Summer Math Packet   Name_____

Welcome to

Honors Math III

To prepare you for the upcoming year, the Mathematics Department has created this summer assignment to help review important skills and concepts you have learned. This assignment has been divided into different sections.

You are responsible for completing your own packet. Try and complete most of the assignment without using a calculator. You may use any previous notes or any website resources, such as www.khanacademy.org.

This packet will be collected on Thursday, August 21, 2014. All work should be attached to the packet and final answers written on the lines provided in the packet. Be sure to show ALL work to receive credit. All answers should be exact (simplified fractions and radicals, no decimals unless stated in problem)

An assessment (quiz/test) will be given to assess your knowledge of the material within the first two weeks of class. These grades will go in the first nine week grading period.

If you lose this packet, you can find a new one on the schools webpage. Good luck! See you in the fall! ☺

Section 1: Order of Operations

Hints:

- Multiplying integers: (+)(+)=(+), (-)(+)=(-), (-)(-)=(+)
- Remember: PEMDAS
  - P-parenthesis E-exponents M-multiply D-divide A-add S-subtract

1. $\dfrac{7(14)-3(6)}{2}$

2. $14 \div [3(8-2)-11]$

3. $14 + 6 \cdot 2 - 8 \div 4$

4. $4^3 - (2-5)^3$

Section 2: Solving Equations

Example: $\dfrac{2}{3}x - \dfrac{1}{6} + \dfrac{1}{2}x = \dfrac{7}{6} + 2x$

Solve each equation. Show all work.

1. $3(r-6) + 2 = 4(t+2) - 21$

2. $\dfrac{4}{5}(3x+4) = 20$

3. $\dfrac{1}{3}(6x+24) - 20 = \dfrac{-1}{4}(12x-72)$

4. $a + (a-3) = (a+2) - (a-1)$

Section 3: Exponents

Hints/Examples:

Exponent Rule	Examples
$x^a \cdot x^b = x^{a+b}$	$c^3 \cdot c^5 = c^8 \qquad 3^5 \cdot 3^8 = 3^{13}$ $5(5^n) = 5^1(5^n) = 5^{n+1}$
$a^x \cdot b^x = (ab)^x$	$2^4 \cdot 3^4 = 6^4 \qquad 12^5 = 2^{10} \cdot 3^5$
$\dfrac{x^a}{x^b} = x^{(a-b)}$	$\dfrac{2^5}{2^{11}} = \dfrac{1}{2^6} = 2^{-6} \qquad \dfrac{x^{10}}{x^3} = x^7$
$\left(\dfrac{a}{b}\right)^x = \dfrac{a^x}{b^x}$	$\left(\dfrac{10}{2}\right)^6 = \dfrac{10^6}{2^6} = 5^6 \qquad \dfrac{3^5}{9^5} = \left(\dfrac{3}{9}\right)^5 = \left(\dfrac{1}{3}\right)^5$
$(a^x)^y = a^{xy} = (a^y)^x$	$(3^2)^4 = 3^{2\cdot4} = 3^8 = 3^{4\cdot2} = (3^4)^2$
$x^{-a} = \dfrac{1}{x^a}$	$\left(\dfrac{3}{2}\right)^{-2} = \left(\dfrac{2}{3}\right)^2 = \dfrac{4}{9} \qquad 2x^{-4} = \dfrac{2}{x^4}$
$x^{a/b} = \sqrt[b]{x^a} = \left(\sqrt[b]{x}\right)^a$	$27^{4/3} = \sqrt[3]{27^4} = \left(\sqrt[3]{27}\right)^4 = 3^4 = 81$ $\sqrt[5]{x^{15}} = x^{15/5} = x^3$
$a^x + a^x + a^x = 3a^x$	$3^4 + 3^4 + 3^4 = 3 \cdot 3^4 = 3^5$ $3^x + 3^x + 3^x = 3 \cdot 3^x = 3^{x+1}$

1. $6^{-2} \cdot 6^{-3}$

2. $x^6 \cdot x^2 \cdot x$

3. $(2a)^3 \cdot (2a)^8$

4. $(-3y^2)^3$

5. $\dfrac{b^7}{b^2}$

6. $(4a^2)^3(-2a^5)^4$

7. Express using a negative exponent: $\dfrac{1}{y^8}$

Section 4: Adding and Subtracting Polynomials

Remember:
- Only like terms can be added or subtracted
- Like terms have the same variable and exponent
- Only the coefficients can be added or subtracted not the variables

Examples:

Add- $(5a^2 + 3a^2x - 7a^3) + (2a^2 - 8a^2x + 4)$

Subtract- $(3p^2 - 2p + 3) - (p^2 - 7p + 7)$

Add or subtract the polynomials. Show all work.

