SUMMER MATH ASSIGNMENT

PRE-CALCULUS (5420)/STATISTICS (5720) CPE
COURSE CODE:

LEARN  EXCEL

You are taking **Pre-Calculus CPE (5420)** and/or **Statistics CPE (5720)**in the fall. A mastery of and proficiency performing the following Algebra 1, Geometry, and Algebra 2 skills will be necessary for success in the Pre-Calculus Course. Work on each problem in order. Copy the problem onto loose-leaf paper; show all work in a neat and organized manner. Box in your final answer and this will be an excellent study guide for you in the future.

This assignment is mandatory and the math department strongly encourages you do this assignment on your own and to the best of your ability. Since the material contained in the summer math packet is *prerequisite material* you are responsible for having learned and retained. If you have forgotten any of these important mathematical concepts, you will find at the end of this assignment, several links to websites that you might find helpful should you have any problems or need some additional support on this assignment.

If you need assistance with a topic, try khanacademy.org for mini lessons, or purplemath.com.

Name: _____ Date: _____

Last Math Class Taken:_____

Teacher: _____

Summer Math Assignment for Pre-Calculus CP

A. Perform the indicated operation(s). You must find the LCD and simplify the result. Do not use a calculator.

1. $\frac{3}{8}+\frac{5}{13}$ 2. $\frac{7}{4}-\frac{1}{12}$ 3. $\frac{2}{5}-\frac{1}{3}-\frac{1}{6}$ 4. $\frac{8}{9}+\frac{2}{3}+\frac{1}{2}$

5. $\frac{1}{2}+\frac{1}{3}+\frac{1}{4}$ 6. $\frac{9}{11}-\frac{5}{3}-\frac{5}{6}$ 7. $-\frac{3}{12}+\frac{4}{10}-\frac{1}{5}$

8. $\frac{2}{8}-\frac{3}{4}+\frac{1}{2}$ 9. $\frac{7}{15}-\frac{4}{5}+\frac{2}{3}$ 10. $\frac{1}{2}-\frac{8}{10}+\frac{5}{4}$

11. $5\frac{1}{8}-2\frac{3}{4}$ 12. $4\frac{3}{8}-2\frac{5}{6}$ 13. $9\frac{2}{5}+3\frac{1}{3}$ 14. $2\frac{1}{20}+3\frac{3}{8}$

B. Perform the indicated operation(s). Simplify the result. Do not use a calculator.

1. $\frac{3x}{8}\div\frac{1}{2}$ 2. $8x\div\left(-\frac{1}{4}\right)$ 3. $-24x\div\left(-\frac{2}{3}\right)$ 4. $\frac{-22}{-\frac{1}{3}}$ 5. $\frac{\frac{1}{2}}{\frac{3}{4}}$

6. $\frac{\frac{2}{3}}{5}$ 7. $-39\div\left(-4\frac{1}{3}\right)$ 8. $\frac{42t}{-14z}\div\frac{-6}{7t}$

9. $\frac{18x-9}{3}$ 10. $\frac{22x+10}{2}$ 11. $\frac{-56+x}{-8}$ 12. $\frac{45-5x}{5}$

13. $\frac{22-4x}{4}$ 14. $\frac{15x-7}{5}$ 15. $\frac{20x+3}{5}$

C. Simplify each expression. No negative exponents.

1. $2^3 \cdot 2^4$
2. $(7)^2 (7)^3$
3. $(12x)^3$
4. $-(4x)^2 \cdot (5x)^3$
5. $(7x^3 y) \cdot (2x^4)$
6. $(4r^2 s)^2 (-2s^2)^3$
7. m^{-4}
8. $\dfrac{y}{x^{-2}}$
9. $\dfrac{3}{3x^{-4}y^3}$
10. $(-3t)^0 \cdot \dfrac{2}{s^{-2}}$
11. $\left(\dfrac{4b^{-1}}{2a^4}\right)^{-2}$
12. $\dfrac{2^{11}}{2^8}$
13. $\left(\dfrac{3x^2 z^4}{2xz}\right)^3$
14. $\dfrac{18b^2 c}{4bc^3} \cdot \dfrac{3ab^{-2}}{5a^2 c^3}$

