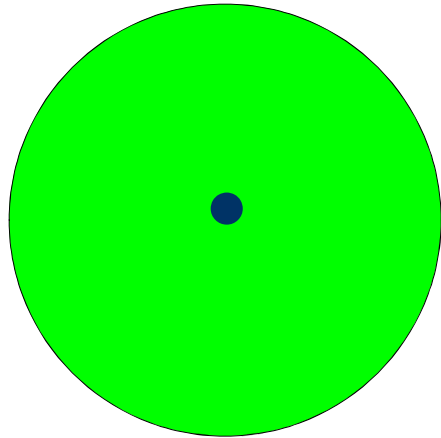




# Circles

# Circle

- A circle is a closed, curved line on which every point on the circle is equally distant from a fixed point within, called the center. A plane figure bound by such a line.

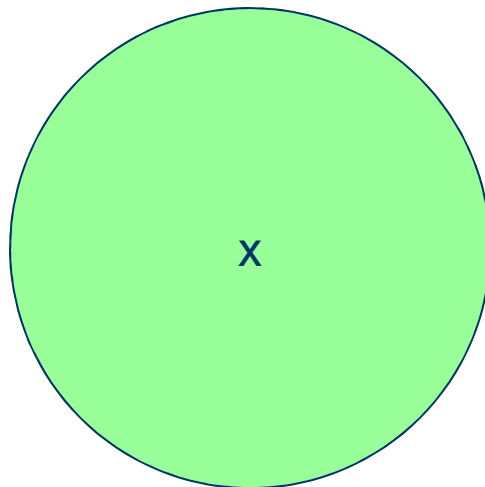


# Circle

- A circle is a type of line.
- Imagine a straight line segment that is bent around until its ends join.
- Then arrange that loop until it is exactly circular - that is, all points along that line are the same distance from a center point.

# Properties of a Circle

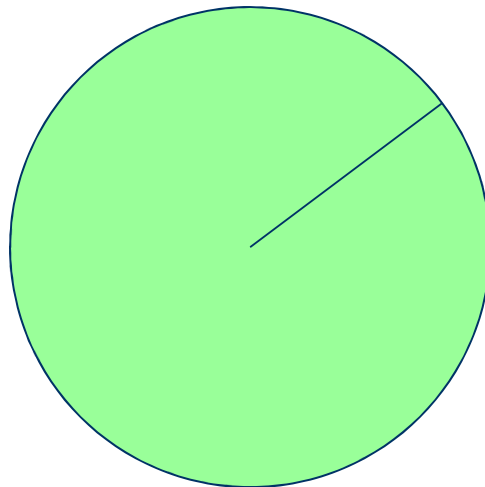
- **Center.** The center is a point inside the circle.
- All points on the circle are equidistant (same distance) from the center point.



# Properties of a Circle

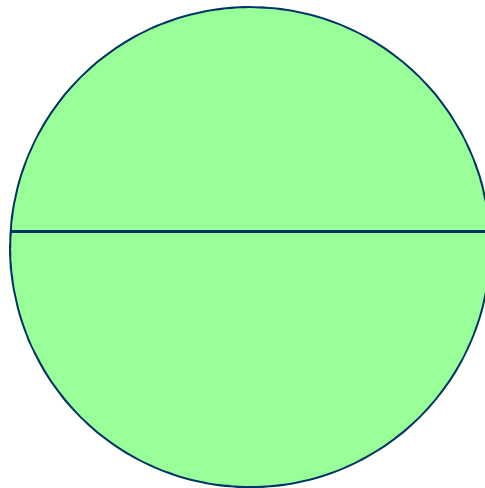
- **Radius.** The radius is the distance from the center to any point on the circle.
- It is half the diameter.

