Dear Parents and Students,

As educators, we realize that students experience a learning loss in mathematics if not academically engaged. Consequently, at the beginning of each school year we are forced to spend an inordinate amount of time reviewing concepts from the previous math course. Our solution for this problem is to expedite the review process in the form of a summer math packet.

The purpose of these packets is to have students review concepts taught during the school year so that there is no retention loss in key concept areas and to better prepare the students for the upcoming year in mathematics.

We ask that over the course of the summer, you download and print the summer math packet that corresponds to your child(ren). If your child is entering the 9th grade then you will download the "Incoming Geometry Students" packet. All work is to be turned in the first full day of school.

As teachers, we will still be reviewing, but not reteaching.

Should you have any questions regarding the math packet please feel free to contact:

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Upper School Assistant Principal
dbrassell@eastwoodschool.org
(334)386-2310

Thank you for your understanding and cooperation. Enjoy the summer! We look forward to working with you and your child during the upcoming 2016-2017 academic term.

7th graders	"Incoming Pre-Algebra Students"
8th graders	"Incoming Algebra 1 Students"
9th graders	"Incoming Geometry Students"
10th graders	"Incoming Algebra 2 with Trig Students"
11th graders	"Incoming Pre-Calculus Students"
12th graders	"Incoming Calculus Students"

Pre-Calculus
Summer Review Packet

About Pre-Calculus:

Pre-Calculus requires students to be able to recall many skills at a moment's notice; it assumes that certain mathematical concepts have been mastered in prior years' courses. This summer packet is designed to help you refresh your memory about certain concepts and possibly relearn others.

Many concepts are interrelated so many topics require multiple approaches to achieve a full understanding. Make use of Google.com, khanacademy.org, and wolfrmalpha.com to search for answers to specific questions you might have.

Name _____

1: Exponent Rules

Simplify the following

1. $(-2^2)^3$
2. $-\left(\frac{2}{5}\right)^{-2}$
3. $(3x^2y)^{-3}$
4. $\frac{y^{-4}}{5x^{-2}}$
5. $\frac{x^{-1}y}{xy^{-2}}$
6. $\frac{3xy^9}{2y^{-2}} \cdot \frac{-7y}{42x^5}$

2: Fractional Exponents

Evaluate the following without a calculator

1. $8^{\frac{2}{3}}$
2. $4^{-\frac{1}{2}}$
3. $\left(\sqrt[4]{16}\right)^2$
4. $\sqrt[3]{1000^2}$
5. $\left(\sqrt[3]{-27}\right)^{-4}$
6. $-(25^{-\frac{3}{2}})$

3: Simplifying Radicals

Simplify and rationalize the following.

1. $\sqrt{80}$
2. $\sqrt[4]{32}$
3. $\sqrt[3]{54x^3}$
4. $\frac{3}{\sqrt{8}}$
5. $\sqrt{\frac{4}{75}}$
6. $4\sqrt{3} \cdot \sqrt{21}$

4: Factoring by GCF

Factor the following completely

1. $3x^4 - 9x^2$
2. $49xy + 28x - 14y$
3. $18x^3y^5 - 12x^4y^2$

5: Factoring Quadratic Expressions

Factor the following completely

1. $x^2 - 3x + 2$
2. $x^2 + 5x - 6$
3. $2x^2 + 5x - 3$
4. $3x^2 - 8x + 4$
5. $3x^2 + 17x + 10$
6. $10x^2 - 19x + 6$

6: Special Factoring

$$a^2 + 2ab + b^2 = (a+b)^2 \qquad a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$
$$a^2 - 2ab + b^2 = (a-b)^2 \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$
$$a^2 - b^2 = (a+b)(a-b)$$

Factor the following completely

1. $4x^2 - 20x + 25$
2. $49x^2 + 42xy + 9y^2$
3. $16x^4 - 81$
4. $x^3 - 8$
5. $125x^3 + y^3$
6. $64 - 27y^6$

7: Factoring through Synthetic Division

Use synthetic division to factor as indicated.

1. $x^3 - 4x^2 + 2x + 1 = (x-1)(\quad)$

2. $2x^3 + 5x + 7 = (x+1)(\quad)$

3. $x^4 - 3x^3 + x^2 + x + 2 = (x-2)(\quad)$

4. $4x^4 + 3x^2 - 1 = (2x-1)(\quad)$

8: Solving Linear Equations

Solve the following for the unknown variable.

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

2. $\frac{x}{2} + \frac{5x}{6} = \frac{2x}{3} + \frac{1}{12}$

3. $3(x-8) + 4x = 5x - (x+7)$

9: Solving Quadratic Equations by Factoring

Factor to solve for x.