D. Factor completely.

1. $y^2 + 3y - 4$
2. $n^2 + 16n - 57$
3. $x^2 + 17x + 66$
4. $-45 + 14 - z^2$
5. $12b^2 - 17b - 99$
6. $2t^2 + 17x + 66$
7. $18d^2 - 54d + 28$
8. $4n^2 + 4n - 288$
9. $a^2 - b^2$
10. $4x^2 - 9$
11. $169 - x^2$
12. $25x^2 - 49y^2$
13. $x^3 + 5x^2 + 8x + 40$
14. $2x^3 + 18x^2 - 5x - 45$
15. $3x^5 + 6x^3 - 45x$
16. $x^3 - 8$
17. $27x^3 + 125$
18. $8x^3 - 64$

E. Solve the equation.

1. $(2x - 3)(x + 7) = 0$
2. $5(x + 3)(2x - 5) = 0$
3. $x^2 - x - 2 = 0$
4. $x^2 + 7x + 10 = 0$
5. $x^2 - 9x = -14$
6. $2x^2 - 9x - 35 = 0$
7. $7x^2 - 10x + 3 = 0$
8. $2x^2 + 19x = -24$
9. $10x^2 + x - 10 = -2x + 8$
10. $\dfrac{x}{3} - \dfrac{x}{5} = 3$
11. $-\dfrac{3}{8}y = 6$
12. $-\dfrac{4}{9}(2x - 4) = 48$
13. $-(8h - 2) = 3 + 10(1 - 3h)$
14. $-2x^2 + 5x = 3x^2 - 10x$
15. $-9x^2 + 35x - 30 = 1 - x$
16. $6x^2 - 8x + 3 = 0$
17. $8x^2 + 4x + 5 = 0$
18. $3(x - 1)^2 = 4x + 2$
19. $x^2 - 6x + 7 = 0$
20. $x^2 + 8x + 19 = 0$
21. $x^2 + 6x + 15 = 0$

*Use the quadratic formula for #19 and #20, and solve #21 by completing the square.

F. Rewrite Formulas.

1. Solve the formula for $I = prt$ for r.
2. Solve the formula for $A = \frac{1}{2}bh$ for b.
3. Solve the formula for $F = \frac{9}{5}c + 32$ for c
4. Solve the formula for $P = 2l + 2w$ for w.
5. Solve the formula for $A = \frac{1}{2}(b_1 + b_2)h$ for b_1.
6. Solve the formula for $C = 2\pi r$ for r.
7. Solve the formula for $A = \pi r^2$ for r.

G. Part 1:Use the points A(4, 1) and B(8, 3).

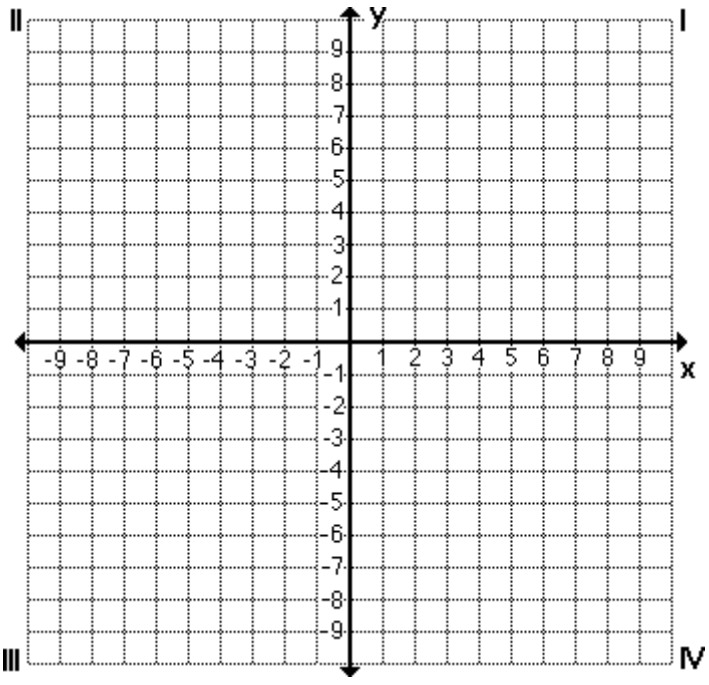
a) Use the graph on the right to graph the line segment $\overline{AB}$.