$$- r = \frac{1}{2}D$$



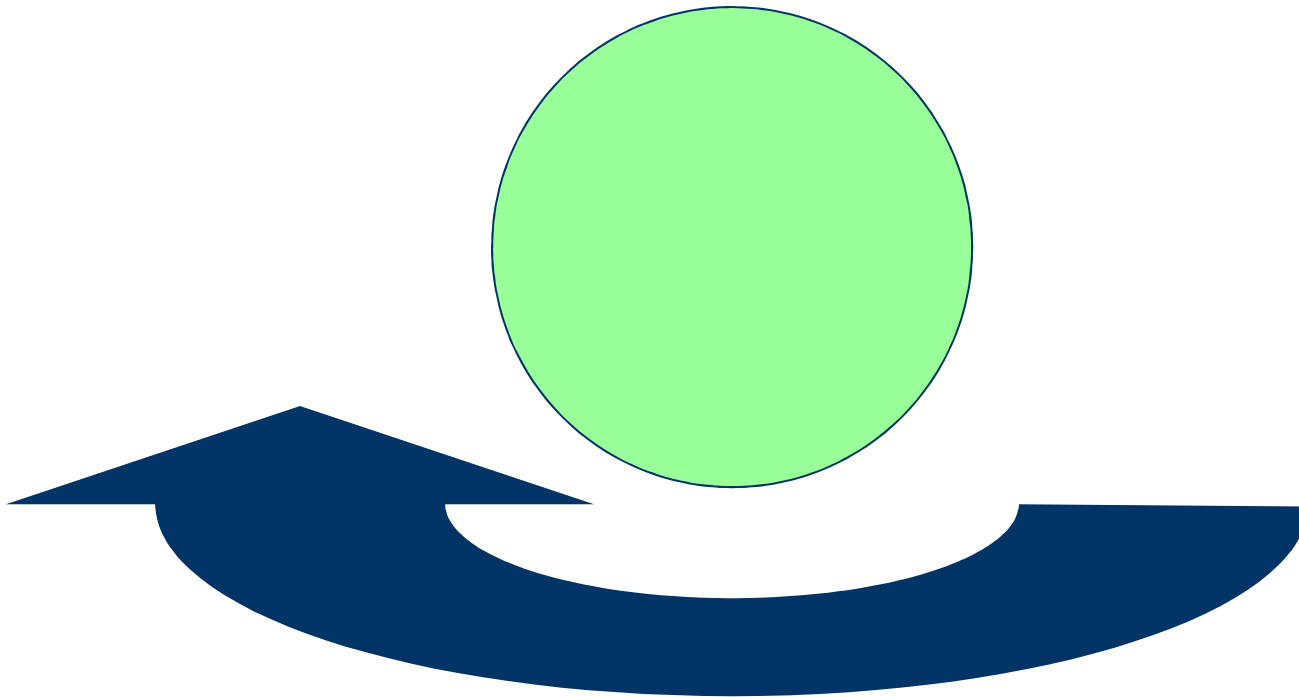
# Properties of a Circle

- **Diameter.** Diameter is the distance across the circle; the length of any chord passing through the center.
- It is twice the radius.
  - $D = 2r$



# Properties of a Circle

- **Circumference.** The circumference is the distance around the circle.



# Properties of a Circle

- **Pi ( $\pi$ )**. In any circle, if you divide the circumference (distance around the circle) by its diameter (distance across the circle), you always get the same number.

$$\text{Circumference} \div \text{Diameter} = \pi$$

- This number is called Pi ( $\pi$ ) and is approximately 3.142.

$$C \div D = \pi$$

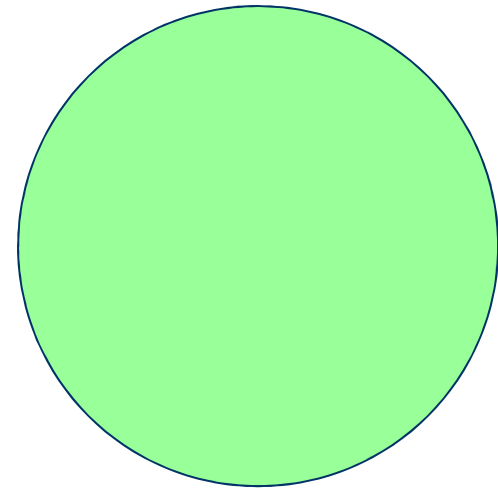


# Properties of a Circle

- **Circumference.** The circumference is the distance around the circle.
- The formula to calculate the circumference of a circle is:
  - $C = 2 \pi r$

