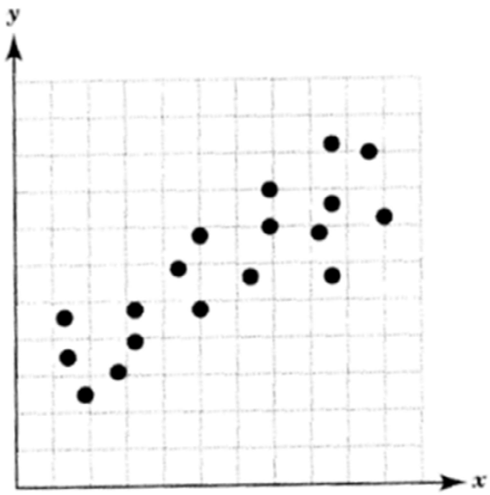
C) A horizontal line can be drawn that will intersect the graph at only one point.

D) Every possible vertical line that can be drawn will intersect the graph at only one point.

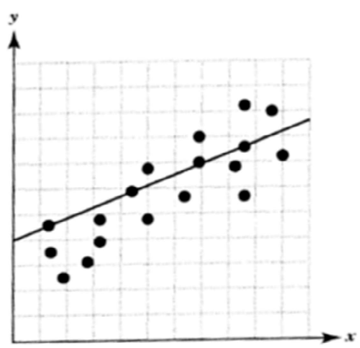
7) The amount of orange juice in a bottle is modeled by the equation $y = 128 - 8x$. If y is the number of ounces of juice left and x is the number of servings of juice poured from the bottle, how many ounces of juice are in an unopened bottle?

A) 208 ounces B) 136 ounces C) 128 ounces D) 120 ounces

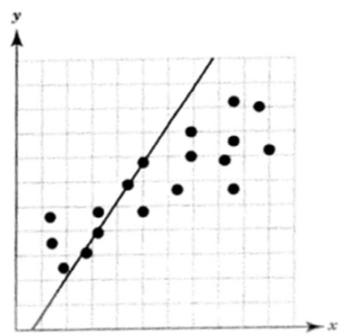
8) Which graph best models the line of best fit for the data in the scatter plot.



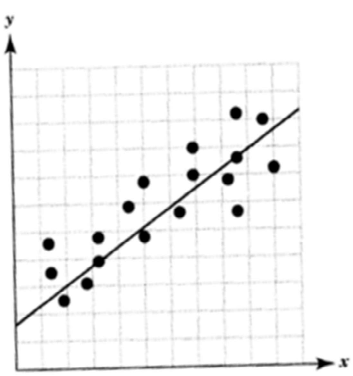
A)



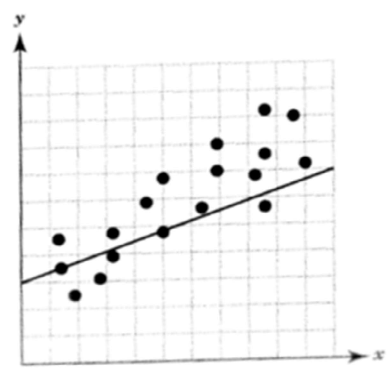
B)



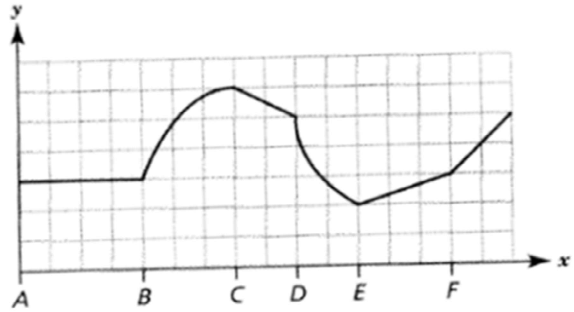
C)



D)



9) In the graph below, how could the behavior of the graph between D and E be described?



