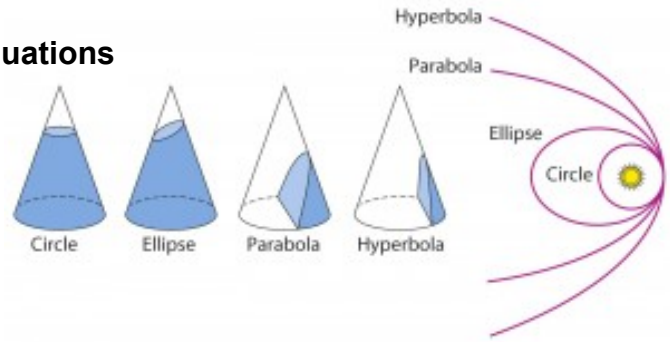
Unit 11.1-11.5, 11.7 Conic Sections and Parametric Equations



By the end of this unit, you should be able to:

- ☐ graph and write equations of circles
- ☐ graph and write equations of parabolas
- ☐ solve applied problems involving parabolas
- ☐ graph and write equations of ellipses
- ☐ solve applied problems involving ellipses
- ☐ graph and write equations of hyperbolas
- ☐ solve applied problems involving hyperbolas
- ☐ identify the conic given the equation in general form
- ☐ graph parametric equations
- ☐ find a rectangular equation for a curve defined parametrically
- ☐ use time as a parameter in projectile motion

Assignments:

11.2 – pg. 780 #19, 29, 33, 41, 47, 49, 59, 61, 63, 67, 71
2.4 – pg. 193 #7-17odd, 23-27odd, 35, 41
11.3 – pg. 790 #27, 39, 41, 43, 49, 53, 55, 57, 69, 71, 75
11.4 – pg. 802 #17, 27, 35, 37, 39, 41, 43, 47, 55, 65, 67
11.5 – pg. 811 #11-18
11.7 – pg. 827 #7-21odd, 49, 53, 55

Review:

For #1-4

a) Identify the conic (circle, parabola, ellipse, or hyperbola).
b) If it is a circle, identify the center and radius.
If it is a parabola, identify the vertex, focus, directrix, points that define the latus rectum, and eccentricity.
If it is an ellipse, identify the center, vertices, foci, and eccentricity.
If it is a hyperbola, identify the center, transverse axis, vertices, foci, equation of the asymptotes, and eccentricity.
c) Graph the conic.

1. $2x^2 - y^2 + 4x + 4y - 4 = 0$
2. $2x^2 + 2y^2 - 12x + 8y - 24 = 0$
3. $(x+5)^2 + 4(y-4)^2 = 16$
4. $x^2 + 8x = 4y - 8$

5. Write the equation of the circle with the given characteristics: Center (-4, 3) tangent to the x – axis.
6. Write the standard form equation of the parabola with the given characteristics: Vertex (3, 1) Focus: (1, 1)
7. Write the standard form equation of the ellipse with the given characteristics: Center (-1, 1) Vertices (-1, 0) and (-1, 2)
8. Write the standard form equation of the hyperbola with the given characteristics: Focus (0, 6) Vertices (0, -2) & (0, 2)

9. A satellite dish is in the shape of a paraboloid. Find the location of the receiver, which is placed at the focus, if the dish is 6 feet across at its opening and 2 feet deep.

10. Suppose a whispering gallery has a ceiling reaching twenty feet above the five-foot-high vertical walls at its tallest point (so the cross-section is half an ellipse topping two vertical lines at either end), and suppose the foci of the ellipse are thirty feet apart. What is the height of the ceiling above each "whispering point"?

#11-12 Graph. Find the rectangular equation of the curve.

11. $x = \frac{1}{2}t \qquad y = 3t - 1 \qquad 0 \le t \le 2$
12. $x = 4\cos t \qquad y = 3\sin t \qquad 0 \le t \le \pi$

13. Suppose Maddie threw a ball from a height of 5 meters with an initial velocity of 20m/s at an angle of 15 degrees to the horizontal.
a) Find parametric equations that describe the position of the ball as a function of time.
b) How long is the ball in the air?
c) When is the ball at its maximum height? Determine the maximum height of the ball.
d) Determine the horizontal distance the ball traveled.