Exploring Conic Sections

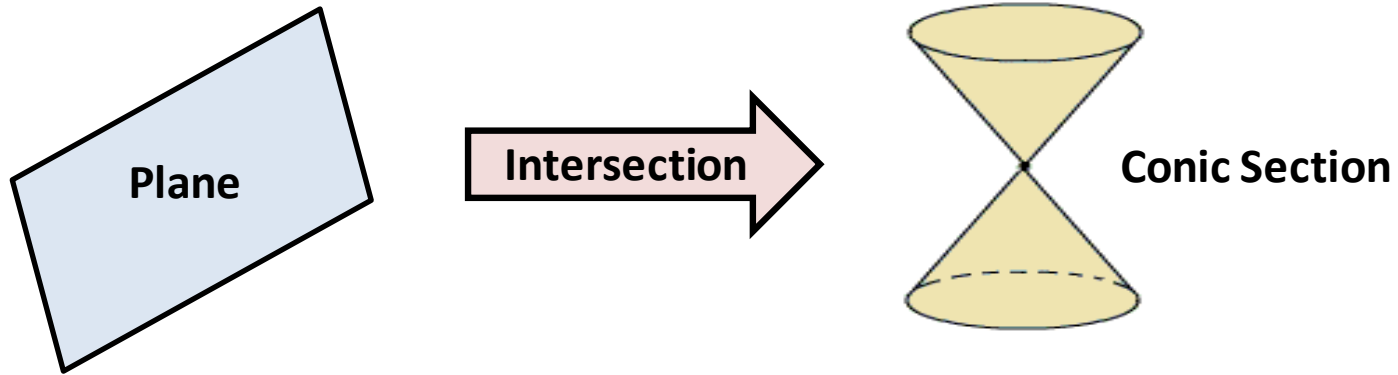Unit 10 Lesson 1

Students will be able to:

Identify different conic sections based
on their shapes and general equations.

Key Vocabulary:

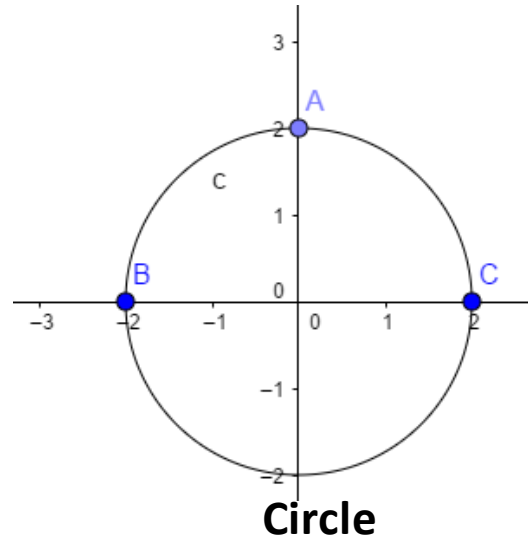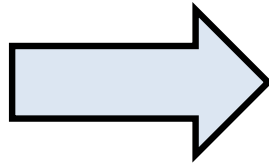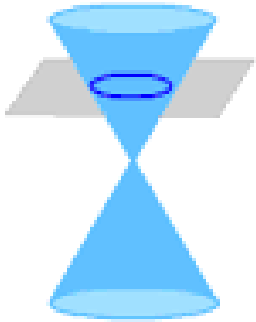- Conic section
- Circle
- Ellipse
- Parabola
- Hyperbola

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A **Conic Section** is a curve formed by the intersection of a plane and a double cone.

Plane → Intersection → Conic Section

By the intersection of this plane and the conic section, we can have a **circle,** an **ellipse,** a **parabola** or a **hyperbola.**

A **Circle** is a curve formed by the intersection of a plane and a double cone such that the plane is perpendicular to the axis of cone.
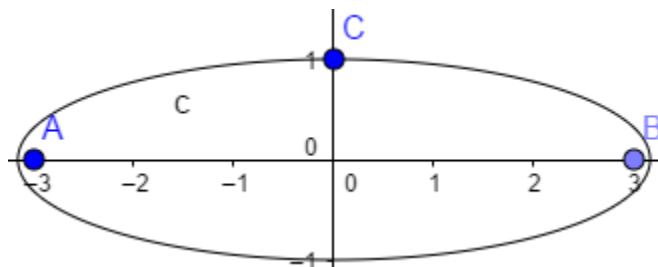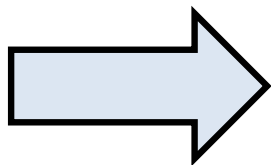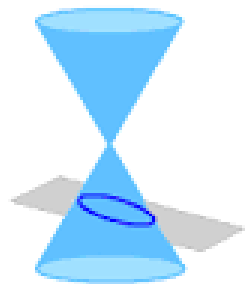

Circle

General equation: $(x - h)^2 + (y - k)^2 = r^2$

(h, k) is the center of the circle.

An **Ellipse** is a curve formed by the intersection of a plane and a double cone such that the plane cuts the cone at an angle.

Ellipse
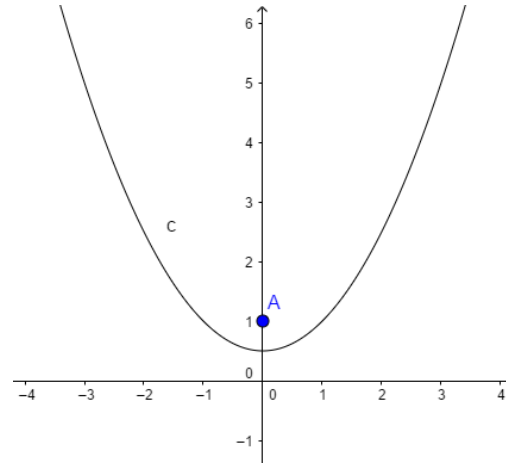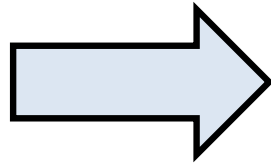
General equations:

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$ **(Horizontal Ellipse)**

$$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$$ **(Vertical Ellipse)**

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A **Parabola** is a curve formed when the plane cuts any one portion of the double cone at angle.

Parabola

General equations:

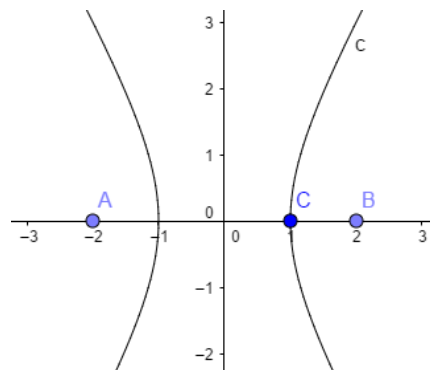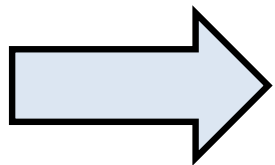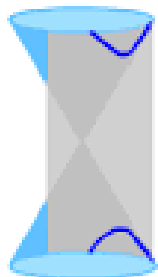$$(y - k)^2 = 4a(x - h)$$ **(Horizontal parabola)**

$$(x - h)^2 = 4a(y - k)$$ **(Vertical parabola)**

a is the distance from the vertex to the focus.

A **Hyperbola** is a curve formed when the plane is parallel to the axis of the double cone and cuts both cones.

Hyperbola

General equations:

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

(Horizontal parabola)

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

(Vertical parabola)