b) Find the midpoint of $\overline{AB}$

c) Find the slope of $\overline{AB}$

d) Determine the slope of the line perpendicular to $\overline{AB}$.

e) Write an equation(in slope-intercept form) of the perpendicular bisector of $\overline{AB}$. In other words, the line you want an equation for is perpendicular to $\overline{AB}$ and passes through the midpoint of $\overline{AB}$.



H. Part 1: Complete the features of the parabola, then graph the parabola.

Given the function $f(x) = x^2 - 4x - 5$

The parabolic curve opens _____

The y-intercept is _____

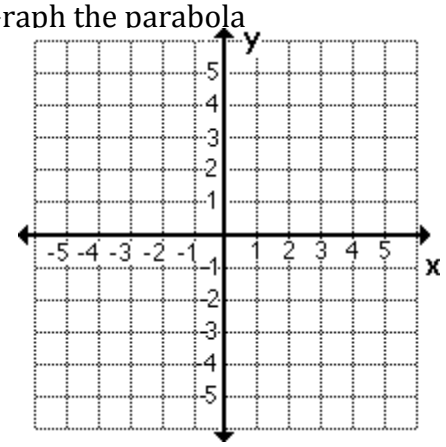
The x-intercepts at most two are:
are _____ and _____

The axis of symmetry _____

The vertex is located at point _____

Point symmetric to the y-intercept _____

Graph the parabola



Part 2: Given $f(x) = x^2 + 6x - 5$ a)Find the axis of symmetry of the function
b) Find the vertex
c) Write the function in vertex form.

I. Write in simplest form. No decimal answers are allowed. Assume all variables are positive.

1. $\sqrt{32}$
2. $\sqrt{56}$
3. $3\sqrt{27}$
4. $\sqrt{15} \cdot \sqrt{3}$
5. $\sqrt{15} \cdot \sqrt{3}$
6. $\dfrac{2}{\sqrt{5}}$
7. $\dfrac{6}{1+\sqrt{2}}$
8. $\dfrac{\sqrt{18}}{\sqrt{2}}$
9. $\sqrt{20x^6y^7}$
10. $7\sqrt{5} - \sqrt{45}$
11. $\sqrt[3]{8x^3y^5z^{10}}$

J. Find the least common denominator of the pair of rational expressions.

1. $\dfrac{1}{2ab}$ and $\dfrac{4}{a^2}$
2. $\dfrac{4}{5x}$ and $\dfrac{-3}{10x}$
3. $\dfrac{m}{14}$ and $\dfrac{1}{18m}$

