## RAMAPO-INDIAN HILLS SCHOOL DISTRICT

Dear Ramapo-Indian Hills Student:
Please find attached the summer packet for your upcoming math course. The purpose of the summer packet is to provide you with an opportunity to review prerequisite skills and concepts in preparation for your next year's mathematics course. While you may find some problems in this packet to be easy, you may also find others to be more difficult; therefore, you are not necessarily expected to answer every question correctly. Rather, the expectation is for students to put forth their best effort, and work diligently through each problem.

To that end, you may wish to review notes from prior courses or on-line videos (www.KhanAcademy.com, www.glencoe.com, www.youtube.com) to refresh your memory on how to complete these problems. We recommend you circle any problems that cause you difficulty, and ask your teachers to review the respective questions when you return to school in September. Again, given that math builds on prior concepts, the purpose of this packet is to help prepare you for your upcoming math course by reviewing these prerequisite skills; therefore, the greater effort you put forth on this packet, the greater it will benefit you when you return to school.

Please bring your packet and completed work to the first day of class in September. Teachers will plan to review concepts from the summer packets in class and will also be available to answer questions during their extra help hours after school. Teachers may assess on the material in these summer packets after reviewing with the class.

If there are any questions, please do not hesitate to contact the Math Supervisors at the numbers noted below.

Enjoy your summer!

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## Ramapo- Indian Hills High School Summer Math Packet

## ADVANCED MATHEMATICS APPLICATIONS CP

To the students:
The following set of review problems were designed to prepare you for your AMA course. You can either print out the problems or complete them on a separate piece of paper. Please bring the packet and your completed work on the first day of school in September.

Thank you.

## Exponents

## Rules of Exponents

$a^{n} \cdot a^{m}=a^{n+m}$

$$
\frac{a^{n}}{a^{m}}=a^{n-m} \quad\left(a^{n}\right)^{m}=a^{n \times m} \quad a^{-n}=\frac{1}{a^{n}}
$$

Ex \#1 Show that $a^{n} \times a^{m}=a^{n+m}$
a. $2^{4} \cdot 2^{3}$
b. $y^{12} \cdot y^{5}$
c. $2 x^{3} \cdot 5 x^{4}$

Ex \#2 Show that $\frac{a^{n}}{a^{m}}=a^{n-m}$
a. $\frac{2^{6}}{2^{3}}$
b. $\frac{x^{8}}{x^{2}}$
c. $\frac{6 x^{11}}{2 x^{7}}$

Ex \#3 Show that $\left(a^{n}\right)^{m}=a^{n \times n}$
a. $\left(2^{2}\right)^{3}$
b. $\left(x^{3}\right)^{4}$
c. $\left(2 x^{6}\right)^{4}$

Ex \#4 Show that $a^{-n}=\frac{1}{a^{n}}$
a. $2^{-2}$
b. $\left(x^{-4} y^{2}\right)^{-3}$
c. $2 x^{-8} \cdot 3 x^{5}$

## Simplifying Algebraic Expressions

PEMDAS - the order in which you evaluate expressions<br>P - Parenthesis<br>E-Exponents<br>M - Multiplication (from left<br>D - Division<br>to right)<br>A - Addition<br>(from left<br>S-Suhstraction th rioht)

Simplify the following expressions using order of operations.
$1.1+7+(24 \cdot 2) \div(2 \cdot 4)$
2. $(7 \cdot 2-4) \div((5-4) \cdot 10)$

Evaluate each expression if $a=2, b=-3, c=-1$, and $d=4$.
3.) $\frac{2 d-a}{b}$
4.) $\frac{3 b}{5 a+c}$
5.) $(c+b)^{2}$
6.) $c+b^{2}$

Solving Systems of Linear Equations By Graphing
$y=-3 x+2$
$y=2 x-3$
Step 1: Graph each equation.


Step 2: Find the point of intersection. This is your solution.

Solve
by
graphing.

1. $y=-x+2$

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


2. $y-2 x=1$
$2 y-4 x=1$


## Solving Systems of Equations by Substitution

Steps to solving Systems of Equations by Substitution:

$$
\begin{aligned}
& x+3 y=6 \\
& 2 x+8 y=-12
\end{aligned}
$$

1. Isolate a variable in one of the equations. (Either $\mathrm{y}=$ or $\mathrm{x}=$ ).

$$
\begin{aligned}
& x+3 y=6 \\
& x=6-3 y
\end{aligned}
$$

2. Substitute the isolated variable in the other equation.

$$
2 x+8 y=-12
$$

$$
2(6-3 y)+8 y=-12
$$

3. This will result in an equation with one variable. Solve the equation.

$$
\begin{aligned}
& 12-6 y+8 y=-12 \\
& 2 y=-24 \\
& y=-12
\end{aligned}
$$

4. Substitute the solution from step 3 into another equation to solve for the other variable.

$$
\begin{aligned}
& x+3(-12)=6 \\
& x=42
\end{aligned}
$$

5. Recommended: Check the solution.

$$
42=6-3(-12)
$$

## Solve by substitution.

1. $-5 x+3 y=12$
2. $x-4 y=22$
$x+2 y=8$
$2 x+5 y=-21$

## Solving Systems of Equations by Elimination



## Solve by elimination.

1. $-3 x+y=7$
$3 x+2 y=2$
2. $-4 x+5 y=-11$
$2 x+3 y=11$

## Simplifying Radicals

- A radical that cannot be taken, must be written in simplest radical form.
- To simplify a radical, break the number under the radicand down to its primes, and find pairs/groupings of the primes that are the same as the index of the radicand.
- If there is no index in the radicand it is understood to be 2 .


Simplify the following radicals.

1. $\sqrt{80}$
2. $\sqrt{50 x^{2}}$
3. $\sqrt[3]{40}$
$6 . \sqrt[3]{500}$
$7 . \sqrt[3]{192 v^{7}}$
4. $\sqrt[3]{128 x^{2}}$

## Pythagorean Theorem

- A right triangle is a triangle that has exactly on right angle. - The side opposite the right angle in a right triangle is called the hypotenuse
- The other two sides in a right triangle are called the legs.
- The Pythagorean Theorem is a method used to find a missing side in a right triangle given that two sides are already knows.
- The formula for the Pythagorean Theorem is: $a^{2}+b^{2}=c^{2}$


Find the missing variable using Pythagorean Theorem

1.
2.

3.


## Trigonometric Ratios

- Trigonometry is the study of the relationships among angles and sides of triangles.
- A trigonometric ratio is a ratio that compares the side lengths of two sides of a right triangle.
$\operatorname{Sin} \theta=\frac{\text { opposite }}{\text { hypotenuse }} \quad \operatorname{Cos} \theta=\frac{\text { adjacent }}{\text { hypotenuse }}$
- $\operatorname{Tan} \theta=\frac{\text { opposite }}{\text { adjacent }}$

- $S \frac{O}{H} C \frac{A}{H} T \frac{O}{A}$

First find the missing side using the pythagorean theorem. Find the values of the three trigonometric ratios for the given angle.
1.

2.

3.


