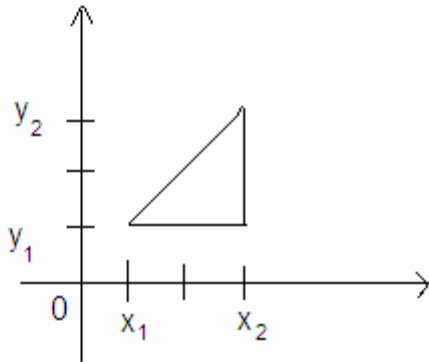


Distance Formula



The distance between the point $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ is _____.

Circles

- Equation:
where (h, k) is the center of the circle, and r is the radius of the circle
- Example: What is the equation of the circle with radius r and center $(0, 0)$?
- Example: What is the equation of the circle with radius 4 and center $(-3, 2)$?
- Example: $x^2 - 4x + y^2 = 5$ is the equation of a circle, but we need it in standard form to graph it. How do we fix it?

What is the graph of this equation?

- Example: Show that $x^2 + y^2 + 2x - 8y + 4 = 0$ is the equation of a circle by writing it in standard form. Find the center and radius. Then, sketch a graph of the circle.

Lines

- Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

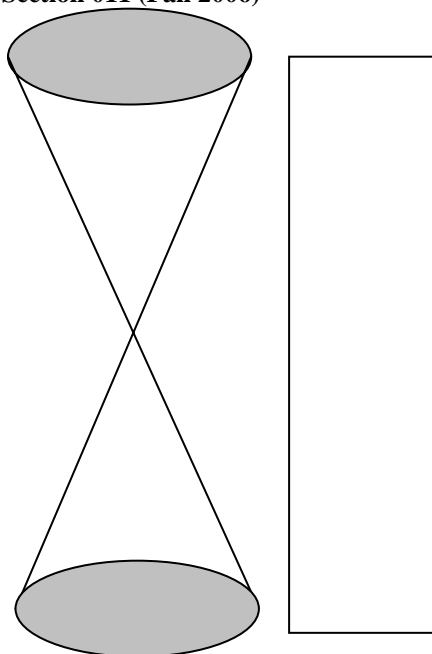
Horizontal line:

Vertical line:

- Slope-intercept form:
where m is the slope and b is the y -intercept.
- Point-slope form:
where (x_1, y_1) is a given point and m is the slope.
- Theorem: Two non-vertical lines are parallel \leftrightarrow _____.
- Theorem: Two lines with slopes m_1 and m_2 are perpendicular \leftrightarrow _____. Equivalently,
_____.
- Example: Find an equation of the line through point $(5, 2)$ that is parallel to the line $4x + 6y + 5 = 0$.
- Example: Are the lines $6x + 4y = 12$ and $-2x + 3y - 10 = 0$ perpendicular?

Conic Sections

- Types: _____, _____, and _____.
- Called conic sections because _____.



- Parabola: $y = ax^2$. If $a > 0$, then the graph of the parabola opens _____. If $a < 0$, then the graph opens _____.

Note: A parabola is an _____ and is _____.

Note: $x = ay^2$ is also a parabola. $x = ay^2 \rightarrow y = \pm(x/a)^{1/2}$. If $a > 0$, then the graph opens to the _____. If $a < 0$, then the graph opens to the _____. The graphs of these parabolas are _____.

- Ellipses:
 - Centered at (0,0): _____
where the x -intercepts are $\pm a$, and the y -intercepts are $\pm b$. (These are known as the vertices.)
 - Centered at (x_0, y_0) : _____
where the vertices are $(\pm a + x_0, y_0)$ and $(x_0, \pm b + y_0)$.
- Example: Sketch the graph of $36x^2 + 9y^2 = 144$.

- Hyperbolas:
 - Centered at (0,0): _____
where the x -intercepts are $\pm a$. (These are known as the vertices.)

Note: There are no y -intercepts.

- Asymptotes: $y =$ _____
- Centered at (x_0, y_0) : _____
where the vertices are $(\pm a + x_0, y_0)$.

Note: If the center is not the origin, there will be y -intercepts, but you will not need to identify them.

- Asymptotes: $y - y_0 =$ _____
- Example: $\frac{(x+3)^2}{16} - \frac{(y+2)^2}{9} = 1$ is centered at what point? What are the vertices? What are the asymptote(s)? Sketch a graph of the hyperbola.