MATH 8 STUDY SHEET

1) **Laws of exponents:**

a) multiplication – when the BASES are the same, ADD the exponents. (Be sure to multiply the COEFFICIENTS!)

Ex. $-3x^3 \bullet 5x^5 = -15x^8$

b) division – when the BASES are the same, SUBTRACT the exponents. (Be sure to divide the COEFFICIENTS!)

Ex. $-10y^8 \div 5x^2 = -2x^6$

2) Negative exponents – When you see a negative exponent, SET UP A FRACTION, with a numerator of 1! The denominator is the negative power moved with a now positive power.

Ex. $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

3) Power to a power – Multiply the exponents.

Ex. $(5^3)^2 = 5^6$

4) Zero exponent - Any number or variable raised to the zero power is **1**!

5) Scientific notation – the product of two factors – the first is a number between 1 and 10 and the second is a power of 10.

Ex. $3{,}000 = 3 \times 10^3$

Ex. $0.0005 = 5 \times 10^{-4}$

6) To add or subtract two scientific notation numbers you can only add or subtract numbers with the ***same*** exponent. Adjust the smaller exponent to the larger exponent so it has the same exponent as the other, and only then can you add or subtract the coefficients.

Ex.
$(2 \times 10^2) + (3 \times 10^3) =$
$(.2 \times 10^3) + (3 \times 10^3) = 3.2 \times 10^3$

Ex.
$(2 \times 10^4) - (3 \times 10^3) =$
$(2 \times 10^4) - (.3 \times 10^4) = 1.7 \times 10^4$

7) To multiply two scientific notation numbers, multiply the coefficients and **add** the exponents.

Ex. $(3\times10^1)(2.5\times10^{-2}) = 7.5\times10^{-1}$

To divide two scientific notation numbers, divide the coefficients and **subtract** the exponents.

Ex. $(9\times10^{20}) \div (3\times10^{15}) = 3\times10^5$

8) Volume of a sphere –

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

9) Polynomials – When adding and subtracting, **KEEP THE SAME ENDING!**

Ex. $-13x^2 + 5x + 8$
$+ \; -3x^2 - 10x - 1$
$-16x^2 - 5x + 7$

10) Distributive Property – used to evaluate the product of a number and a sum or difference.

Ex. $6(a + b) = 6a + 6b$

Ex. $7(m - 5) = 7m - 35$

11) State the equation from a table of values:

a) Find the slope using $m = \frac{\Delta y}{\Delta x} = \frac{-4}{2} = -2$

b) Find b by substituting a point from the table into the equation.

$y = -2x + b$
$-3 = -2(12) + b$
$-3 = -24 + b$
$+24 \;|\; +24$
$21 = b$

c) **$y = -2x + 21$**

d) **Check** YOUR WORK!

x	y
12	-3
14	-7
16	-11
18	-15

CK: $y = -2x + 21$
$-15 = -2(18) + 21$
$-15 = -36 + 21$
$-15 = -15$✓

12) Solving equations:

$4w + 5 = -6w + 25$
$+6w \;|\; +6w$
$10w + 5 = 25$
$-5 \;|\; -5$
$\frac{10w}{10} = \frac{20}{10}$
$w = 2$

CK:
$4w + 5 = -6w + 25$
$4(2)+5 = -6(2) + 25$
$8 + 5 = -12 + 25$
$13 = 13$✓

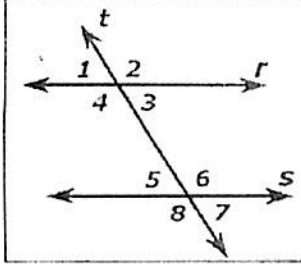
$-9n - 8 - 2n = 25$
$-11n - 8 = 25$
$+8 \;|\; +8$
$\frac{-11n}{-11} = \frac{33}{-11}$
$n = -3$

CK:
$-9n - 8 - 2n = 25$
$-9(-3) - 8 - 2(-3) = 25$
$27 - 8 + 6 = 25$
$19 + 6 = 25$
$25 = 25$✓

$-3(n - 5) = 12$
$-3n + 15 = 12$
$-15 \;|\; -15$
$\frac{-3n}{-3} = \frac{-3}{-3}$
$n = 1$

CK:
$-3(n - 5) = 12$
$-3(1 - 5) = 12$
$-3(-4) = 12$
$12 = 12$✓

13) Angles in Parallel Lines:



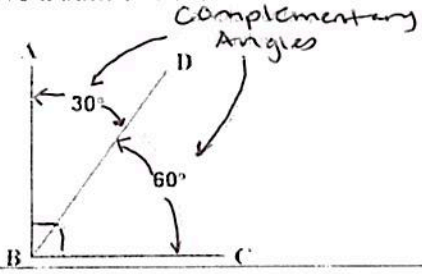
USE "ABBA".

