Today's Materials

- **device**
- **calculator**
- **pencil**
- **notebook**
- **glue**
- **scissors**
- **a marker** (not EXPO)

Relating Area to Circumference

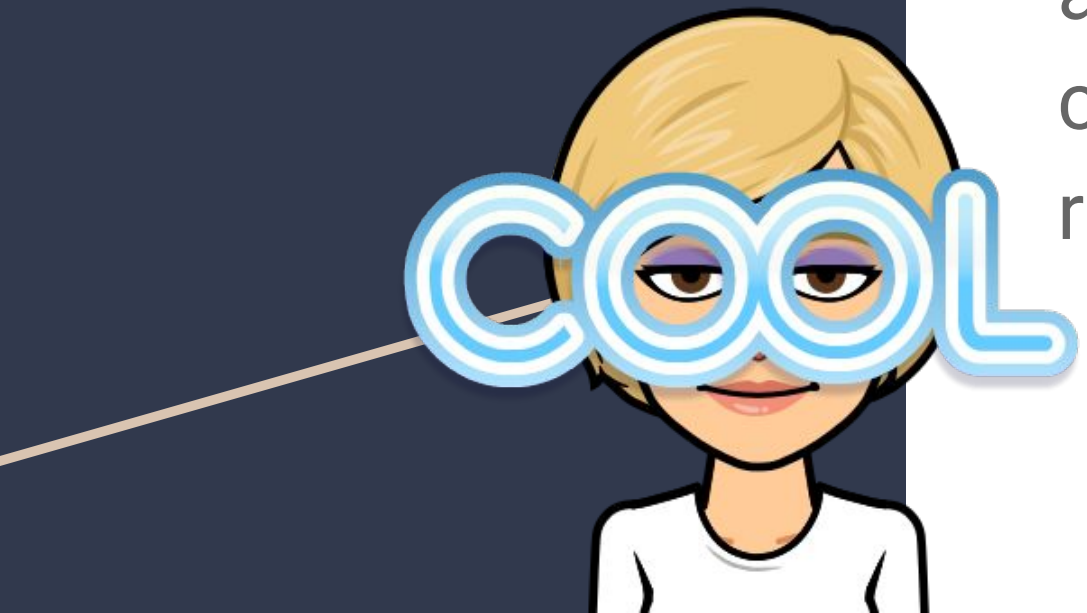
Lesson 8

CCSS Standards: Addressing	• 7.G.B.4

Let’s rearrange circles to calculate their areas!

Today's Goals

- ❏ I know the formula for area of a circle.
- ❏ I can explain how the area of a circle and its circumference are related to each other.



Irrigating a Field

Warm Up

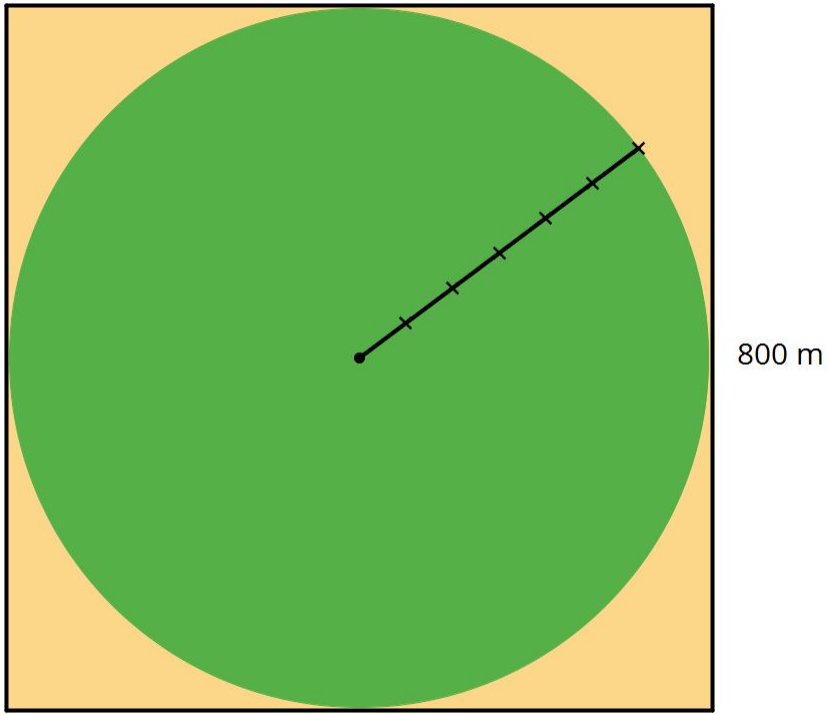
Some farms have circular fields because they use center-pivot irrigation.

TypicalCenterPivotIrrigationLandscape Copyright Owner: NASA License: Public Domain Via: Wikimedia Commons

PivotIrrigationOnCotton Copyright Owner: US Department of Agriculture License: Public Domain Via: Wikimedia Commons

Estimate the field's area.

