**Geometry HW: CG - Review**

1.  What is the slope of the line containing points $A(a, b)$ and $B(a - 4, b + 2c)$?

2.  Find the coordinates of the midpoint of the segment whose endpoints are $(a, b)$ and $(-5a, 7b)$.

3.  If $M(1, 2)$ is the midpoint of $\overline{AB}$ and the coordinates of $A$ are $(3, -1)$, find the coordinates of $B$.

4.  Given points $A(-2, 2)$, $B(3, 7)$, $C(5, -1)$, and $D(k, 2)$. If $\overline{AB} \parallel \overline{CD}$, find the value of $k$.

5.  Find the distance between the points $(a, b)$ and $(a + 2b, 4b)$.

6.  Which is an equation of the set of points that are 4 units from the point $(-3, 2)$?
    (1) $(x + 3)^2 + (y - 2)^2 = 2$          (2) $(x + 3)^2 + (y - 2)^2 = 16$
    (3) $(x - 3)^2 + (y + 2)^2 = 2$          (4) $(x - 3)^2 + (y + 2)^2 = 16$

7.  What is the radius of a circle whose center is at $(-2, 6)$ and passes through the point $(0, 3)$?

8. Draw the graphs $x^2 + y^2 = 4$ and $y = 4$ on the same axes. How many points are common to both graphs?

9. What are the coordinates of the center and the length of the radius of the circle $x^2 + y^2 + 12x - 8y + 43 = 0$

10. Triangle $ABC$ has vertices $A(-4, 7)$, $B(6, -3)$ and $C(2, 9)$.
    a. Prove using coordinate geometry that $\triangle ABC$ is a right triangle.

    b. Prove using coordinate geometry that the length of the median from $C$ to $\overline{AB}$ is half the length of $\overline{AB}$.

11. The vertices of $\triangle ABC$ are $A(2, 5)$, $B(4, -1)$, and $C(-3, 0)$.
    a. Prove that $\triangle ABC$ is isosceles.

    b. Find the coordinates of $M$, the midpoint of $\overline{AB}$.

    c. Find the length of the median from $C$ to $\overline{AB}$.

    d. Prove that $\overline{CM} \perp \overline{AB}$.

12. Given: The vertices of quadrilateral $ABCD$ are $A(0, 0)$, $B(s, 0)$, $C(t + s, s)$, and $D(t, s)$. If $s > 0$ and $t > 0$, prove using coordinate geometry that:

a. $ABCD$ is a parallelogram

b. $ABCD$ is *not* a rhombus

(Recall: a parallelogram is a quadrilateral with *both* pairs of opposite sides parallel; a rhombus is a quadrilateral with all four sides congruent. **You must know these**.)