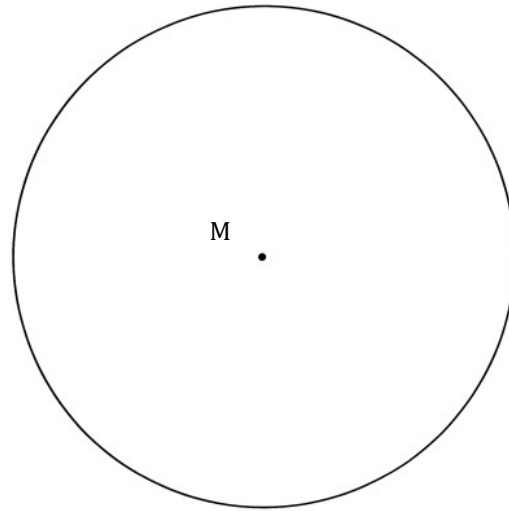


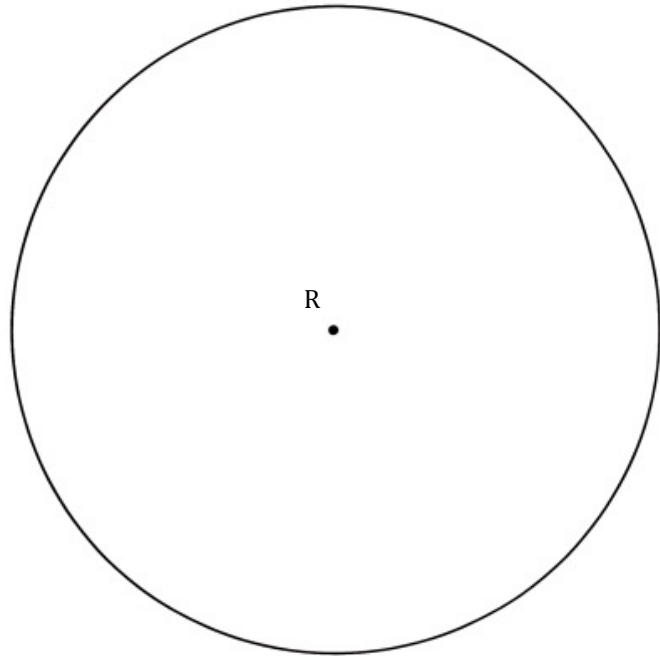
Investigation: Measuring with Radians

Name _____ # _____

1. Use the string to measure the radius of circle M.
 - a. Create minor arcs that are the length of the radius and draw them end-to-end on the circumference of the circle. Draw each minor arc using a different color.
 - b. Approximately how many radii does it take to create the circumference of circle M?



2. Use the string to measure the radius of circle R.
 - a. Create minor arcs that are the length of the radius and draw them end-to-end on the circumference of the circle. Draw each minor arc using a different color.
 - b. Approximately how many radii does it take to create the circumference of circle R?

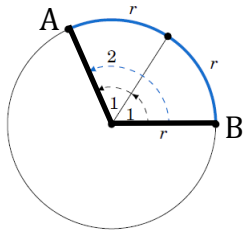
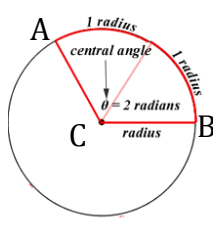


3. Use a ruler to draw and measure radius \overline{MN} in centimeters.
 - a. How long is radius \overline{MN} ?
 - b. Calculate the circumference of circle M rounded to the nearest hundredth.
 - c. Divide the circumference of circle M by the length of radius \overline{MN} .
 - d. How does your answer compare to your answer in #1b?
4. Use a ruler to draw and measure radius \overline{RS} in centimeters.
 - a. How long is radius \overline{RS} ?
 - b. Calculate the circumference of circle R rounded to the nearest hundredth.
 - c. Divide the circumference of circle R by the length of radius \overline{RS} .
 - d. How does your answer compare to your answer in #2b?
5. Write a ratio of the formula for circumference to the radius and simplify (keeping in terms of pi). How does this compare to #3c and #4c?

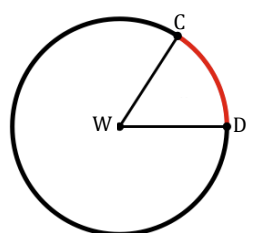
A radian is a unit used to measure angles. A central angle with measure 1 radian intercepts an arc with length equal to the radius of the circle.

6. Determine the length of each arc in terms of radii using the string.

7. Find the central angle in terms of radians.

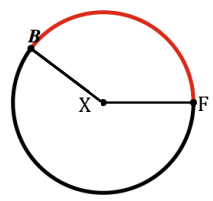
<p>Example:</p>  <p style="text-align: center;">$\frac{\text{arc length}}{\text{radius}} = \underline{\hspace{2cm}} \text{ radii}$</p> <p style="text-align: center;">$\frac{2r}{r} = 2 \text{ radii}$</p> <p>$\widehat{AB}$ can be created by drawing 2 radii end-to-end, therefore the length of \widehat{AB} is 2 radii.</p>	<p>Example:</p>  <p style="text-align: center;">$\frac{\text{arc length}}{\text{radius}} = \underline{\hspace{2cm}} \text{ radians}$</p> <p style="text-align: center;">$\frac{2r}{r} = 2 \text{ radians}$</p> <p>The length of $\widehat{AB} = 2$ radii, so $m\angle ACB = 2$ radians.</p>
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a.



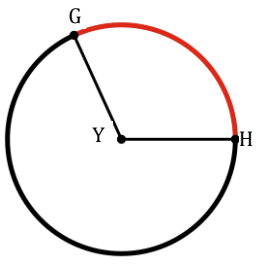
length of $\widehat{CD} = \underline{\hspace{2cm}} \text{ radii}$

b.



length of $\widehat{BF} = \underline{\hspace{2cm}} \text{ radii}$

c.



length of $\widehat{GH} = \underline{\hspace{2cm}} \text{ radii}$

a.

$m\angle CWD = \underline{\hspace{2cm}} \text{ radians}$

b.

$m\angle BXF = \underline{\hspace{2cm}} \text{ radians}$

c.

$m\angle GYH = \underline{\hspace{2cm}} \text{ radians}$

8. Draw central angles for each radius-length minor arc in Problem #1 and Problem #2.

- a. What is the measure of each central angle in radians?
- b. How many radians do you think make up a circle?
- c. Why does this make sense when relating the circumference to the radius?