A. About 5,000 m^2
B. About 50,000 m^2
C. About 500,000 m^2
D. About 5,000,000 m^2
E. About 50,000,000 m^2

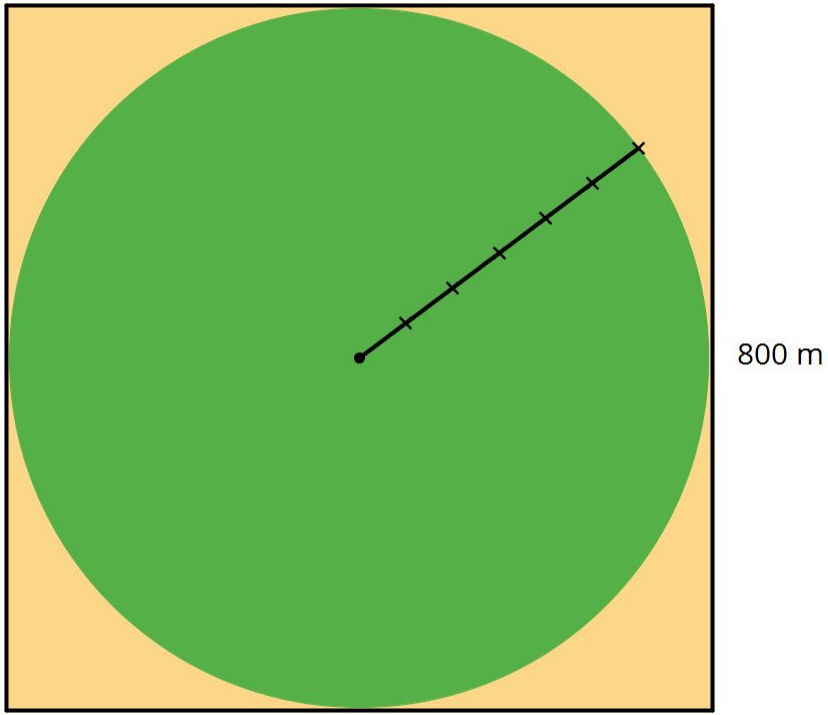


A circular field is set into a square with an 800m side-length.

What is the area of the square in square meters?

Is the circle's area greater than or less than the square's area?

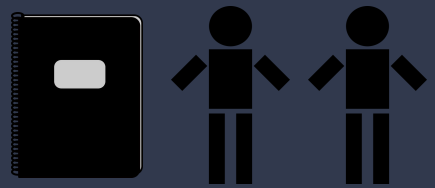
What's the best estimate for the area of the circle?



A circular field is set into a square with an 800m side-length.

Making a Polygon Out of a Circle

Activity 1



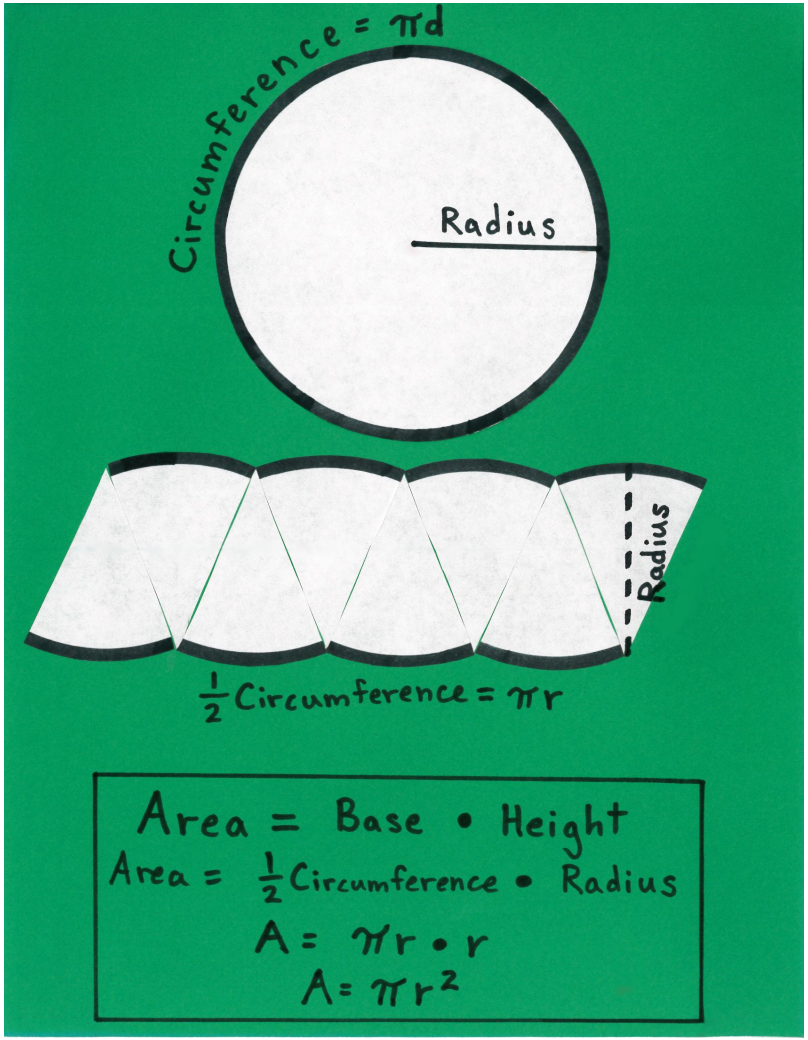
In the past, you decomposed and rearranged a shape to figure out its area!