1. $x^2 + 5x + 6 = 0$

2. $8x^2 - 6x - 5 = 0$

3. $11x^2 - 14x - 16 = 0$

10: Solving Quadratic Equations using the Quadratic Formula
For each equation, solve for the indicated expression.

1. $2x^2-4x-1=0$ *for* x
2. $2x^2+2x+3=0$ *for* x
3. $x^4-4x^2+2=0$ *for* x^2

11: Solving Radical Equations
Solve the following for x.

1. $\sqrt{x}=3x-1$
2. $3\sqrt{2x}+1=7$
3. $3x^{\frac{3}{4}}-5=19$

12: Solving Rational Equations
Solve the following for x

1. $\frac{3}{2x}-\frac{9}{2}=6x$
2. $\frac{2}{3x}+\frac{2}{3}=\frac{8}{x+6}$
3. $\frac{2}{x+1}+\frac{x}{x-1}=\frac{2}{x^2-1}$

13: Solving Logarithmic Equations
Solve the following for x

1. $\log_3 3^x=7$
2. $\log_9 x=\frac{1}{2}$
3. $2\log_3(x+1)=4$

14: Function Notation

Given $f(x)=-x^2+x$, answer the following questions.

1. Find $f(0)$
2. Find $f(x)=0$
3. Find $f\left(-\frac{1}{3}\right)$

Given $f(x)=\frac{1}{3}x+\frac{7}{4}$, answer the following questions.

4. Find the zeros of $f(x)$
5. Solve $f(x)=\frac{1}{8}$
6. Find $f\left(-\frac{9}{8}\right)$

15: Function Names

Match the following equations to their description.

_____1.	$f(x)=\frac{2}{3}\lvert 4x+5\rvert-3$	A.	Linear Function
_____2.	$f(x)=\frac{2}{3}\sqrt[3]{4x+5}-3$	B.	Quadratic Function
_____3.	$f(x)=\frac{2}{3}\cdot\frac{1}{4x+5}-3$	C.	Absolute Value Function
_____4.	$f(x)=\frac{2}{3}(4x+5)^4-3(4x+5)^2-2$	D.	Cubic Function
_____5.	$f(x)=\frac{2}{3}(4x+5)^3-3$	E.	Cube Root Function
_____6.	$f(x)=\frac{2}{3}(4x+5)-3$	F.	Square Root Function
_____7.	$f(x)=\frac{2}{3}(4x+5)^2-3$	G.	Rational Function
_____8.	$f(x)=\frac{2}{3}\sqrt{4x+5}-3$	H.	Polynomial Function

16: Function Operations

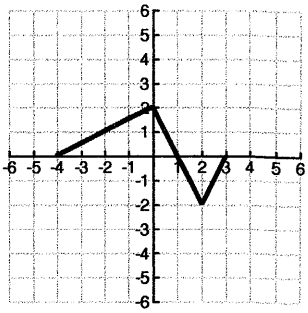
Perform the following function operations if $f(x)=2x^2$ and $g(x)=3-4x$

1. $f(g(x))$
2. $g(f(x))$
3. $(f-g)(x)$

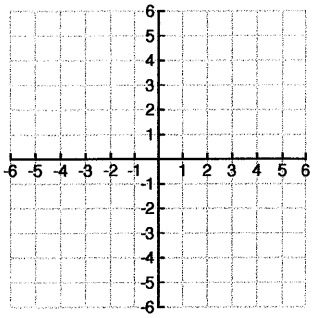
4. $f(f(x))$
5. $g(g(x))$
6. Find $g(g(x))=0$

17: Function Transformation

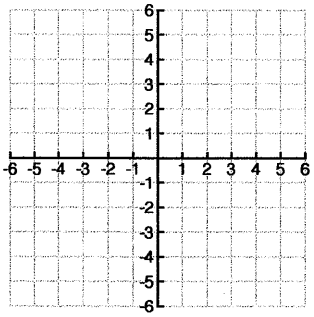
Use the graph of $y=f(x)$ at the right to sketch the following transformations.



