Incoming Magnet Precalculus / Functions Summer Review Assignment

Students,
This assignment should serve as a review of the Algebra and Geometry skills necessary for success in Precalculus. These skills were taught in previous math courses. Our hope is that this review will keep your mind mathematically active during the summer, identify weaknesses in Algebra and Geometry, if they exist, and prepare you for the fun and challenging year ahead.

Because of the diverse backgrounds of the students coming into the magnet program some of the problems may be more challenging than others. We expect that you will do your best with this material and make an attempt of all the problems.

Directions:
- Answer all questions on a separate sheet of paper.
- Show all work.
- Carefully and neatly label your problems and solutions, including the original problem.
- If your answer involves radicals or π, give an exact answer *and* a decimal approximation using a calculator

This assignment will be *collected* on the **first day of school**. Enjoy your summer. See you in August ready to learn!!!

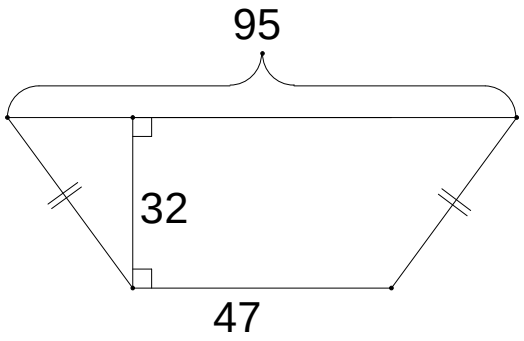
I. Convert from one kind of units to another:

1) 159 cm = _____ mm 2) 3.2 m = _____ km 3) 18 inches = _____feet

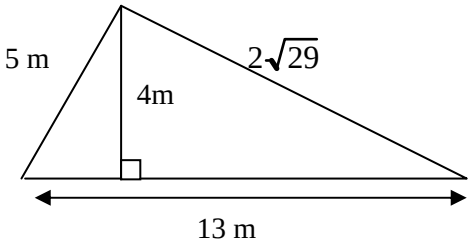
4) _____feet = 4 miles 5) 3.6 yards = _____feet

II. Find the perimeter and area of each of the following figures.

1)



2)



Triangle

III. For each of the following circles:

1. If the radius is 5.2 cm, find the area and the circumference.
2. If the circumference = 6π m, find the radius and the area.
3. If the area = 14 π cm^2, find the circumference and the diameter.

IV. Simplify.

1) $\sqrt{8}$ 2) $4\sqrt{27}$ 3) $\frac{6}{\sqrt{3}}$

4) $\sqrt{16\,a^3b^2}$ 5) $\sqrt{8}+\sqrt{18}-\sqrt{32}$ 6) $\sqrt{21}\cdot\sqrt{14}$

V. Solve for *x* in each of the following equations:

1) $\frac{5x}{8}=\frac{6x-7}{3}$ 2) $\frac{6}{x+3}=\frac{4}{2x-7}$ 3) $\frac{2}{3}x+4=6$

4) $\frac{3}{x+1}=\frac{x}{4}$ 5) $2(x+1)-3=4$ 6) $\frac{1}{5}x-3=2$

VI. Complete the following.

1. a) Give the equation of a line with a slope of 0 and a *y*-intercept of (0, 12).
   b) Sketch the line.

2. a) Give the equation of a line that contains the points A(-2, 3) and B(-6, -5).
   b) Sketch the line.

3. a) Give the equation of a line with a slope of -3 and a *y*-intercept of (0, 5).
   b) Sketch the line.

4. a) Give the equation of a line perpendicular to $3x - 4y = 2$ and passing through (1, 1).
   b) Sketch the line.

VII. Multiply the polynomials and expand.

1) $(x-9)(x+8)$ 2) $(x-8)^2$ 3) $(x+2)^3$

4) $(2x-1)(x+5)$ 5) $(x+y-2)^2$ 6) $(x^2-3)(-4+x-3x^2)$

VIII. Solve the following equations for *x* by factoring:

1) $x^2 - x - 72 = 0$ 2) $2x^2 + 9x - 5 = 0$ 3) $4x^2 - 36x + 72 = 0$

4) $x^2 - 16x + 64 = 0$ 5) $x^3 - 64 = 0$ 6) $x^4 - 13x^2 + 36 = 0$

IX. Solve the following equations for *x* by using the quadratic formula (remember to give all solutions in two ways: exactly, using radicals and an approximation using your calculator):