$\angle A \cong \angle A$, $\angle B \cong \angle B$,

$\angle A + \angle B = 180°$. (Supplementary)

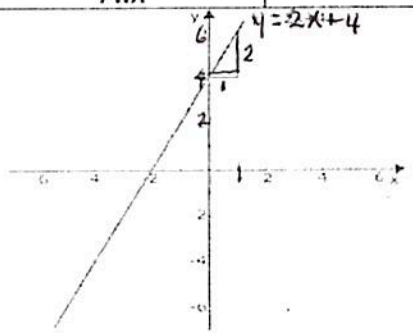
Corresponding - same position and congruent.	Vertical - opposite and congruent.
$\angle 1$ & $\angle 5$, $\angle 2$ & $\angle 6$	$\angle 1$ & $\angle 3$, $\angle 2$ & $\angle 4$
$\angle 4$ & $\angle 8$, $\angle 3$ & $\angle 7$	$\angle 5$ & $\angle 7$, $\angle 6$ & $\angle 8$
Alternate Interior - inside the parallel lines and on opposite sides of the transversal and $\cong$.	Alternate Exterior - outside the parallel lines and on opposite sides of the transversal and $\cong$.
$\angle 3$ & $\angle 5$, $\angle 4$ & $\angle 6$	$\angle 1$ & $\angle 7$, $\angle 2$ & $\angle 8$

15) Complementary angles – two angles which form a right angle. They do NOT have to be next to each other. They have a sum of 90°.



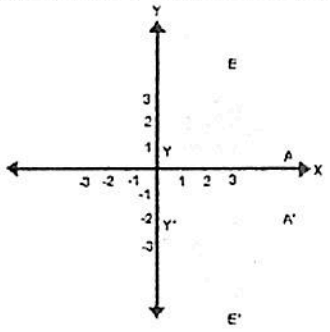
16) Equation of a line $\Rightarrow y = mx + b$

m $\Rightarrow$ slope - constant rate of change between any two points on the line.	b $\Rightarrow$ y intercept - place where the line crosses the y-axis.
m (move) $\frac{rise}{run}$	*b(begin) on the y-axis*



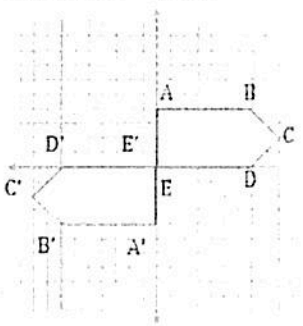
14) Transformations:
KNOW THE PROPERTIES!

Reflection - mirror image



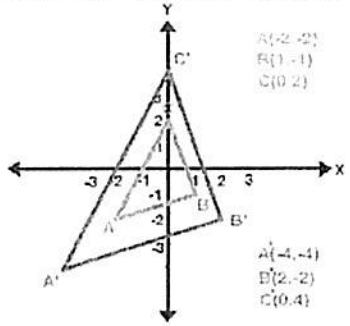
The figures are congruent. Angles and line segments are congruent.

Rotation - turn



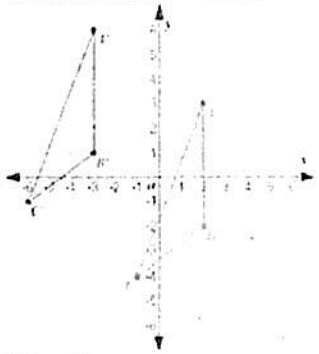
The figures are congruent. Angles and line segments are congruent.

Dilation - similar figures



The figures are SIMILAR. Angles are congruent. Line segments are corresponding. The **ratios of the sides** are congruent.

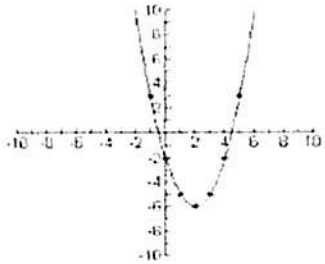
Translation - slide



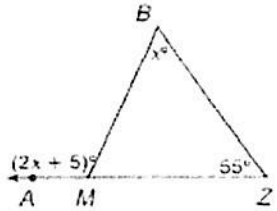
The figures are congruent. Angles and line segments are congruent.

17) Parabola – non linear or quadratic equation, in the shape of a "U"; must have an x^2 in the equation.

$y = x^2 - 4x - 2$



18) Exterior angle of a triangle – is equal to the sum of the remote interior angles.



$x + 55 = 2x + 5$

$-x \quad | \quad -x$

$55 = 1x + 5$

$-5 \quad | \quad -5$

$50 = x$