

## Archimedes' Placemats

### Materials:

- 1 sheet with three placemats
- 1 sheet with three circles
- scissors
- glue

### Instructions

1. Cut out the three circles and compare their areas. What do you notice?
  
2. The length and the width of the placemats have something in common with your circles. Using one of your circles determine the dimensions (length and width) of the placemats.
  
3. Cut out the wedges of the circle with the least amount of sectors and glue them on your placemat as if they were hanging from their points.
4. Compare the area of the placemat with the area of the circle. What percentage of the placemat is covered by the circle?
  
5. Cut out the wedges of the next circle with the least amount of sectors and glue them on your placemat as if they were hanging from their points.
6. Compare the area of the placemat with the area of the circle. What percentage of the placemat is covered by the circle?

(It is alright if your estimate is different this time than last time. Because you have more wedges, you might be able to more accurately estimate.)

7. Cut out the wedges of the last circle with the least amount of sectors and glue them on your placemat as if they were hanging from their points.
8. Compare the area of the placemat with the area of the circle. What percentage of the placemat is covered by the circle?

(It is alright if your estimate is different this time than last time. Because you have more wedges, you might be able to more accurately estimate.)

9. Determine the area of the placemat using the dimensions you discovered in #2. (Leave your answers with  $\pi$ )
10. Using the percentage you found in #8 and the area of the placemat, find the formula for the area of the circle.
11. Explain how this activity shows the relationship between the area and circumference formulae for a circle.