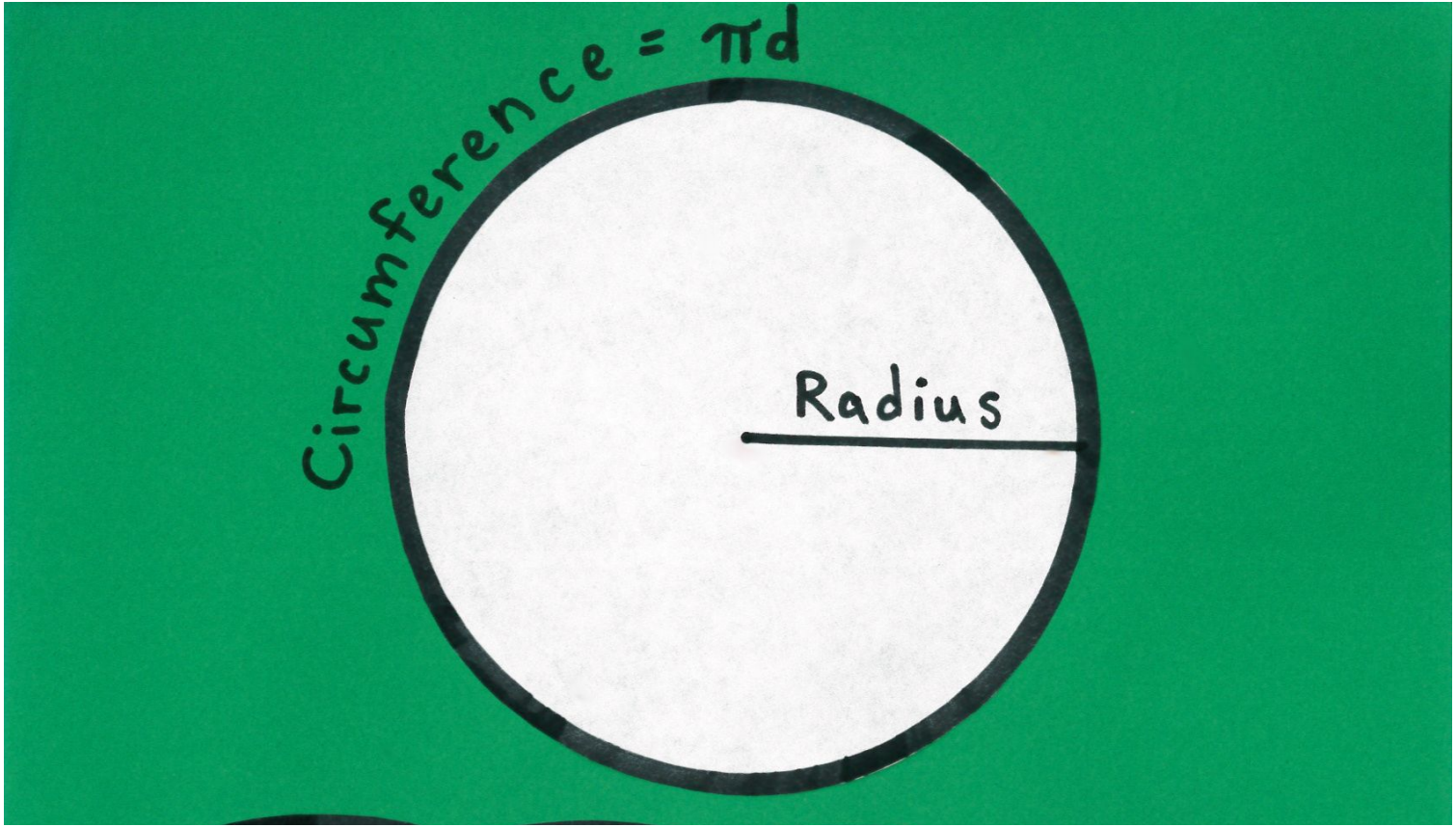
Each of you needs a circular object, a marker, and a colored piece of paper.

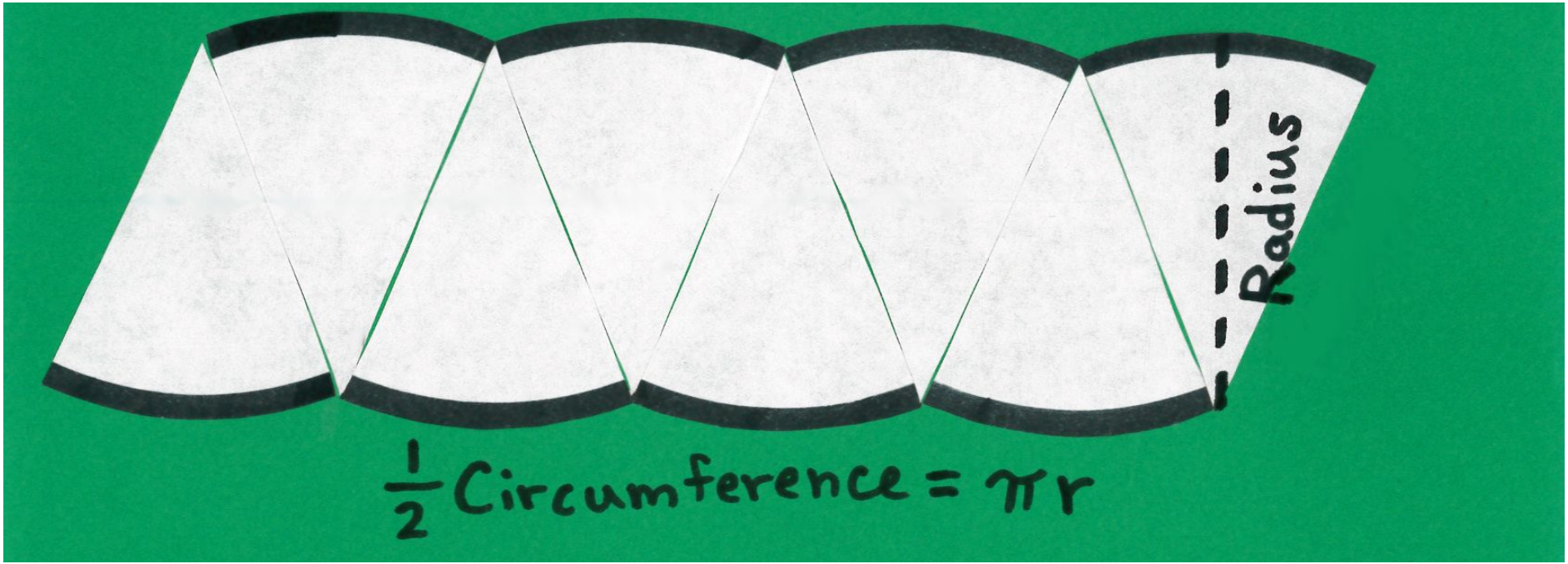
Follow along with me to create a visual display!

1. Using a thick marker, trace your circle in 2 separate places on the colored paper.
2. Cut out both circles, cutting around the marker line.
3. Fold and cut one of the circles into fourths.
4. Arrange the fourths so that straight sides are next to each other, but the curved edges are alternately on top and on bottom.

