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 $y = -2x + 10$.

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.

Answers: 1. (-46, 79) **2. (8, 14) and (8, -10)** **3.** $\sqrt{5}$ **4. a)** $x = -\frac{1}{6}(y-2)^2 - \frac{5}{2}$

b) $y = \frac{1}{12}(x-3)^2 - 1$ **5.** $x^2 + y^2 = 100$ **6.** $(x-3)^2 + (y+2)^2 = 12$, **C(3, -2), r =** $2\sqrt{3}$

7. $(x+1)^2 + (y-3)^2 = 9$ **8.** $x = -\frac{1}{8}(y-k)^2 + 5$ **9.** $\frac{(x+3)^2}{16} + \frac{(y-5)^2}{4} = 1$

10. $\frac{(x-2)^2}{32} + \frac{(y-6)^2}{36} = 1$ **11. a. C(-2, 4); vertices (3, 4)(-7, 4); co-vertices (-2, 0) (-2, 8); foci (-5, 4) (1, 4) b. C(-1, 0); vertices (-1, 10) (-1, -10); co-vertices (1, 0) (-3, 0); foci** $(-1, 4\sqrt{6})(-1, -4\sqrt{6})$ **c. C(1, -2); vertices (10, -2) (-8, -2); co-vertices (1, -5), (1, 1); foci (** $1 + 6\sqrt{2}$ **, -2) (** $1 - 6\sqrt{2}$ **, -2) 12.a. C(4, 0); vertices (8, 0) (0, 0); foci (9, 0) (-1, 0); asymptotes** $y = -\frac{3}{4}x + 3$, $y = \frac{3}{4}x - 3$ **13. C(2, -1); vertices (2, 1) (2, 3); foci** $(2, -1 + 2\sqrt{17})(2, -1 - 2\sqrt{17})$**; asymptotes** $y = \frac{1}{4}x - \frac{3}{2}$, $y = -\frac{1}{4}x - \frac{1}{2}$

13. $\frac{x^2}{4} - \frac{y^2}{9} = 1$ **14.** $\frac{(x-2)^2}{4} - \frac{(y+3)^2}{12} = 1$