1) $x^2 + 3x - 5 = 0$ 2) $-2x^2 - 4x + 7 = 0$

X. Solve the following systems of equations:

1) $\begin{aligned} 5x + 4y &= 6 \\ -2x - 3y &= -1 \end{aligned}$ 2) $\begin{aligned} -2x + y &= 8 \\ y &= -3x - 2 \end{aligned}$

XI. For each of the following functions:
a) Graph the function
b) State the domain of the function using interval notation. Example: $[-3, \infty)$ or $(-2, 7)$
c) State the range of the function using interval notation

1) $f(x) = -\frac{3}{4}x + 4$ 2) $f(x) = 3x + 2$ 3) $f(x) = (x-2)^2 + 1$

4) $f(x) = x^2 + 6x + 1$ 5) $f(x) = \sqrt{x-4}$ 6) $f(x) = |x|$

7) $f(x) = |x+2|$ 8) $f(x) = |x| + 3$ 9) $f(x) = \frac{3}{x+5}$

XII. For each of the following inequalities, sketch the set of points in the xy-plane that satisfies the inequality:

1) $y \geq 2x+1$ 2) $y < -3x+4$ 3) $y \leq 4$

4) $x > -2$ 5) $y < |x|$ 6) $y > x^2$

XIII. Simplify the following expressions:

1) $(-3x^2+4x-7)+(2x^2-7x+8)$ 2) $\dfrac{64x^3y^2 - 16x^2y^3 + 32x^5y^5}{8x^2y^2}$

3) $(39a^4-4a^3+2a^2-a-7)-(10a^4+3a^3-2a^2-a+8)$ 4) $2x^2z(3x-2z)$

5) $-3xy^3(x-2y)$ 6) $(3x^2+x-1)(2x-3)$ 7) $\dfrac{10a^3b^2c^7}{5a^5bc^7}$

8) $(8a^3b^2)(2a^{-4}b^{-5})$ 9) $(-3x^2y^3z)^3$ 10) $(15a^4b^2c)^0$

11) $\dfrac{3x^3y^2}{6x^{-2}y^5}$

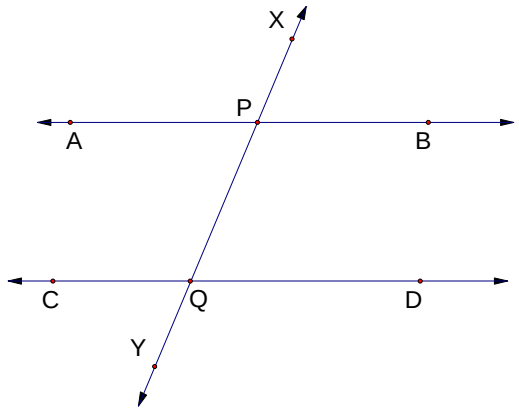
XIV. Solve for x in each of the following equations:

1) $\sqrt{2x} = 8$ 2) $\sqrt{3x-5} = \sqrt{2x+4}$

3) $2 - \sqrt{x} = 4$ 4) $\sqrt{3x} - 4 = 2$

XV.

1. Let parallel lines AB and CD be intersected by line XY at the points P on AB and Q on CD in such a way that A and C are on one side of XY and B and D are on the other. Answer the following questions using this figure:



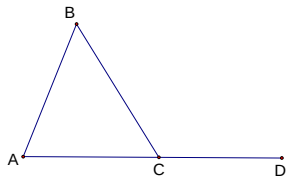
a. If $m\angle APX = \frac{1}{2}x+3, m\angle YQD = \frac{2}{3}x-8$, find the measure of each of these angles.

b. If $m\angle APQ = x^2+x+1, m\angle QPB = 3x^2+7x+39$, find the measure of each of these angles.

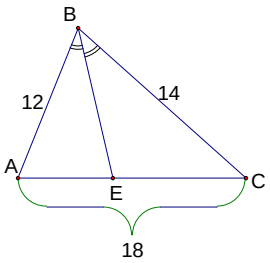
c. What is the measure of the angle formed by the intersection of the angle bisector of $\angle BPQ$ and the angle bisector of $\angle DQP$?

2. In ΔABC, if the ratio of $m\angle A : m\angle B : m\angle C$ = 3:4:5, find the measure of each angle of the triangle.

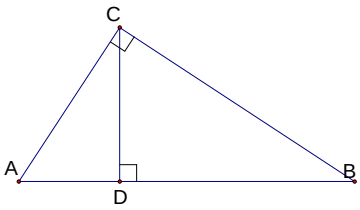
3. In ΔABC, extend side AC past C to the point D. If $m\angle A = 2x^2 + 5x - 5, m\angle B = 5x^2 - x - 3$, and $m\angle BCD = 120°$, find the measure of each of these three angles. (Give all solutions that work.)



