EXPLORATIONS

Activity 13

Circle Around

Getting Students Involved

♦ If a car has tires that are 24 inches across, how far does it travel each time the tires rotate once?

$d = 24$

$C = \pi d = (3.141592654) \times (24)$ in. = 75.39822369 in.

This is a good chance to talk about *significant digits*. Since the diameter is given to the nearest inch, it does not make sense to record the circumference to eight decimal places. At most keep one decimal place, so record the circumference as 75" or 75.4".

♦ How many revolutions of the wheels does the car take each mile?

1 mile = 5280 ft. = 63,360 in.

63,360 in. / mile ÷ 75.4 in. / revolution = 840.3 revolutions / mile.

Making Mathematical Connections

Review the notions of circumference and area. You may need to write the formulas for circumference and area of a circle on the overhead.

♦ How is the circumference of a circle related to its radius?

$C = \pi d = 2\,\pi r$

♦ How is the area of a circle related to its radius?

$A = \pi r^2$

♦ What is pi?

The ratio of the circumference to the diameter of any circle.

♦ What is a decimal representation of pi?

$\pi = 3.141592654...$

♦   How accurate do we need to be?   *It depends on how accurate the measurements are in solving a problem.*

♦   How do you show pi on your calculator?   *Use the* ▢π̲ *key.*

➠ Transparency Master J: Use pi

Carrying Out the Investigation

Use the transparency at the end of this activity (page 106) as a warm-up. The key sequence for the example on the transparency should be fairly easy for students, but this example provides an opportunity to discuss the number of significant digits to keep in the answer. Since the diameter is measured only to the nearest inch, there is an inherent error of up to 1/2 inch in the value. It does not make "measurement sense" to keep more than one decimal place in the answers.

Assign the exercises on the student pages.

Making Sense of What Happened

♦   How did you solve problems 5 and 6? What key sequence did you use? How did you know what to do with the decimal part of your final display?   *Use r = C/(2 π). Either use parentheses keys or key in:*

value of C ▢÷ (2▢× ▢π̲).

♦   How did you solve problems 7 and 8? What key sequence did you use? How did you know what to do with the decimal part of your final display?   *Use r = $\sqrt{A}$ / π; or key in:*

value of A ▢÷ ▢π̲ ▢= ▢√x̲.

Continuing the Investigation

Investigate approximations of pi (such as 3.14 or 22/7). Rework the problems with these approximations and determine how much difference there are in the answers.

➠ Transparency Master L: Entering Fractions

Challenge students to write formulas for circumference and area of a circle using the diameter instead of the radius.

Solutions

1. C = 37.7 cm; A = 113.1 cm^2

2. C = 49.0 ft; A = 191.1 ft^2

3. C = 942.5 cm ; A = 70,685.8 or 70,686 cm^2

4. $C = 98.6$ yd; $A = 774.4$ yd^2

5. $r = 10.8$ in.

6. $r = 163.0$ cm

7. $r = 12.6$ in.

8. $r = 35.1$ cm

9. 12.6 ft^2

10. 11.1%

11. 34.6 ft^2

12. 69.1 ft^2

13. 61.1%

14. 38.9%

15. Both arrows in the 20-point ring, since the probability of 20 twice in a row (0.063) is greater than the probability of scoring 10 and then 30 (0.059).