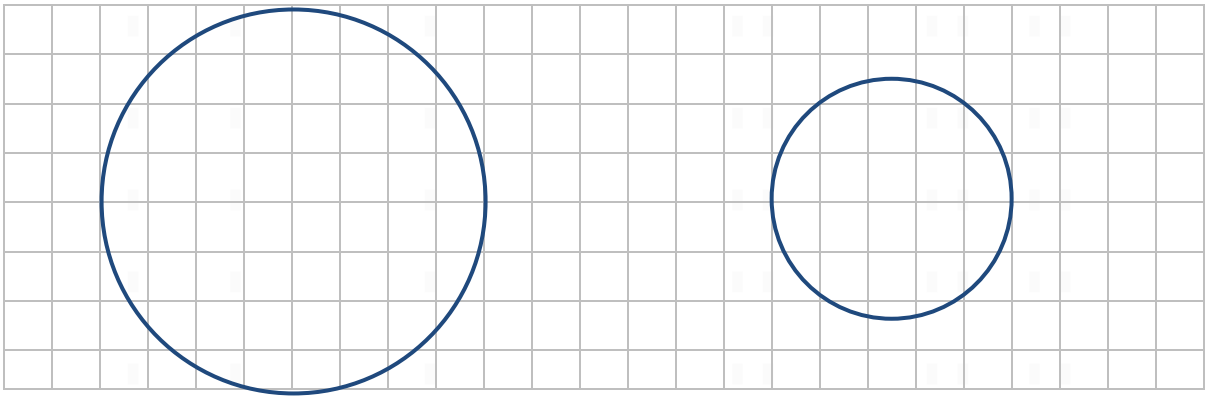
Area of a Circle

Use What You've Learned
Answers and Explanations

1. Estimate the area of each of the following circles by counting the squares. Then find the approximate area by using the formula $A = \pi r^2$ and substituting 3 for pi. How do your answers compare?



Large Circle
44 to 52 squares
$A = \pi \cdot 4^2$
$= 16\pi$
$\approx (16 \cdot 3)$ square units
≈ 48 square units

Small Circle
16 to 22 squares
$A = \pi \cdot (2.5)^2$
$= 6.25\pi$
$\approx (6.25 \cdot 3)$ square units
≈ 19 square units

2. The Cedar Valley Recreational Soccer League recommends that fields be the following size for each age category.

Age Category	Field Size	Radius of Center Circle
U-12 (under age 12)	50 yards by 80 yards	10 yards
U-10 (under age 10)	40 yards by 70 yards	8 yards
U-8 (under age 8)	25 yards by 50 yards	6 yards

What is the approximate area of the center circle on each field? Use 3.14 for pi or use the pi key on your calculator.

U-12 Field
$A = \pi \cdot 10^2$
$= 100\pi$
$\approx (100 \cdot 3.14)$ sq. yd.
≈ 314 sq. yd.

U-10 Field
$A = \pi \cdot 8^2$
$= 64\pi$
$\approx (64 \cdot 3.14)$ sq. yd.
≈ 201 sq. yd.

U-8 Field
$A = \pi \cdot 6^2$
$= 36\pi$
$\approx (36 \cdot 3.14)$ sq. yd.
≈ 113 sq. yd.

3. Molly's family is deciding whether to buy a 12-foot trampoline, a 14-foot trampoline, or a 16-foot trampoline. Each measurement tells the diameter of a round trampoline mat, rather than the trampoline frame. Approximately how many square feet of jumping area does each trampoline have?

12-foot Trampoline
$A = \pi \cdot 6^2$
$= 36\pi$
$\approx (36 \cdot 3.14)$ sq. ft.
≈ 113 sq. ft.

14-foot Trampoline
$A = \pi \cdot 7^2$
$= 49\pi$
$\approx (49 \cdot 3.14)$ sq. ft.
≈ 154 sq. ft.

16-foot Trampoline
$A = \pi \cdot 8^2$
$= 64\pi$
$\approx (64 \cdot 3.14)$ sq. ft.
≈ 201 sq. ft.

4. The Cookie Factory has decided to add monster cookies to their selection. They are trying to decide on a fair price for the cookies. A regular cookie has a radius of 2 in. and costs $0.85. The large cookie will have a radius of 4 in. What is a fair price for the large cookie?

Regular Cookie
$A = \pi \cdot 2^2$
$= 4\pi$

Monster Cookie
$A = \pi \cdot 4^2$
$= 16\pi$

The monster cookie is four times as large as the regular cookie ($4 \cdot 4\pi = 16\pi$), so the price of the monster cookie should be four times the price of the regular cookie ($4 \cdot \$0.85 = \$3.40$). The monster cookie should cost $3.40.

5. Ms. Smith put the following problem on a quiz.

What is the area of a circle with a diameter of 2.40 mm?

Six students gave answer A and five students gave answer B. What is incorrect about each answer?

Answer A

$A = \pi r^2$
$A = \pi(2.40)^2$
$A \approx (3.14)(5.76)$
$A \approx 18.09$ sq. mm

Answer B

$A = \pi r^2$
$A = \pi(1.20)^2$
$A = (3.14)(1.44)$
$A = 4.52$ sq. mm

Answer A is incorrect because the radius of the circle is 1.20 mm, not 2.40 mm.

Answer B is incorrect because 4.52 sq. mm is an approximate answer (≈) and not an exact answer (=). Pi is an irrational number that continues forever without repeating. Therefore pi is not equal to 3.14, but approximately equal to 3.14.