5. Fold and cut the fourths in half to make eighths. Arrange the eighths next to each other, like you did with the fourths.
6. If your pieces are still large enough, repeat the previous step to make sixteenths.


Circumference = πd
Radius
Radius
½ Circumference = πr
Area = Base • Height
Area = ½ Circumference • Radius
A = πr • r
A = πr²


Circumference = πd
Radius


Radius
$\frac{1}{2}$ Circumference = πr

$$\text{Area} = \text{Base} \cdot \text{Height}$$

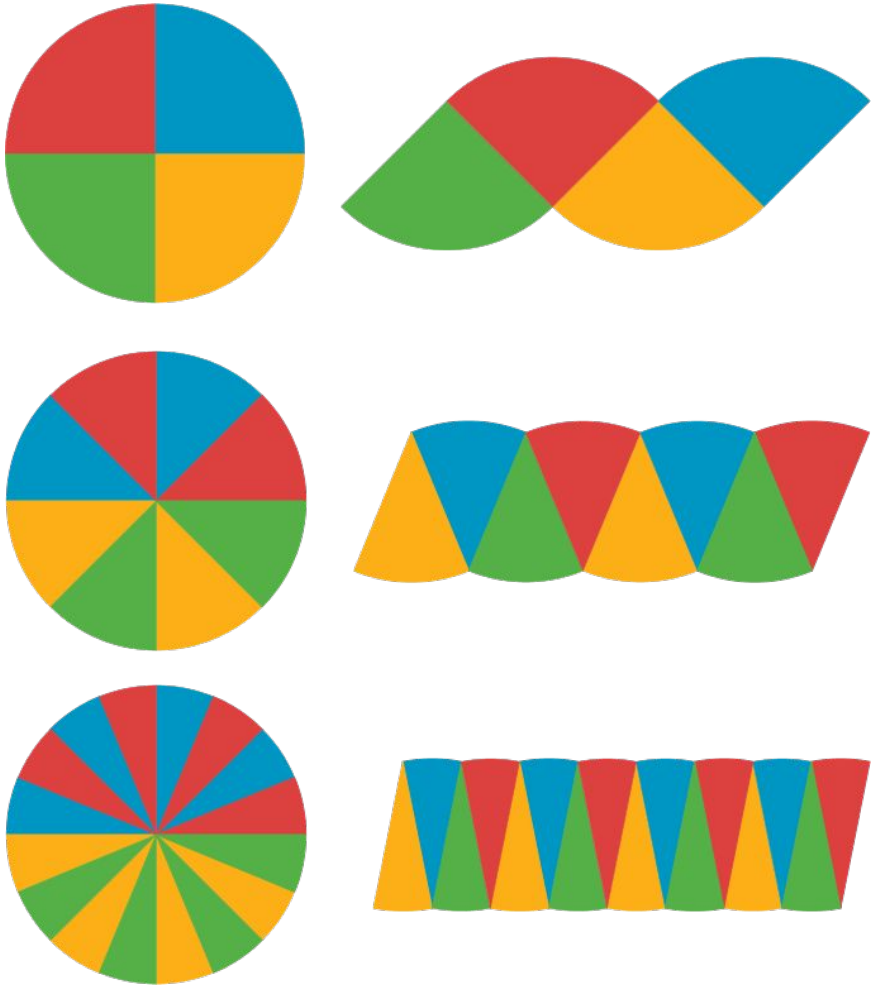
$$\text{Area} = \frac{1}{2}\text{Circumference} \cdot \text{Radius}$$

$$A = \pi r \cdot r$$

$$A = \pi r^2$$

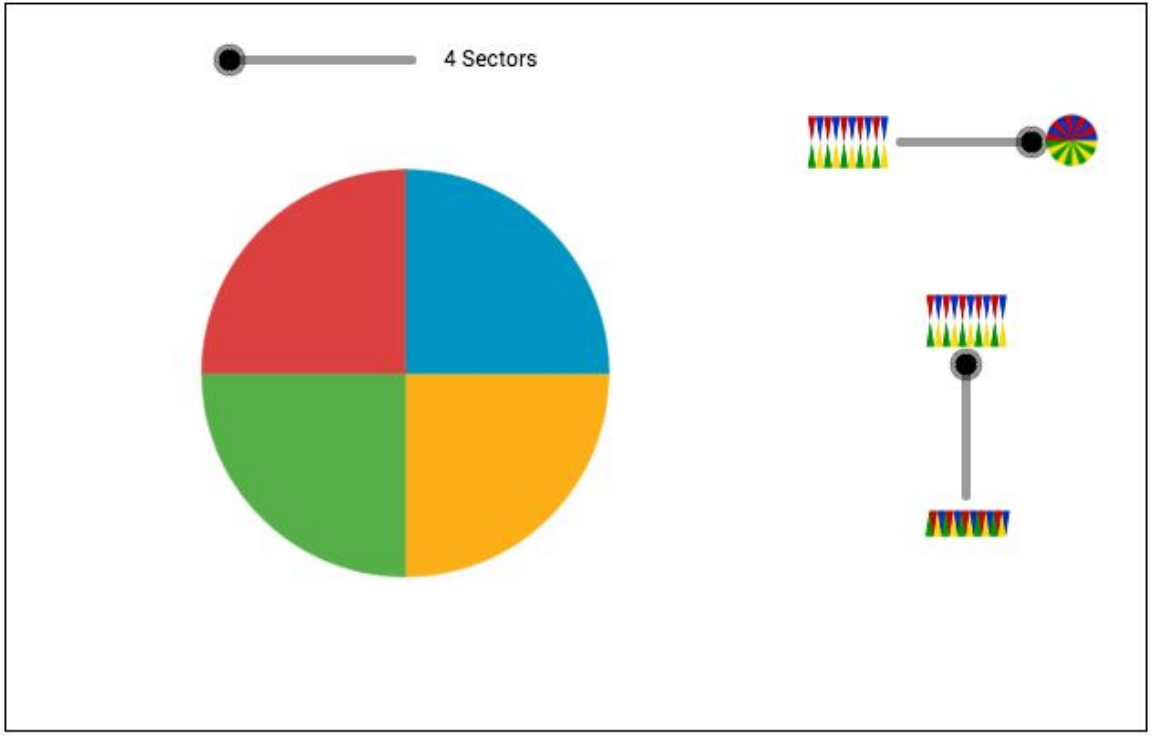
With your partner, answer these questions:

1. How do the areas of the two shapes compare?
2. What polygon does the shape made of the circle pieces most resemble?
3. How could you find the area of this polygon?