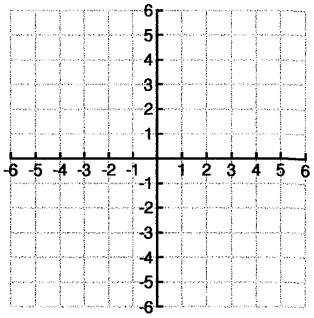
1. $y=2f(x)$



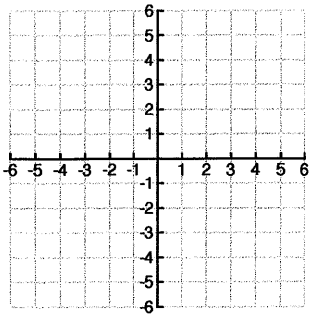
2. $y=-f(x)$



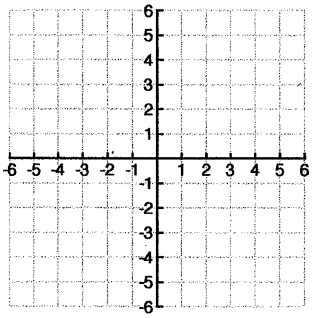
3. $y=f(x-1)$



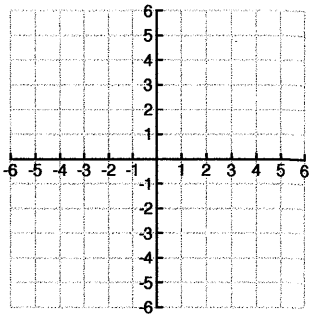
4. $y=f(x)+2$



5. $y=f(-x)$



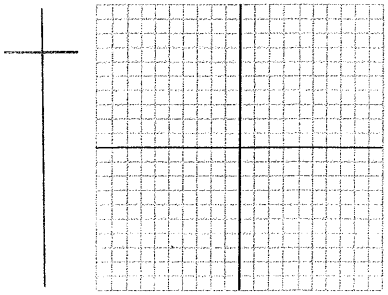
6. $y=-2f(x+2)+1$



18: Graphing Parent Functions using T-Charts

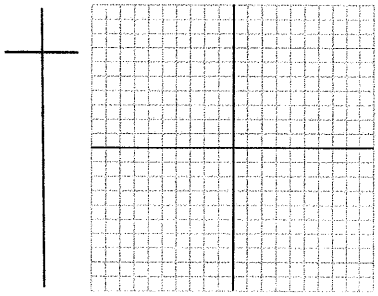
Graph the following using a T-Chart with "smart" values. State the Domain and Range of each function.

1. $f(x)=x^2$



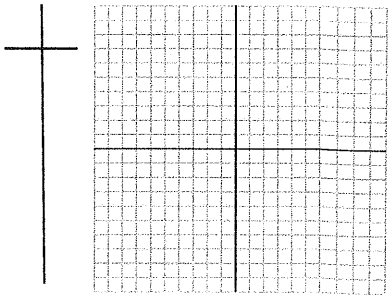
D: R:

2. $f(x)=\sqrt{x}$



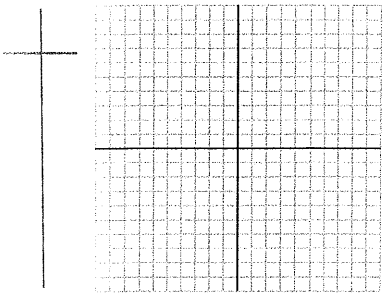
D: R:

3. $f(x)=|x|$



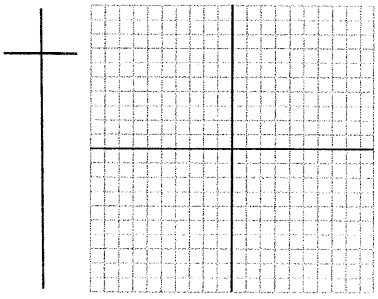
D: R:

4. $f(x)=x^3$



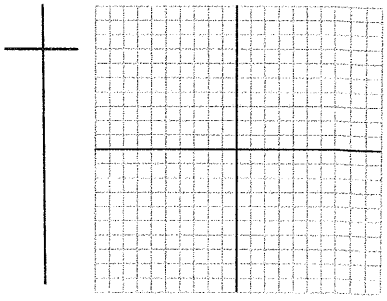
D: R:

5. $f(x)=\sqrt[3]{x}$



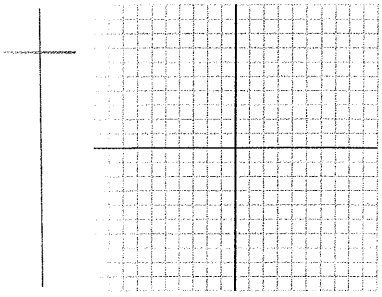
D: R:

6. $f(x)=\frac{1}{x}$



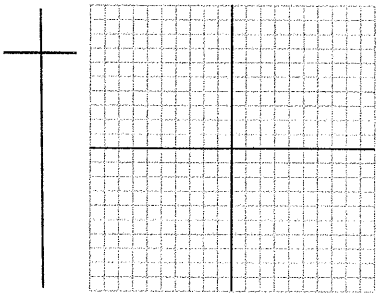
D: R:

