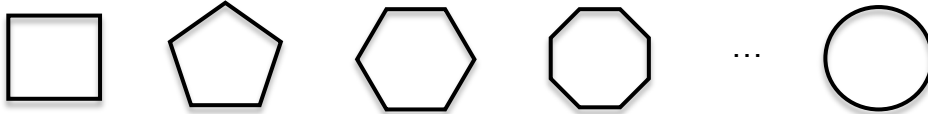


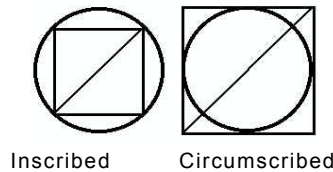
## Pi day activity #1 - What is $\pi$ ?

People have long known that the distance around a large round building or objects was related to the distance across it. Ancient Babylonians (1650 BC), Egyptians, and Chinese had figured out that the distance around any circle (circumference) was about 3 times the distance across that circle (diameter).

Archimedes (287 – 212 BC) was the first person credited with calculating  $\pi$  pretty exactly. He reasoned that as the number of sides of regular polygons increased the polygons started to look like circles and their perimeters must approximate a similar circle's circumference.



So, he started calculating the perimeters and diagonals of regular polygons that were both inscribed and circumscribed about circles.



Here is some of the data that Archimedes found.

| Number of polygon sides | Perimeter divided by diameter of inscribed polygon | Perimeter divided by diameter of circumscribed polygon | Difference between inscribed and circumscribed polygon ratios |
|-------------------------|--|--|---|
| 6                       | 3.0000000000000000                                 | 3.4641016151377544                                     |   |
| 12                      | 3.1058285412302493                                 | 3.2153903091734723                                     |   |
| 24                      | 3.1326286132812382                                 | 3.1596599420975005                                     |   |
| 48                      | 3.1393502030468672                                 | 3.1460862151314348                                     |   |
| 96                      | 3.1410319508905098                                 | 3.1427145996453687                                     |   |

1. Fill in the difference between the two “perimeter divided by diameter ratios” of the inscribed and circumscribed polygons about a circle in the chart above.
2. How does that difference change as the number of polygon sides increases?
3. How will this difference change as we continue to increase the number of sides the polygon?