4. $-\dfrac{1}{x-1}$ and $\dfrac{1}{18m}$

5. $-\dfrac{8}{5h+5}$ and $\dfrac{4}{h+1}$

6. $\dfrac{y}{8}$ and $\dfrac{1}{2y+8}$

7. $\dfrac{x}{10x+20}$ and $\dfrac{x}{7x+14}$

8. $\dfrac{1}{2x-6}$ and $\dfrac{-1}{x^2-x-6}$

9. $\dfrac{x}{x^2-9}$ and $\dfrac{-x}{x^2+3x-18}$

K. Perform the indicated operation and simplify the result.

1. $\dfrac{4x^3y^5}{3x^2y^4}\cdot\dfrac{9x^3y^2}{12xy}$

2. $\dfrac{x^2-1}{12x^2+24x}\cdot\dfrac{4}{x^2+x}$

3. $\dfrac{6x^2+7x+1}{7x+49}\div\dfrac{2x+2}{2x+14}$

4. $\dfrac{2x}{x-4}-\dfrac{8}{x-4}$

5. $\dfrac{5}{2x^2}-\dfrac{3}{4x}$

6. $\dfrac{x+1}{x^2-x-6}+\dfrac{5}{x+2}$

7. $\dfrac{8x-1}{x^2+x-6}-\dfrac{4}{x-2}$

8. $\dfrac{7}{x^2+8x+15}-\dfrac{3}{x+5}$

9. Solve $\dfrac{4}{2x}=\dfrac{5}{x+6}$

10. Solve $\dfrac{1}{x-2}+2=\dfrac{3x}{x+2}$

L. 1. Solve a) $|2x-1|=9$ b) $|2x-1|<7$ c) $|-x+1|\geq 11$

2. a) Graph $f(x)=\dfrac{1}{2}|x-3|+1$ b) Find the vertex of this function.

3. Solve a) $x^2-4x+3<0$ b) $2x^2-5x-3\geq 0$

*For 3a) and b), write the solutions in interval notation.

M. Part 1: Given $f(x)=2x+5$ *and* $g(x)=x^2+3$

a) Find the inverse of $f(x)$

b) Graph both f(x) and its inverse.

c) Find $f(g(x))$

Part 2: a) Graph the piecewise defined function below

$$f(x)=\begin{cases}2x+1, & x<-2\\ x^2, & -1\le x\le 2\end{cases}$$

b) Evaluate $f(1)$

N. Transformations

1. Given the parent function $f(x)=x^2$, write the following transformed functions. Simplify your answers.

a)Moved 1 unit to the left and 2 units up.

b) Stretched vertically twice, then reflected across the x-axis.

c) Horizontally compressed by a factor of $\mathbf{\frac{1}{3}}$

d) Reflected across the y-axis, then moved 3 units down.

O. Perform the given operation and simplify each.

1. $(2+3i)-(4-i)$ 2. $(1+2i)(3-2i)$ 3. $\frac{2}{3+4i}$ 4. $\frac{2-i}{3+5i}$

P. Given $(x^3-10x^2+19x+30)\div(x-6)$

1. Divide by long division. 2. Divide by synthetic division.

3. Find all the factors of $(x^3-10x^2+19x+30)$

4. Evaluate $f(x)=(x^3-10x^2+19x+30)$ when x=2 by synthetic substitution.

5. Find all zeros of $f(x)=2x^3-7x^2+9$

6. Find all zeros of $f(x)=x^3-x^2+4x-4$

Q. Rational functions

1. Identify the vertical and horizontal asymptotes, domain and range of a) $f(x)=\frac{1}{x}$

2. Identify the vertical and horizontal asymptotes, domain and range of $f(x)=\frac{1}{x-4}+2$

3. Find the zeros of the function and domain $f(x)=\frac{x^2-2x-3}{x+2}$

R. Evaluate log expressions without using a calculator.

1. $\log_2 16$
2. $\log_5 25$
3. $\log_{11} 1$
4. $\log_7 343$
5. $\log_9 9^3$
6. $\log_4 \frac{1}{16}$
7. $\ln_e e^3$
8. $\log_2 8^2$

S. Classify each of the following, using N, W, Z, Q, Ir and $\Re$, or none. (Use the following as a guide)

The Natural Numbers (abbreviated N) are the set of numbers {1,2,3,4,5……}.

The Whole Numbers (abbreviated W) are the set of numbers {0,1,2,3,4,5……}.

The Integers (abbreviated Z, but sometimes abbreviated I) are the set of numbers {…-3,-2,-1,0,1,2,3……}.

A Rational Number (abbreviated Q) can be expressed as a ratio $\frac{m}{n}$, where *m* and *n* are Integers and *n* is not zero. Examples include: $\frac{2}{3},\ 1.\overline{23},\ 5.8,\ -7,\ 0$.

Any Real Number that is not a Rational Number is an Irrational Number (abbreviated Ir or Irr). Examples include: $\sqrt{2}, \pi, \sqrt{7}$.