# Properties of a Circle

- **Area.** The area of a circle is the space of the region enclosed by the circle.
- The formula to calculate the area of a circle is:
  - $A = \pi r^2$
  - $A = 3.142 \times (\text{radius} \times \text{radius})$



# Properties of a Circle

- **Area** is the amount or extent of surface, especially the measure in square units of a two-dimensional (plane) figure of limited extent.
- Even though a circle is round, we still calculate area in “square units.”

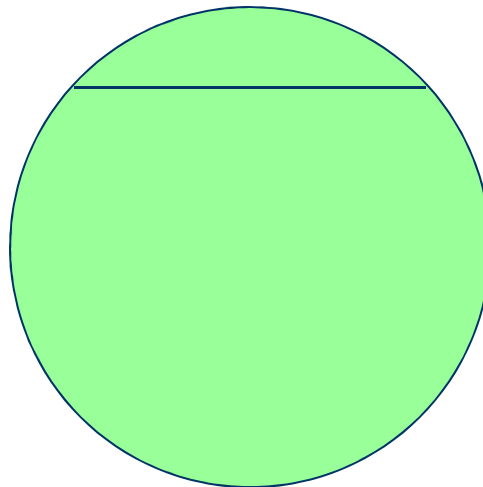
$$A = \pi r^2$$

# Area of a Circle

- $A = \pi r^2$

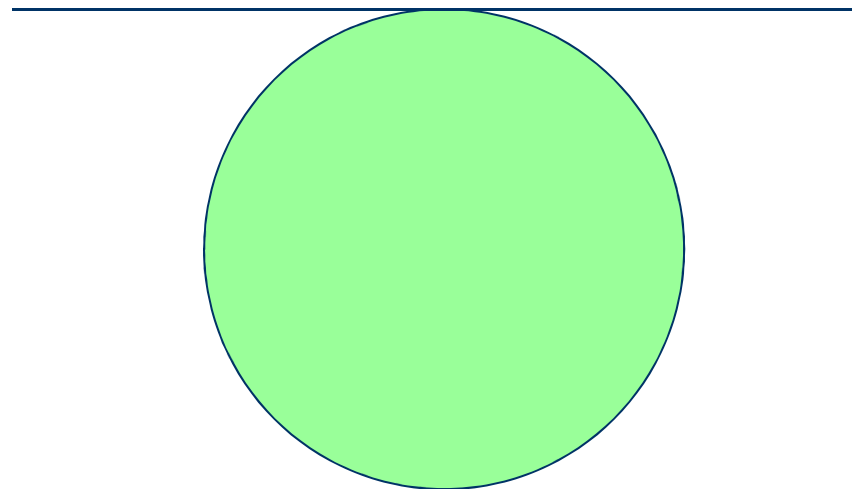
# Properties of a Circle

- **Chord.** A chord is a line segment linking any two points on a circle.



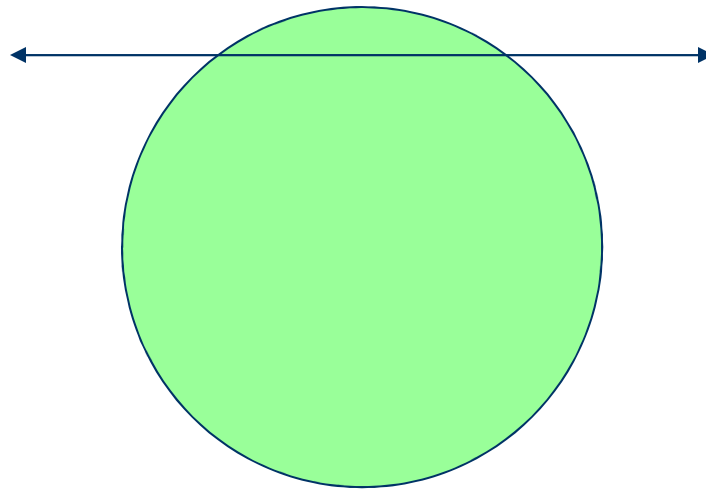
# Properties of a Circle

- **Tangent.** A tangent is a line passing (the outside of) a circle and touching it at just one point.



