3.3 Squaring a Circle to Find Its Area

In earlier study of polygons, you developed formulas for the areas of triangles and parallelograms by comparing them to rectangles. You can discover more about the areas of circles by comparing them to squares.

- How is the area of a circle related to the area of a square?

Problem 3.3

In the drawing at the right, a shaded square covers a portion of each circle. The length of a side of the shaded square is the same length as the radius of the circle. You call such a square a "radius square."

A 1. Make a table like the one below. Record the circle number, radius, area of the radius square, area of the circle, and number of radius squares needed to cover each circle.
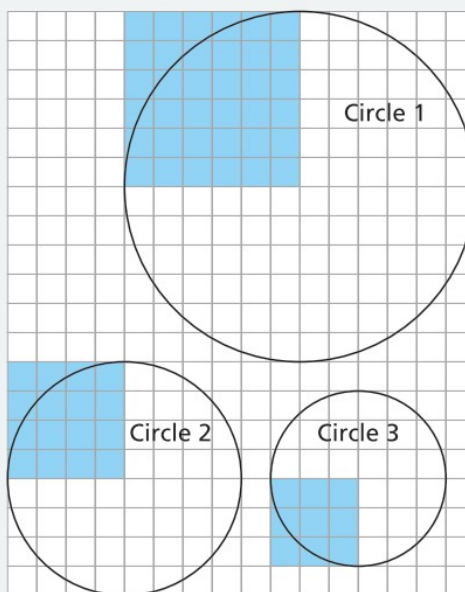
Circle	Radius of Circle (units)	Area of Radius Square (square units)	Area of Circle (square units)	Number of Radius Squares Needed
1	■	■	■	■
2	■	■	■	■
3	■	■	■	■

4/27/2016   mediadev.pearsoncmg.com/curriculum/dash/courses/CMP3_TP_G7_JAN16_20160215/course_base/resources/content_module_868/assets/A1F4DB96A…

3.1   3.2   **3.3**   3.4

Problem 3.3 *continued*

   2. Describe any patterns and relationships you see in the table that will allow you to predict the area of the circle from its radius square. Test your ideas on some other circular objects.

B **1.** How can you find the area of a circle if you know the radius?

   2. How can you find the radius of a circle if you know the area?

A C E Homework starts on page 58.

Did You Know?

You have discovered that the circumference of a circle is a little more than three times the diameter. The area of a circle is a little more than three times the square of the radius. The number "a little more than 3" is the same in both circumference and area calculations. It is given exactly by a decimal with infinitely many decimal digits beginning 3.14159265 …

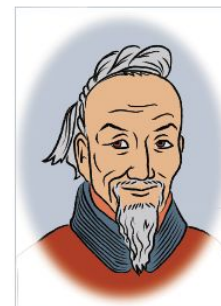In 1706, William Jones used the Greek letter π (also written as pi and pronounced "pie") to stand for the distance around a circle with a diameter of 1 unit.

William Jones

As early as 2000 B.C., the Babylonians knew that π was more than 3. Their estimate for π was $3\frac{1}{8}$. By the fifth century A.D., Chinese mathematician Tsu Chung-Chi wrote that π was somewhere between 3.1415926 and 3.1415927. From 1436 to 1874, the known value of π went from 14 places past the decimal point to 707 places.

In the past 50 years, mathematicians have used computers to calculate millions more digits in the decimal for π. They have shown that π cannot be expressed as a fraction with whole numbers in the numerator and denominator. Such numbers expressed as unending decimals that have no repeating pattern are called *irrational numbers*.

Tsu Chung-Chi

Investigation 3   Area and Circumference of Circles   **55**