Each Real Number (abbreviated $\Re$) corresponds to exactly one point on the number line, and every point on the number line represents exactly one real number. Every Real Number can be classified as Rational or Irrational.

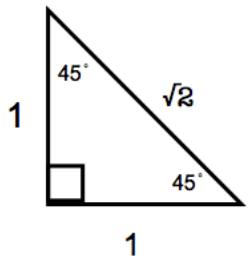
Ex: 3: W, Z, Q, $\Re$ Ex: ½ : Z, Q, $\Re$

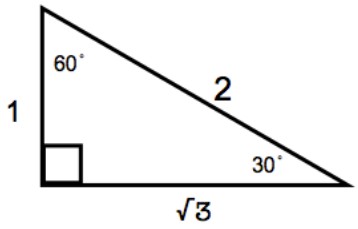
1. $-\frac{2}{3}$ 2. -2.683 3. $\sqrt{25}$ 4. -4

5. 9.9 6. $7.\overline{6}$ 7. $-\sqrt{100}$ 8. $3\sqrt{7}$

9. 1,000,000 10. 0

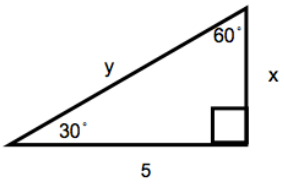
T. Based on the ratios of $30°-60°-90°$ *and* $45°-45°-90°$ triangles and definitions of sin, cos, tan, csc, sec and cot solve each of the following trigonometric problems. Simplify your answers. Rationalize the denominator. No decimal answers.



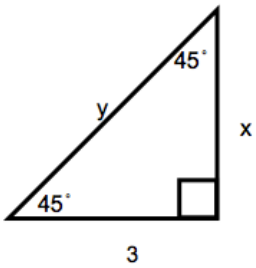


For #1-3 below, solve for x and y in each triangle.

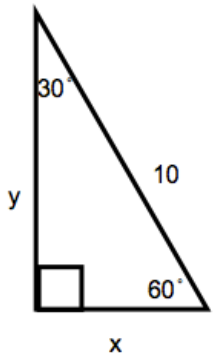
1.



2.



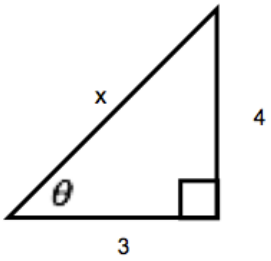
3.



4. For the triangle on the right,

a) find x and

b) Find: $\sin\theta, \cos\theta, \tan\theta, \csc\theta, \sec\theta, \cot\theta$



U. Solve each word problem.

1. While on vacation, your family rented a car for $293. The car rental cost $180, plus $0.25 for every mile driven over 150 miles. How many miles did you drive while on vacation?

2. At a small theater, tickets for adults cost $12 and tickets for children cost $8. At one performance ticket sales were $480. How many people may have attended the performance?

3. Quinn and Kyle collected 87 aluminum cans to recycle. Quinn collected twice as many cans as Kyle. How many can did each person collect?

4. You buy a jacket, and the sales tax is 6%. The total cost is $79.49. Find the cost of the jacket before the tax?

5. A frozen yogurt stand offers walnuts, peanuts, sprinkles, chocolate chips, and toffee bits as toppings. How many combinations of two different toppings are possible.

6. You can wash one window in 15 minutes and your sister can wash one window in 20 minutes. How many minutes will it take to wash 12 windows if you work together?

7. For the 15 years that a computer store has been open, its annual revenue R(in millions of dollars) can be modeled by $R = -0.0040t^4 + 0.088t^3 - 0.36t^2 - 0.55t + 5.8$ where t is the number of years since the store opened. In what year was the revenue first greater than $7 million?

$$A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$$

8. Mary invested $2000 at 6% interest compounded quarterly.
   a) How much will the investment be worth after 5 years? (round to the nearest cents)
   b) When will the investment be worth $6,000? (round to two decimal places)