

Circumference of a Circle: What is π ?

Use Java Applet on the website to explain what is π and why there is π in the formula for the circumference (perimeter) of a circle:

$$C = 2\pi r \text{ or } C = \pi d$$

First explore perimeters of regular polygons inscribed in a circle of a known diameter. As the number of sides of a polygon increases, the perimeter of the polygon gets closer to the circumference of its circumscribed circle. For each regular polygon (equilateral triangle, square, pentagon, hexagon, ...) there is a specific number that can be used to find its perimeter, if we know the diameter of the circumscribed circle ("x" stands for the multiplication sign):

Perimeter of a polygon = "*the number*" x Diameter of the circumscribed circle.

Play with the slider(s) and observe numbers in the applet. Record "*the number*" for these regular polygons:

Triangle: Perimeter of an equilateral triangle = x Diameter of the circumscribed circle

Square: Perimeter of a square = x Diameter of the circumscribed circle

Hexagon: Perimeter of a regular hexagon = x Diameter of the circumscribed circle

Decagon: Perimeter of a regular decagon = x Diameter of the circumscribed circle

Dodecagon: Perimeter of a dodecagon = x Diameter of the circumscribed circle

- What did you observe about "the number" for a hexagon? In what way is it different from other numbers? Can you explain why?
- What happens as you keep increasing numbers of sides of your regular polygon? Is there a specific number of sides after which "the number" does not change?
- Use the previous observation to draw a conclusion about the circumference of a circle.
- How would you answer the question **What is π ?**
- Think about an activity for middle school students that would help them to derive the formula for the circumference of a circle and discover π .