4. In ΔABC, suppose that the bisector of angle B meets side AC at point E. If AB = 12, BC = 14, and AC = 18, find AE and EC.



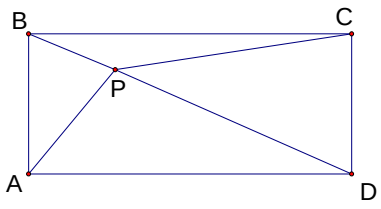
5. Given right triangle ABC with right angle at C, altitude CD is drawn to the hypotenuse of the triangle. If AD = $\sqrt{12}$,and DB = $4\sqrt{3}$, find AC, CB, and CD.



6. In parallelogram ABCD, AB = 31, BC = 20, CD = 5x + 3y, and DA = 3x + 2y. Find the lengths of the sides of the parallelogram.

7. If ABCD is a rhombus with diagonal AC = 10, and diagonal DB = 24, find the perimeter of the rhombus.

8. If ABCD is a rectangle and P is any point in its interior, prove that $AP^2 + PC^2 = PB^2 + PD^2$.

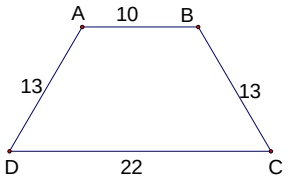


9. In trapezoid ABCD with bases $\overline{AB}$ and $\overline{CD}$, if AB = 10 and DC = 22, find the length of the median (also known as midsegment) of the trapezoid.

10. Given trapezoid ABCD with bases $\overline{AB}$ and $\overline{CD}$, draw diagonals AC and BD. Let E be the midpoint of AC and F the midpoint of BD.

a. Prove that E and F lie on the midsegment of the trapezoid.
b. If AB = 10 and DC = 22, find EF.

11. Suppose isosceles trapezoid ABCD has AD = BC = 13, AB = 10, and DC = 22. Find the area of the trapezoid.



XVI.

1. Given circle O with points A, B, C, and D on the circle, answer the following:

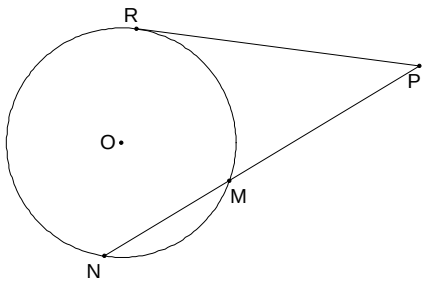
a. If $m\angle AOB$ = 60° and OA is 8, determine the area of sector AOB.

b. If $m\angle AOB$ = 30° and OA = 10, determine the area of the segment formed by chord AB and arc AB.

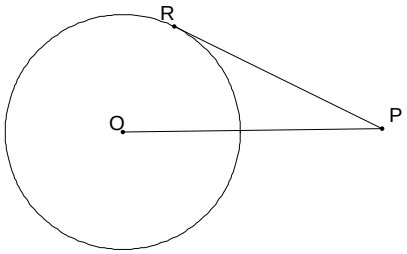
c. If AC = 16 and OA is 10, how far is chord AC from the center O.

2. Let chords AB and CD of circle O intersect at point E. If $BE = x$, $EA = 3x - 1$, $DE = x - 1$, and $CE = 4x$, find the lengths of these chords.

3. From a point P outside of circle O, let $\overline{PR}$ be tangent to the circle at R and let secant $\overleftrightarrow{PM}$ intersect the circle at M and N (with M between P and N). If PM = 9 and MN = 3, find PR.



4. From a point P outside of circle O, let PR be tangent to the circle at R. Find OP if the radius of the circle is 5 and PR = 13.



XVII. Proofs:

1. Use a truth table to prove the validity of $[(P \wedge \sim Q) \vee Q] \rightarrow (P \vee Q)$

2. Prove that the base angles of an isosceles triangle are congruent three times in three different ways.

XVIII. Given the indicated measures of angles and lengths of sides, solve the triangles below for the missing parts.

1. Given right triangle ABC, $m\angle A = 56^{\circ}, \quad a = 42km, \quad c = 51km$.

2. $m\angle B = 43°, m\angle C = 36°, a = 92cm$

3. $a = 21.1m, \quad b = 24.6m \quad c = 12.0m$