Algebra 2 Honors "Extra Fun" Problems Chapter 10 (10.1-10.5)

1. The midpoint of $\overline{PQ}$ is $M$ ( -21, 37 ). If $P$ is ( 4, -5 ), find $Q$.

2. Find all points on the line $x = 8$ that are 13 units from $P$( 3, 2 ).

3. Find the <u>exact</u> distance from $Q$ ( 3, -1 ) to line $k$, with equation $y = -2x + 10$. (hint: find the equation of the line through $Q$ that intersects line $k$ and the point of intersection for these 2 lines)

4. Write the equation of a parabola in vertex form:
   a) given focus (-4, 2 ) and directrix $x = -1$
   b) given focus ( 3, 2) and parabola is tangent to $y = -1$

5. Find the equation of a circle centered at the origin and tangent to the line $3x + 4y = 50$.
   (remember: a tangent line is perpendicular to the radius of the circle)

6. Write the equation of the circle $3x^2 + 3y^2 - 18x + 12y + 3 = 0$ in standard form, and determine center and radius.

7. A circle is tangent to the $x$-axis, the line $x = 2$, and the line $y = 6$. Its center is in quadrant 2. Write the equation of this circle in standard form.

8. Write the equation of a parabola in vertex form, given that the parabola is tangent to the line $x = 5$ and its directrix is the line $x = 7$.

9. Write the equation of an ellipse in standard form, given that its vertices are ( -7, 5 ) and ( 1, 5 ) and its co-vertices are ( -3, 7 ) and ( -3, 3 ).

10. Write the equation of an ellipse in standard form, given that the ellipse is tangent to the $x$ – axis and its foci are ( 2, 8 ) and ( 2, 4 ).

11. Graph each ellipse. Identify and locate center, vertices, co-vertices, and foci. Round decimals to the nearest tenth as needed.

a. $\dfrac{(x+2)^2}{25} + \dfrac{(y-4)^2}{16} = 1$ b. $25(x+1)^2 + y^2 = 100$ c. $9(x-1)^2 + 81(y+2)^2 = 729$

12. Graph each hyperbola . Identify and locate center, vertices, and foci. Round decimals to the nearest tenth as needed. Write the equations of the asymptotes in slope-intercept form.

a. $\dfrac{(x-4)^2}{16} - \dfrac{y^2}{9} = 1$ b. $64(y+1)^2 - 4(x-2)^2 = 256$

13. Write the equation of a hyperbola in standard form, given its vertices are ( 2, 0 ) and ( -2, 0 ) and its asymptotes are $y = \pm\dfrac{3}{2}x$.

14. Write the equation of a hyperbola in standard form, given its foci are (-2, -3 ) and ( 6, -3 ) and one branch of the hyperbola is tangent to the $y$ – axis.