Check this out!

If we could continue cutting the wedges in half, how would that affect the new shape?



http://ggbm.at/RUqSMrjn, created in GeoGebra by Malin Christersson

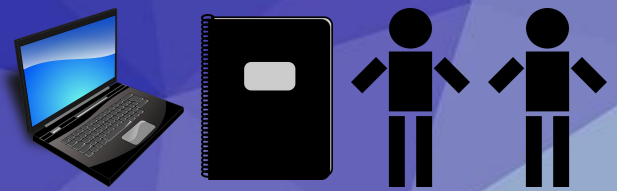
How do the parts of this “parallelogram” relate to the original circle?

Making Another Polygon out of a Circle

(optional)

Activity 2

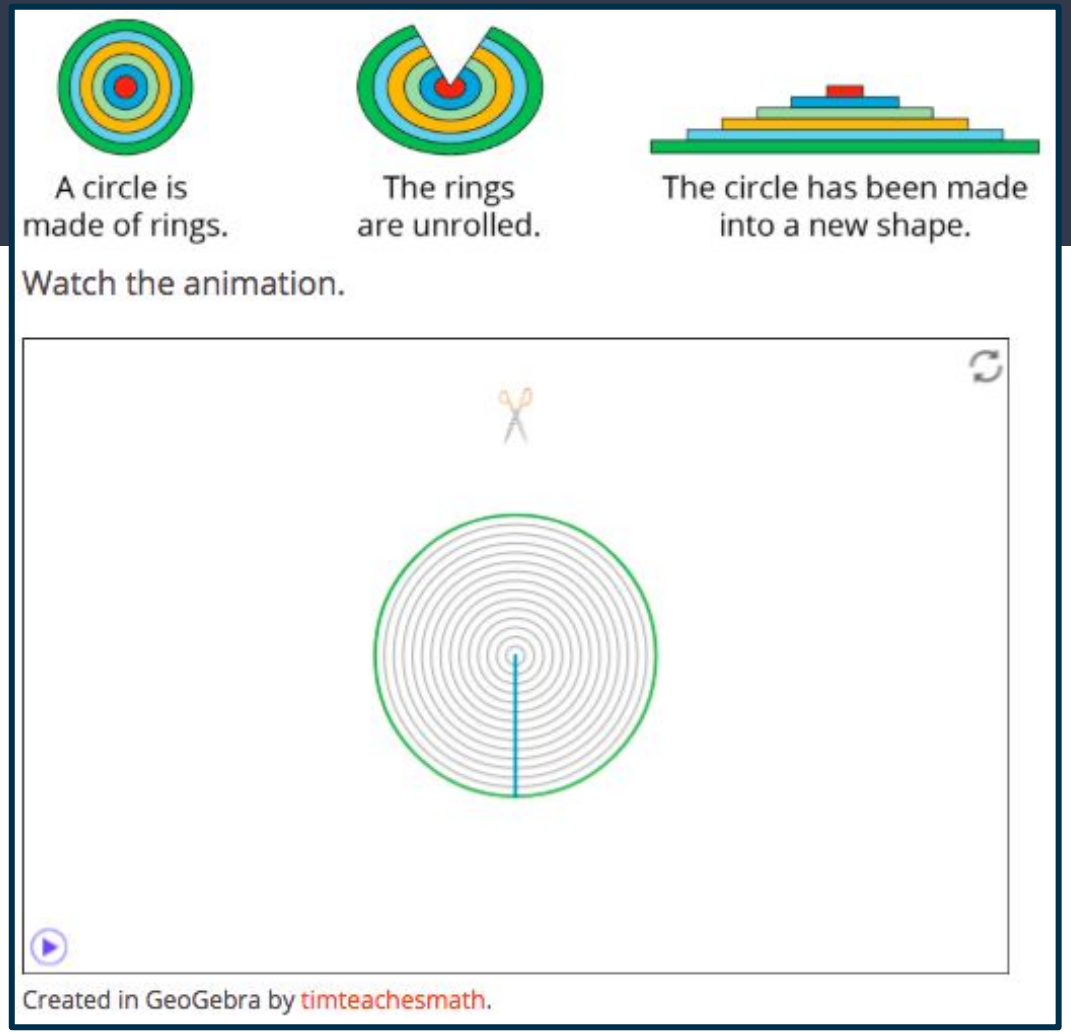
- Notice and Wonder



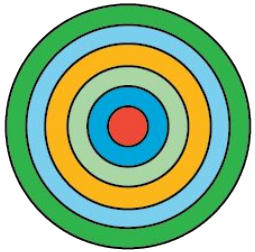
Imagine a circle made of rings that can bend but not stretch.

Begin working on your own. Watch the animation and answer the questions.

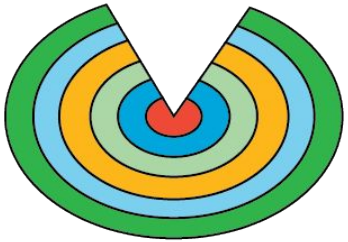
- **Unit 3**
- **Lesson 8**
- **Activity 8.3**



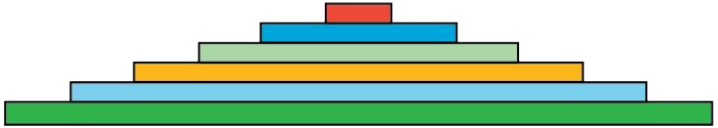
Explain your steps for finding the area in terms of the circle's measures.