7. $f(x)=x$



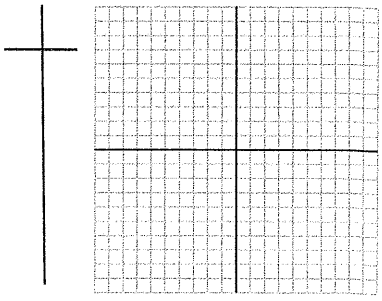
D: R:

8. $f(x)=2^x$



D: R:

9. $f(x)=\log_2 x$



D: R:

19: Basic Graphing Choosing "Smart" Points

Fill in the T-chart using at least 3 smart x-values (that enable you to find exact points)

1. $f(x)=\sqrt{3-x}$

2. $f(x)=\dfrac{7}{x-2}$

3. $f(x)=3^{\frac{x}{4}}$

20: Distance and Midpoint Formulas

Find the distance between the two points. Then find the midpoint between the two points.

1. $(-2,5);\ (6,-1)$

2. $\left(\dfrac{3}{2},-\dfrac{1}{2}\right);\ \left(-\dfrac{3}{2},\dfrac{7}{2}\right)$

3. $\left(\dfrac{5}{2},-\dfrac{3}{2}\right);\ (1,-4)$

21: Intercepts

Use the following equations to find the x and y intercept(s)

1. $y^2=x+9$

2. $9x^2+4y^2=36$

3. $\left(\dfrac{x+4}{2}\right)^2+y^2=1$

22: Equations of Lines

Find the equation of the line that has the given characteristics. Leave your answer in the form indicated.

1. $slope=\dfrac{3}{4};\ y-\text{int}:-\dfrac{2}{3}$

(Standard Form)

2. Parallel to $2x+3y=4$ through $(-3,6)$

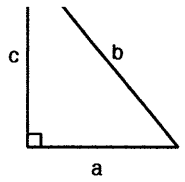
(Slope-intercept form)

3. Perpendicular to $4x-7y=23$ through $\left(\dfrac{2}{3},-\dfrac{4}{5}\right)$

(Point-Slope Form)

23: Pythagorean Theorem

Use the diagram at the right to answer the following questions. Be sure to simplify.



1. Find b if a = $4\sqrt{5}$, c = 2

2. Find c if a = $2\sqrt{3}$, b=6

3. If a = c, and b = 10, find a

24: Algebraic Errors to Avoid

Error	*Correct form*	*Comments*
$a-(x-b)\neq a-x-b$	$a-(x-b)=a-x+b$	Change all signs when distribution negative through parentheses.
$(a+b)^2\neq a^2+b^2$	$(a+b)^2=a^2+2ab+b^2$	Don't forget middle term when squaring binomials.
$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right)\neq\frac{1}{2}ab$	$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right)=\frac{1}{4}(ab)$	1/2 occurs twice as a factor.
$\frac{a}{x+b}\neq\frac{a}{x}+\frac{a}{b}$	Leave as $\frac{a}{x+b}$	Don't add denominators when adding fractions.
$\frac{1}{a}+\frac{1}{b}\neq\frac{1}{a+b}$	$\frac{1}{a}+\frac{1}{b}=\frac{a+b}{ab}$	Use definition for adding fractions.
$\frac{\frac{x}{a}}{b}\neq\frac{bx}{a}$	$\frac{\frac{x}{a}}{b}=\left(\frac{x}{a}\right)\left(\frac{1}{b}\right)=\frac{x}{ab}$	Multiply by reciprocal of the denominator.
$\frac{1}{3x}\neq\frac{1}{3}x$	$\frac{1}{3x}=\frac{1}{3}\cdot\frac{1}{x}$	Use definition for multiplying fractions.
$1/x+2\neq\frac{1}{x+2}$	$1/x+2=\frac{1}{x}+2$	Be careful when using a slash to denote division.
$(x^2)^3\neq x^5$	$(x^2)^3=x^{2\cdot3}=x^6$	Multiply exponents when an exponential form is raised to a power.
$2x^3\neq(2x)^3$	$2x^3=2(x^3)$	Exponents have priority over coefficients.
$\frac{1}{x^2+x^3}\neq x^{-2}+x^{-3}$	Leave as $\frac{1}{x^2+x^3}$	Don't shift term-by-term from denominator to numerator.
$\sqrt{5x}\neq5\sqrt{x}$	$\sqrt{5x}=\sqrt{5}\sqrt{x}$	Radicals apply to every factor inside radical.
$\sqrt{x^2+a^2}\neq x+a$	Leave as $\sqrt{x^2+a^2}$	Don't apply radicals term-by-term.
$\frac{a+bx}{a}\neq1+bx$	$\frac{a+bx}{a}=1+\frac{b}{a}x$	Cancel common factor, *not* common terms.
$\frac{a+ax}{a}\neq a+x$	$\frac{a+ax}{a}=1+x$	Factor *before* canceling.