# Properties of a Circle

- **Secant.** A secant is a line that intersects a circle at two points.



# Area of a Circle

- The formula to calculate the area of a circle is:

$$\pi r^2$$

$$3.14 \times (\text{radius} \times \text{radius})$$



# Semicircle

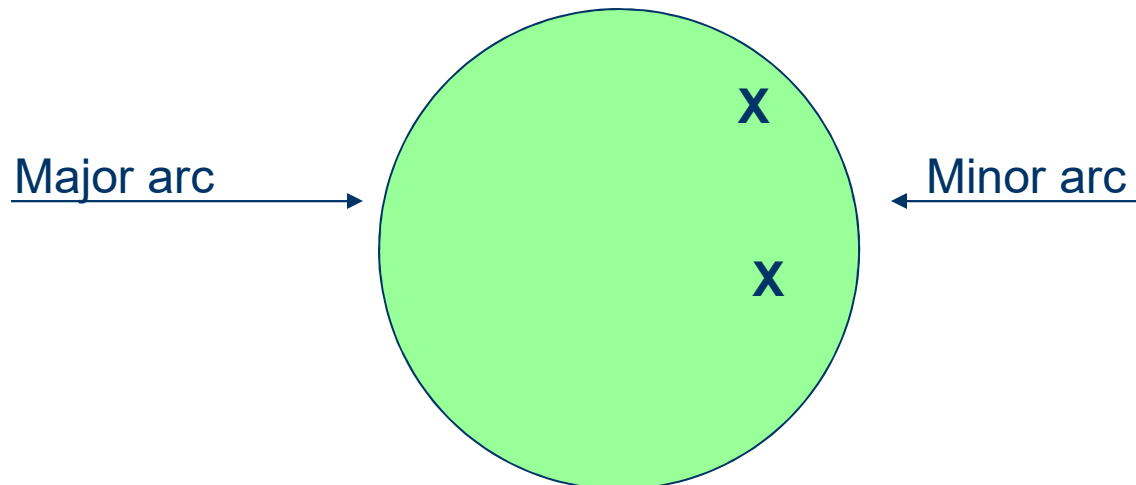
- A semicircle is a half circle, formed by cutting a whole circle along a diameter line, as shown above.
- Any diameter of a circle cuts it into two equal semicircles.
- Since a semicircle is one-half of a circle, the formula to calculate the area of a semicircle is:

$$\frac{1}{2} \pi r^2$$

$$\frac{1}{2} \times 3.14 \times (\text{radius} \times \text{radius})$$

# Major and Minor Arcs

- Given two points on a circle:
- The minor arc is the shortest arc linking them.
- The major arc is the longest.