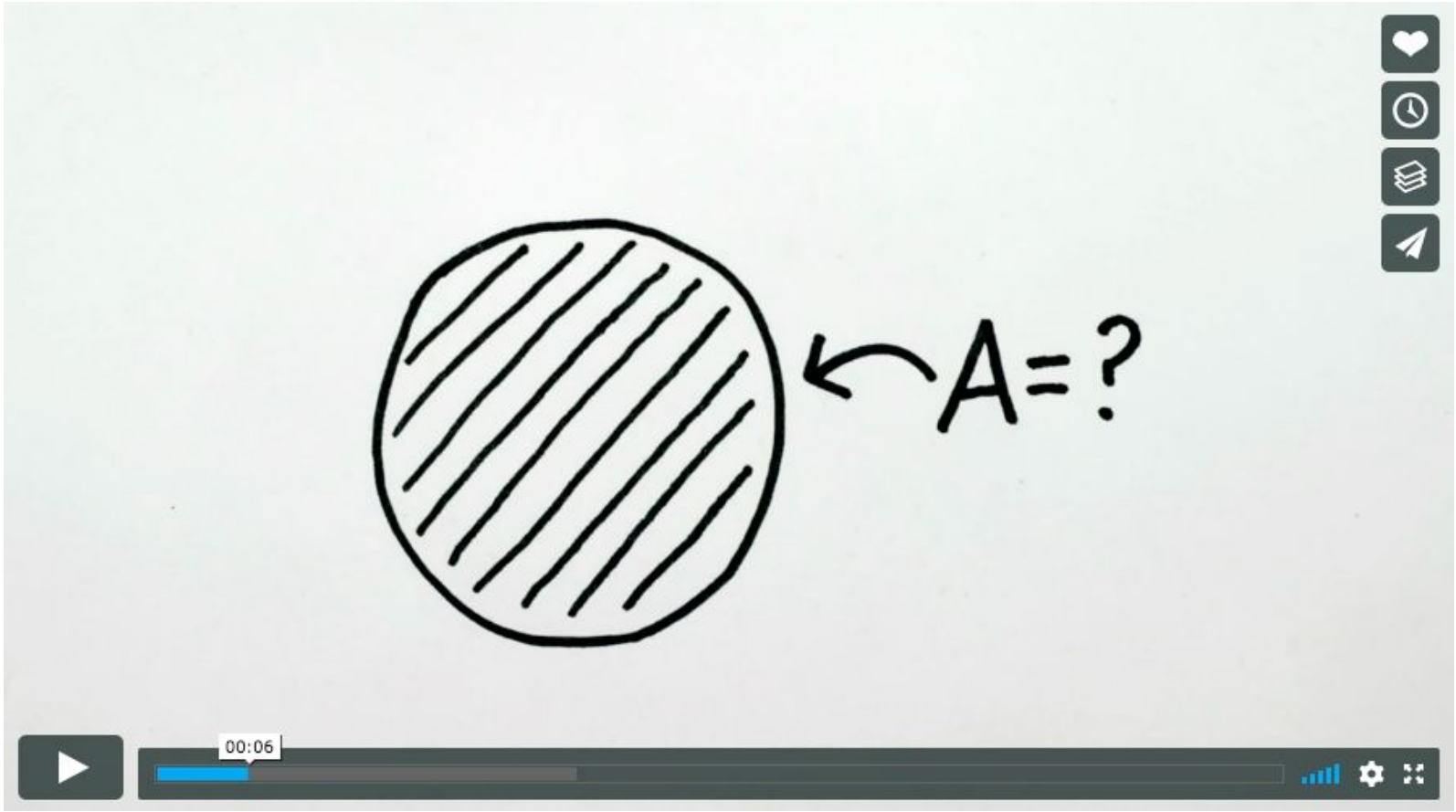
A circle is made of rings.



The rings are unrolled.



The circle has been made into a new shape.



One Way to Derive a Formula for the Area of a Circle from Open Up Resources on Vimeo https://vimeo.com/195695630

Thanks to Henry Reich of Minute Physics for permission to use this video.