A) linear and increasing

B) Linear and decreasing

C) nonlinear and increasing

D) nonlinear and decreasing

10) The solution to 3(x – 8) = 3x – 24 is shown below.

$$3(x - 8) = 3x - 24$$

$$3x - 24 = 3x - 24$$

$$3x - 3x = {}^{-}24 + 24$$

$$0 = 0$$

What does the equation 0 = 0 mean?

A) The equation has infinitely many solutions, x is any real number.

B) The equation has only one solution, x = 0

C) The equation has many solutions, x > 0

D) The equation has no solution

11) This relationship represented in this table names a function where x is the independent variable and y is the dependent variable:

x	y
0	5
1	5
2	6
3	6

Is this relation a function? Explain? ______________________

____

12) Tyler and Jason were discussing the relation shown by the table below. The boys decided that that if x is the input and y is the output that the relation would <u>not</u> be a function, however, if they were allowed to reverse the input and output, the relation <u>would be</u> a function. Do you agree or disagree with the boys claim? Support your argument with details about functions.

x	y
3	-3
2	-2
1	-1
0	0
1	1
2	2
3	3

____

____

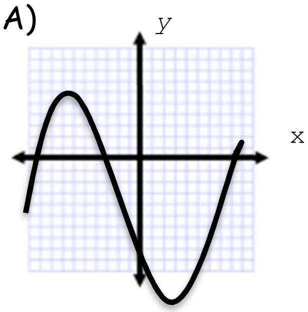
____

____

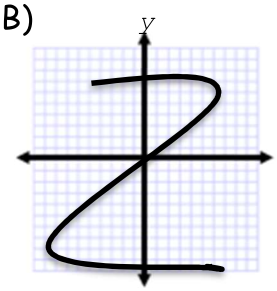
____

13) Two relations are drawn on the grids below. Which graph represents a function? ________
Explain how you can use the graphs to decide.

A)



B)



____

____

14) Which set of ordered pairs does NOT represent a function?

A) {(3, -2) (4, -3) (5, -4) (6, -5)} B) {(3, -2) (3, -4) (4, -1) (4, -3)}

C) {(3, -2) (5, -2) (4, -2) (-1, -2)} D) {(3, -2) (-2, 3) (4, -1) (-1, 4)}

15) Which equation is a linear equation?

A) $y = 3x^2 - 4$ B) $y = 2^x$ C) $y = 2x$ D) $y = x^3$

Polynomials – a monomial or the sum/difference of monomials. Each monomial in a polynomial is called a **term.**

Types of Polynomials:

- **Mono**mials – one term (Ex: $-2x$, 4)
- **Bi**nomial – two terms (Ex: $3x + 5$, $x^2 - 9$)
- **Tri**nomial – three terms (Ex: $x^2 + 5x + 4$)
- If a **poly**nomial has **more than three** terms, it is simply called a polynomial.

Standard Form – a polynomial in **one variable** with no like terms, and having exponents of the variables arranged in **descending order**. Constant terms are always last in standard form.

Ex: $5x^3 - 2x^2 + 3x + \mathbf{7}$

Like Terms – monomials with the **same variables** with the **same exponents**.

Ex: $5m$ & $3m$, $2x^2$ & x^2, xy^3z & $-9xy^3z$

To find the **DEGREE** of a monomial you add the exponents of its variables. A constant has a degree of 0.

Ex. $-6r^2$ has a degree of 2; $\frac{1}{2}bc^8$ has a degree of 9. The exponent of b is 1. You add 1 + 8 = 9

To find the **degree of a polynomial** you find the **degree** of **each term** and **choose** the **largest**.

EX. $4 + 3a - 8a^3$ **The degree of the polynomial is 3.** The last term, $-8a^3$, had the largest sum of exponents.

Adding Polynomials

- ✓ **To add polynomials: Distribute the positive sign to each term in parenthesis.**
  This does *not change* the *sign* of each term.
- ✓ **Use the commutative property to rearrange the terms so that like terms are beside each other.**
- ✓ **When you are rearranging terms, keep the sign with the term.**
- ✓ **Combine like terms following the rules for adding integers.**
- ✓

To subtract polynomials:

- ✓ **Distribute the negative sign to each term in parenthesis.**
  This *changes* the *sign* of each term to its opposite.
- ✓ **Combine like terms following rules for adding integers.**

Review Polynomials

State the degree for each polynomial.