1. $(5x^2 - x - 7) + (2x^2 + 3x + 4)$

2. $(5a + 9b) - (4b + 2a)$

3. $(5a^2x + 3ax^2 - 5x) + (2a^2x - 5ax^2 + 7x)$

4. $(x^3 - 3x^2y + 4xy^2 + y^3) - (7x^3 - 9x^2y + xy^2 + y^3)$

5. $(x^5 - 3xy + 4x^2 + x^3) - (7x^4 - 9x^2y + 2x^2 + x^3)$

6. $(9x^3 - x - 7) + (2x^3 - 3x + 1)$

Section 4: Multiplying Polynomials

Hints: Distributive Property or Box Method

Example:

$(-b + 8)(-6b^2 + b + 6)$

Multiply the polynomials. Show all work.

1. $4x(1-x)$

2. $6(x^2 + 2x + 7)$

2. $3x^2(4x^3 - 5x + 10)$

4. $(7m - 5n)(2m + 5n)$

5. $(6a - 6)(-2a^2 - 4a - 8)$

6. $(-3m^2 - 2mn - 8n^2)(8m^2 + 4mn + n^2)$

Section 5: Dividing Polynomials

Hints:

- Divide the coefficients.
- Use rules of exponents to divide the variables.

Example: $\dfrac{2s^3+20s^2+16s}{4s}$

Divide the polynomials. Show all work.

1. $\dfrac{14x^3 + 28x^2 - 70}{7}$

2. $\dfrac{20x^4 + 15x^2}{5x^2}$

3. $\dfrac{x^4 + 3x^3 + 7x}{x}$

4. $\dfrac{8s^8 + 2s^5 + 6s}{2s}$

Section 6: Factoring Polynomials Part 1

Hints:
- Look for GCF(greatest common factor)
- Check your answer by multiplying back out.

Example: $14z^8 + 24z^7 - 30z^3$

Factor the polynomials. Show all work.

1. $8x^2 + 10x$

2. $-15d^5 + 45d^3$

3. $36rs^2 - 108r^2s^3$

4. $23y^{10} - 46y^7 + 68y^2 + 10y$

Section 7: Factoring Polynomials Part 2

Hints: **ax²+bx+c**
- Write the terms in descending order. Example x⁵-x⁴+x
- List the factors of **c**
- Add those factors to find the number that matches to **b**

Example: t² -24 +5t

Factor the polynomials. Show all work.

1. $x^2 + 8x + 16$

2. $x^2 - 9x - 10$

3. $x^2 - 5x + 6$

4. $x^2 - 2x - 99$

Section 8: Solving Systems of Equations by Substitution

Hints:
- Solve one equation for a variable with a coefficient of 1.
- Substitute what the variable equals in the other equation.
- Solve for variable.
- Use that answer and solve for the other.

Example:

$$x - 2y = 6$$
$$3x + 2y = 4$$

Solve each system of equations by the substitution method. Show all work.

1. $\begin{pmatrix} 2x - 3y = 5 \\ 3x + y = 2 \end{pmatrix}$

2. $\begin{pmatrix} x - 2y = -12 \\ 2x + 9y = 2 \end{pmatrix}$

Section 9: Solving Systems of Equations by Elimination

Hints:
- Eliminate one variable by adding the two equations together.
- Sometimes you may have to multiple the equations by a number so the variables will eliminate.

Example:

$\begin{pmatrix} x + 3y = 7 \\ 2x - 3y = 5 \end{pmatrix}$

$\begin{pmatrix} 3x - 2y = -21 \\ 2x + 3y = -1 \end{pmatrix}$

Solve each system of equations by the elimination method. Show all work.

1. $\begin{pmatrix} 4x - 3y = 19 \\ 5x + 4y = -15 \end{pmatrix}$

2. $\begin{pmatrix} 10x - 2y = 26 \\ 3x + 2y = 0 \end{pmatrix}$

Section 9: Simplifying Radicals

Hints:
- A negative cannot be under the square root.

Examples:

$6\sqrt{300}$

Simplify the radical expressions. Show all work.

1. $\sqrt{27}$
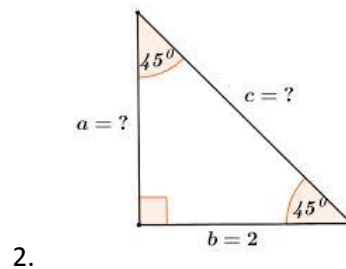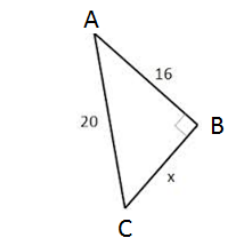
2. $4\sqrt{80}$
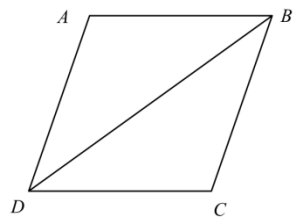
3. $\sqrt{75}$

4. $-3\sqrt{54}$

Section 10: Triangles

Hints:

Soh Cah Toa

Find the missing sides and angles. Show all work.

1.

2.

Section 11: PROOF

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Given: Parallelogram ABCD with diagonal $\overline{BD}$

Prove: $\triangle ABD \cong \triangle CDB$