# Circle Formulas

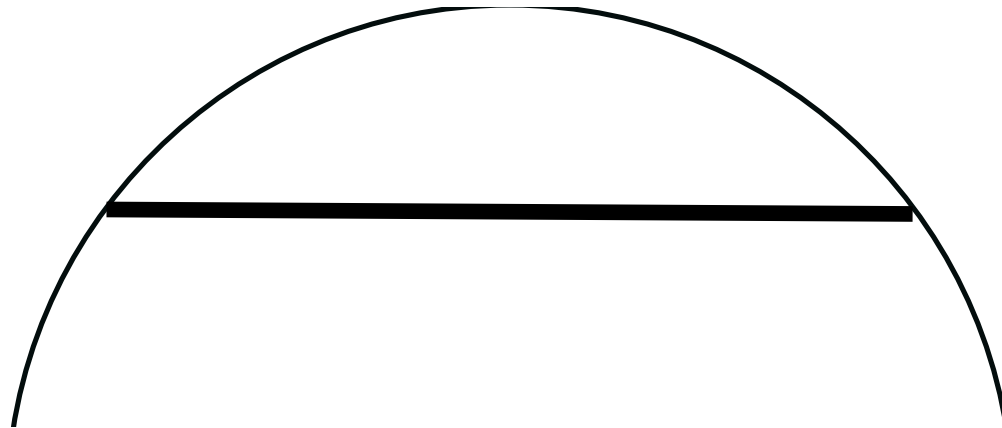
- Magic Number: pi,  $\pi$ , 3.142
  - $\pi = C / D$
  - $C = \pi D$       *or*       $C = 2\pi r$
  - $R = \frac{1}{2} C / \pi$
- Area
  - Circle:       $A = \pi r^2$  - *or* -  $A = \pi(\frac{1}{2}D)^2$
  - Semi-circle:       $A = \frac{1}{2}\pi r^2$
- Circumference
  - $C = 2\pi r$       *or*       $C = \pi D$

Find the Radius of an  Arc

- 1. Draw a chord across the arc:
- 2. Measure:
- 3. Calculate:

Find the Radius of an  Arc

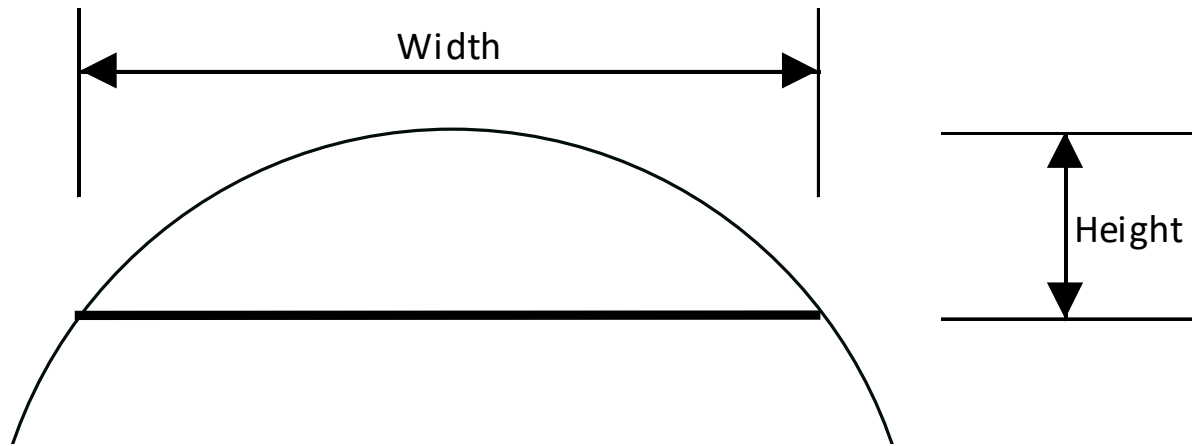
- 1. Draw a chord across the arc:



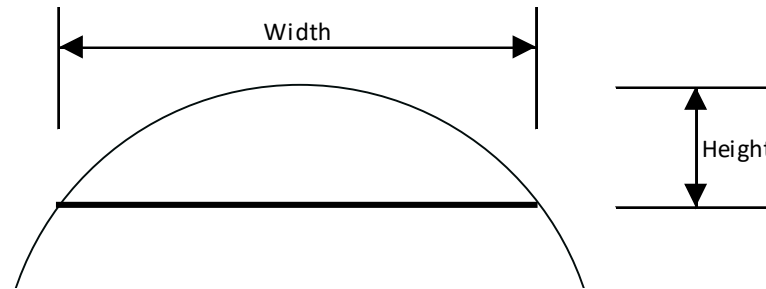
# Find the Radius of an Arc

- 2. Measure:

- The height of the arch above the chord:
- The width of the chord:



Find the Radius of an Arc



- Calculate:
- Formula:

$$\text{Radius} = \frac{H}{2} + \frac{W^2}{8 \times H}$$