1) $5y^2 + 7y^3$ ________ 2) $7x^3 + 5x^2 + 3$ ________ 3) $5x^2 + 2x + 1$ ________

Write each polynomial in STANDARD FORM.

4) $6x + 2x^2$ 5) $-7 + 5y^5 + 8y^7 + 9y$ 6) $3 + 7x + 2x^2$

______________________ ______________________ ______________________

Identify each polynomial as a monomial, binomial, trinomial or polynomial.

7) $5m^2n$ _________________ 8) $2x + 1$ _________________

9) $-5 + 2x^4 + 3x$ _________________ 10) $4x^4 + x^3 + x^2 + x$ _________________

Simplify.

11) $3(x^2 + 9) - 5x - 7$ 12) $-3x(6x + 4) + 2x - 9$ 13) $-5(x^2 + 7x - 3) + x^2 + 5x - 2$

Add or Subtract.

14) $(5x^2 + 2x + 3) + (3x^2 + x + 4)$ 15) $(14x^2 + 5x + 9) - (3x^2 + 3x + 3)$

16) $(3x^2 - 2x - 3) - (5x^2 - 2x + 3)$ 17) $(-7x^2 + 5x - 2) + (-2x^2 + 4x - 3)$

18) $(3x^2 - 5x - 4) + (4x^2 - 6x + 2)$ 19) $(-5x^2 - 2x - 4) - (-2x^2 - 5x + 7)$

20) $(-8x^2 - 4x) - (10x^2 + 2x)$ 21) $(-4x^2 + 6x - 7) + (-2x^2 - 9x - 3)$

REAL NUMBERS, RATIONAL NUMBERS, IRRATIONAL NUMBERS

First of all, ALL the numbers we worked with this year are REAL NUMBERS. That means every number we worked with was either RATIONAL or IRRATIONAL. How can I tell if a number is rational or irrational? #'s that can be written as fractions → rational #'s that can't→ irrational

All **RATIONAL** numbers can be written as a fraction:

RATIONAL NUMBERS

COUNTING NUMBERS →1, 2, 3 … → $\frac{1}{1}$ also known as **NATURAL NUMBERS**

WHOLE NUMBERS → 0, 1, 2, 3,…→ $\frac{0}{1}$

INTEGERS → …, -5,-4,-3,-2,-1, 0, 1, 2, 3,… → $\frac{-5}{1}$

FRACTIONS → $\frac{2}{3}$ → ALREADY A FRACTION!!

TERMINATING DECIMALS → 0.13 → $\frac{13}{100}$

REPEATING DECIMALS → 0.333… → $\frac{3}{9} = \frac{1}{3}$

PERFECT SQUARES → $\sqrt{49}$ → 7 → $\frac{7}{1}$

All **IRRATIONAL** numbers **cannot** be written as fractions:

IRRATIONAL NUMBERS

PI → π → 3.1415926…

NON-PERFECT SQUARES → $\sqrt{5}, \sqrt{17}, \sqrt{31}$ ...

NON-TERMINATING NON-REPEATING DECIMALS → 0.12112111211112…

Radicals

WHAT ARE PERFECT SQUARES? A number is a perfect square if its square root is a whole number. That is, the number is equal to a number times itself.

FOR EXAMPLE: 25 = 5 • 5 AND 25 = **−**5 • **−**5 therefore, **25 IS A PERFECT SQUARE.**
First 15 Perfect Squares.

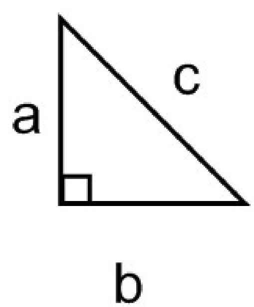
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225
Remember there are positive roots and negative roots. Be sure you know which root you are looking for. When solving for a variable there will ALWAYS be 2 solutions. Read carefully to see if you need to reject the negative root.