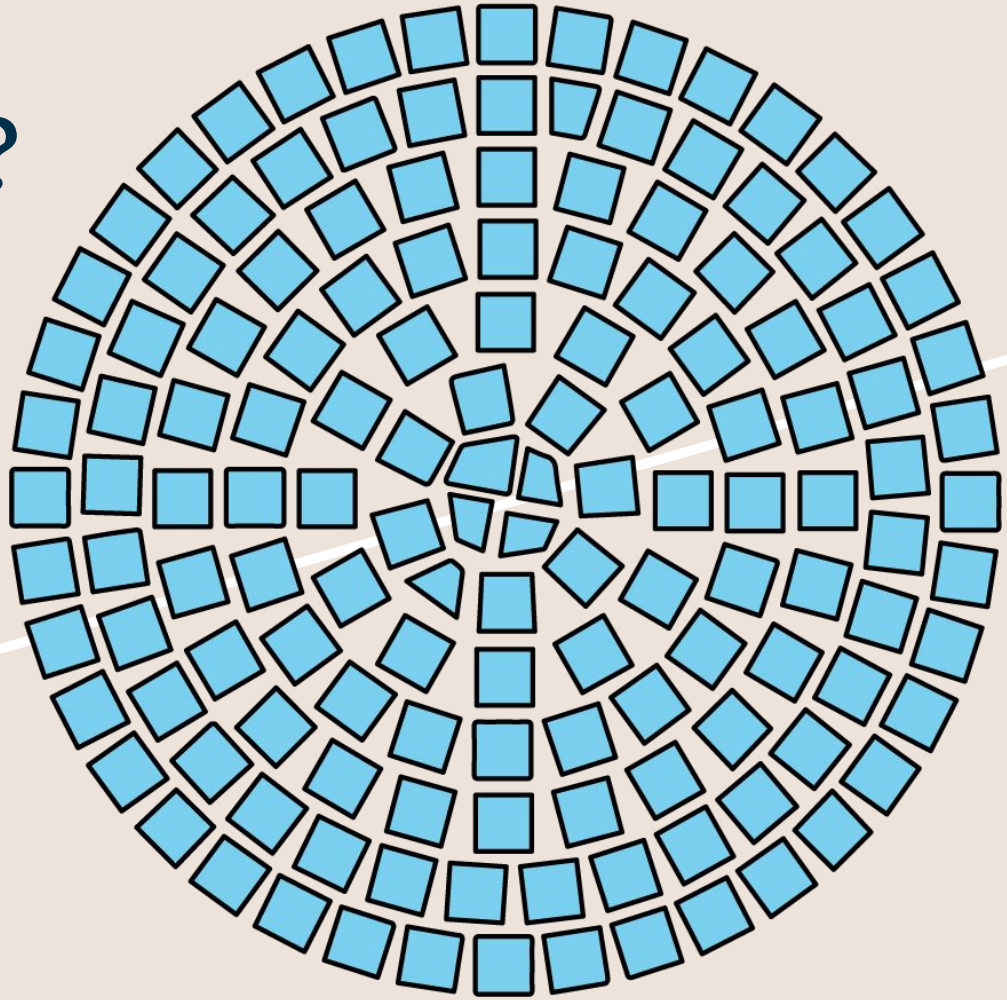
Tiling a Table

(optional)

Activity 3

- Notice and Wonder

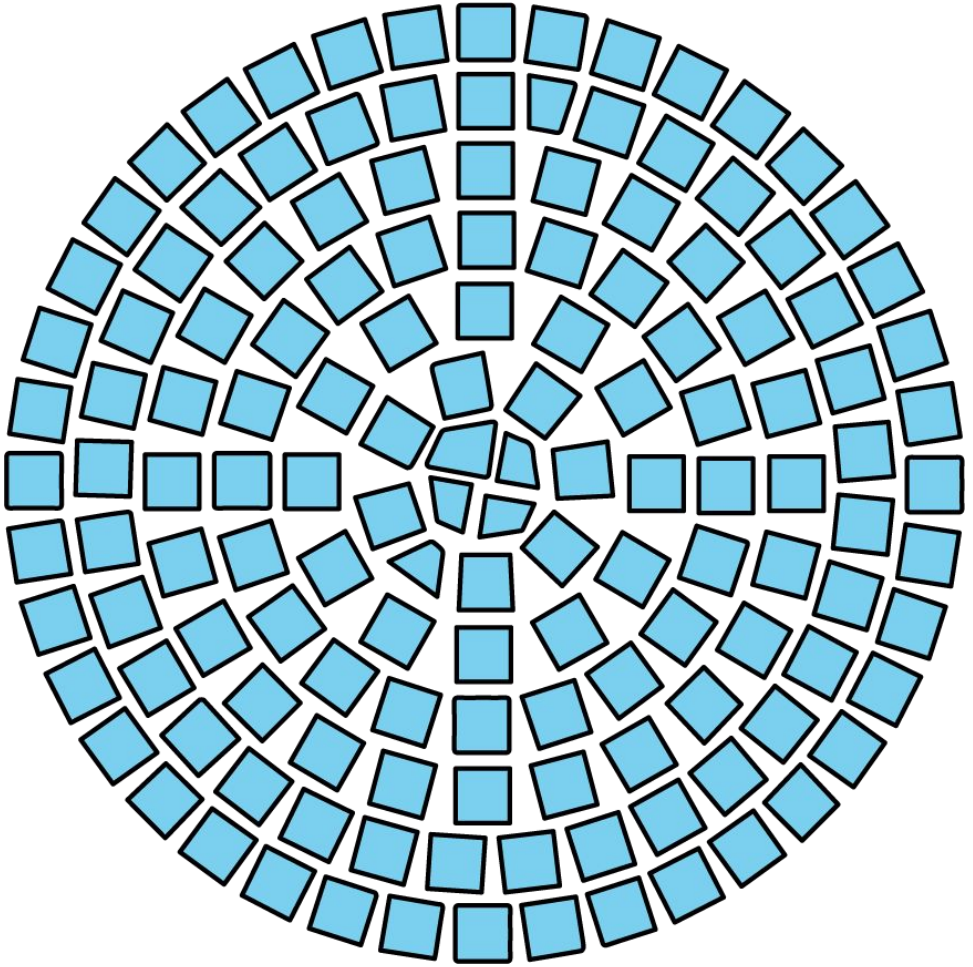
What do you notice?
What do you wonder?