- $\sqrt{64}$ indicates the ***positive***, or ***principal*** square root of 64. Therefore, $\sqrt{64} = 8$.
- $-\sqrt{121}$ indicates the ***negative*** square root of 121. Therefore, $-\sqrt{121} = -11$.
- $\pm\sqrt{225}$ indicates BOTH ***positive*** and ***negative*** square roots of 225. Therefore, $\pm\sqrt{225} = \pm 15$

The opposite of cubing a number is taking its **cube root**. The symbol for the cube root is $\sqrt[3]{}$.
When written this way: $\sqrt[3]{8}$ means "the cube root of 8" or find the number that when cubed is equal to 8.
List the first 8 perfect cubes.

1, 8, 27, 64, 125, 216, 343, 512

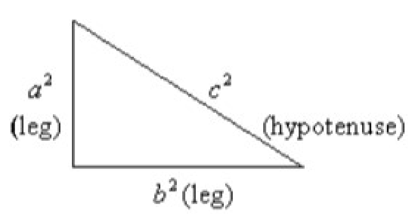
Right Triangles



- In a right triangle, the sides that form the right angle are called the legs. (sides a and b)
- The side opposite the right angle is called the hypotenuse. (Side c)
- The hypotenuse is always the longest side of a right triangle.

The Pythagorean Theorem

A triangle is a right triangle if and only if the sum of the squares of two sides of the triangle is equal to the square of the measure of the third side of the triangle.



$$a^2 + b^2 = c^2$$
$$(\text{leg})^2 + (\text{leg})^2 = (\text{hypotenuse})^2$$

Radicals Review/Pythagorean Theorem

Name the groups of numbers that the following belong to.

Real	Counting	Whole
Integer	Rational	Irrational

1) $-\sqrt{16}$: ___________, ___________, ___________

2) π: ___________, ___________

3) 0: ___________, ___________, ___________, ___________

4) $-\frac{5}{7}$: ___________, ___________

5) $\sqrt{19}$: ___________, ___________

6) $\sqrt[3]{8}$: ___________, ___________, ___________, ___________, ___________

	Rational or Irrational?	2 Consecutive Whole Numbers it Lies Between	Answer Rounded to the nearest whole number
7) $\sqrt{10}$			
8) $\sqrt{3}$			
9) $\sqrt{100}$			
10) $\sqrt{215}$			

Solve ALGEBRAICALLY. Round to the nearest tenth if necessary.

11) $y^2 = 196$

12) $7x^2 = 175$

13) $-6(x^2 - 9) = 4x^2 - 146$

RIGHT TRIANGLES:

14) Pythagorean Theorem is used for ALL _________________ triangles.

15) State the Pythagorean theorem formula. ___________________________________

16) "a" and "b" represent the _______________ of the triangle and "C" represents the

_____________________, the longest side of the triangle.

The measures of the three sides of a right triangle are given. Determine if each triangle is a RIGHT TRIANGLE. Show work.

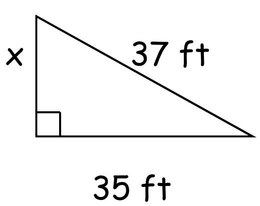
17) 7 ft, 9 ft, 6 ft

18) 5m, 12m, 13m

19) 30 m, 24 m, 18 m

Solve for the missing side in each RIGHT triangle. SHOW ALL WORK!
Round any decimals to the nearest tenth for #'s 20 - 23.

20)



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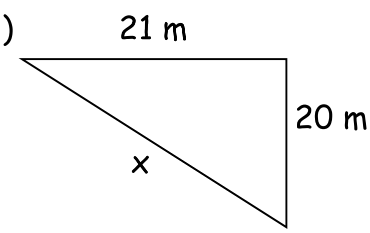

22) A ladder is leaning against wall at a point 12 feet above the ground and the base of the ladder is 5 feet from the wall. How long is the ladder? **Show all work.**

23) Gabriel takes a shortcut to school by walking diagonally across an empty lot. The rectangular lot is 20 meters wide and 40 meters long. How much shorter is the shortcut than a route on the sides of the lot? Show all work.