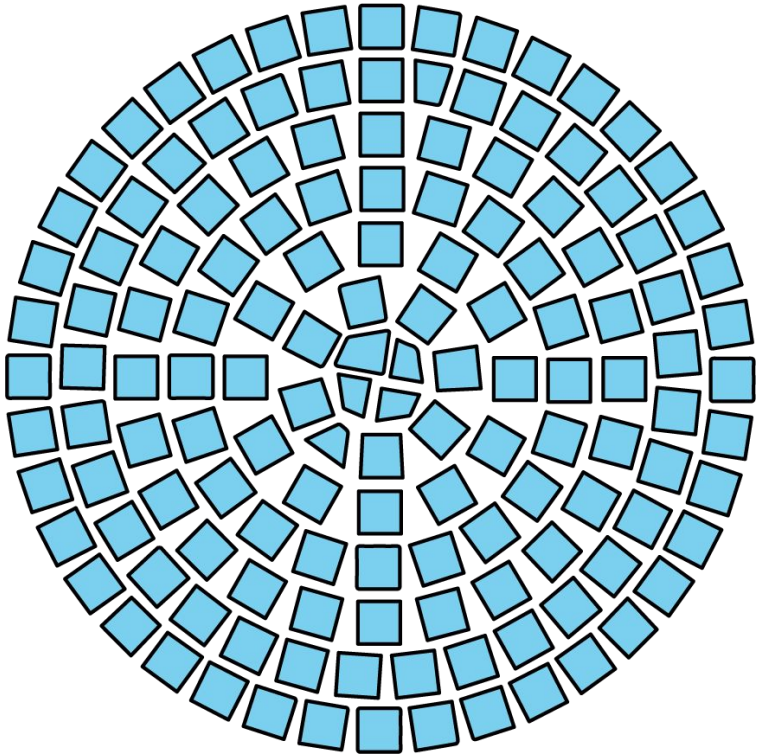
Elena wants to tile the top of a circular table.

The diameter of the tabletop is 28 inches.

What is its area?



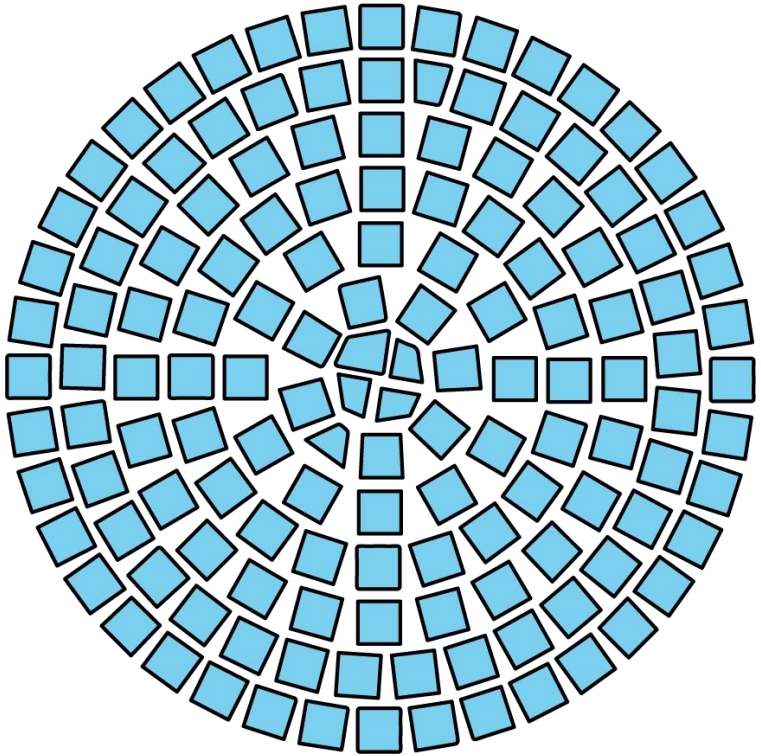
Elena wants to tile the top of a circular table. The diameter of the table top is 28 inches. **What is its area?**



Elena wants to tile the top of a circular table. The diameter of the table top is 28 inches. **What is its area?**

What formula did we use to find the area of a circle?

$$A = \pi r^2$$



Are you ready for more?

A box contains 20 square tiles that are 2 inches on each side.

How many boxes of tiles will Elena need to tile the table?

Today's Main Ideas:

- ★ We can find the area of a circle if we know the radius or the diameter.
- ★ We know that the radius is half the length of the diameter.
- ★ The formula for finding area of a circle is $A = \pi r^2$.

How would you find the area of a circle with a radius of 10 units?

How would you find the area of a circle with a diameter of 10 units?

Today's Goals

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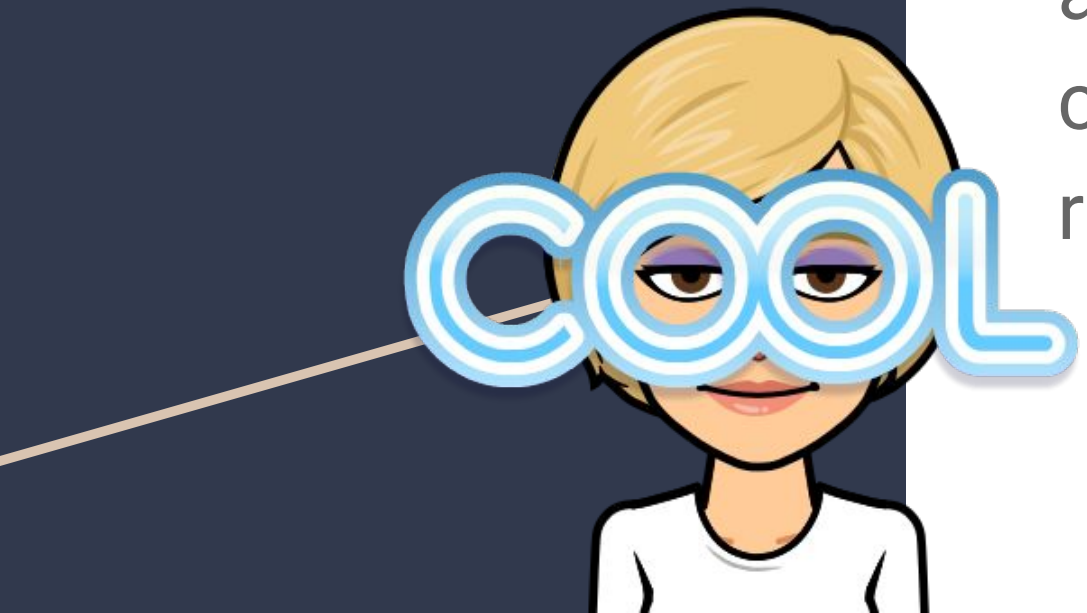

A Circumference of 44

Cool Down