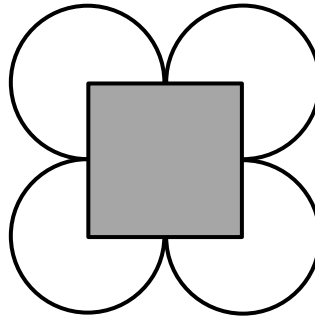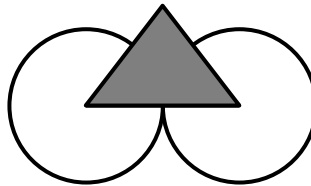BLUE MATH LESSON 18B: SECTOR AREA AND ARC LENGTH
## Learning to Swim

**Directions:** Answer each question below.

PRACTICE SET 1 (NO CALCULATOR)



1. If the square above has side lengths of 3 and each of its corners is at the middle of a circle, what is the area of the unshaded region above?



2. The triangle in the image above is equilateral and has a height of $3\sqrt{3}$ units. What is the area of the unshaded region above?

3. A dog is tethered to a pole by a 30-foot leash. If his owner wants to fence the dog in using a square fence, what's the minimum length of fencing the owner will need, assuming that she wants the dog to be able to go to the limits of his leash at all times?

4. What area of the fenced-in enclosure in Problem 3 will the dog be unable to visit because of the constraints of his leash?

5. A circle with radius $x$ and central angle $y°$ has an arc length of what?

## BLUE MATH LESSON 18B: SECTOR AREA AND ARC LENGTH
### Diving into the Deep End

**Directions:** Answer each question below.

### PRACTICE SET 2 (CALCULATOR)

6. A pie with a 16-inch diameter is cut into 8 equal pieces. If cheese evenly covers 80% of the pizza, how many square inches, to the nearest tenth of an inch, of cheese are on 3 pieces of pizza?
   A) 20.1
   B) 30.2
   C) 60.3
   D) 83.8

7. A sector of a circle has an area of 24π. If the circle has an area of $60\pi$, what is the measure of the central angle that is contained in the sector?
   A) 60°
   B) 72°
   C) 120°
   D) 144°

8. A merry-go-round takes 1 minute and 40 seconds to make two complete paths. In 12.5 seconds, a rider on the outer edge of the ride can travel 56 feet. What is the radius of the merry-go-round, in feet?
   A) 35.6 feet
   B) 47.5 feet
   C) 53.4 feet
   D) 71.3 feet
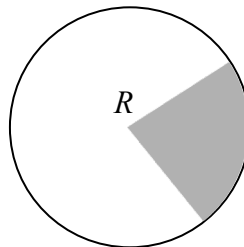


9. Circle $R$ above has a radius of 10 and the shaded region has an area of $25\pi$. What is the perimeter of the shaded region?
   A) $10 + 5\pi$
   B) $20 + 5\pi$
   C) $10 + 10\pi$
   D) $20 + 10\pi$
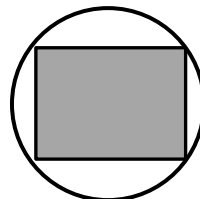


10. A rectangle with side lengths 6 and 8 is inscribed inside of a circle, as shown above. What is the area of the unshaded region above?
    A) $25\pi - 24$
    B) $25\pi - 48$
    C) $50\pi - 48$
    D) $100\pi - 4$

11. Circle $A$ has a radius that is twice as long as that of Circle $B$. If both circles have sectors of equal area, what is the ratio of Circle A's central angle to Circle B's central angle?
    A) $1 : 8$
    B) $1 : 4$
    C) $1 : 2\sqrt{2}$
    D) $1 : 2$

12. A circle has an area of $36\pi$ and a central angle of 80°. What is the positive difference between the area of the circle and the area of its sector?
    A) $8\pi$
    B) $14\pi$
    C) $28\pi$
    D) $36\pi$

13. A circular room with floor area of $81\pi$ square feet needs to have wooden trim put around the border between the wall and the floor. To the nearest foot, how much trim should be used?
    A) 28
    B) 57
    C) 2576
    D) 5153

14. The central angle of a circle measures 100°, while the area of the sector including that angle is $40\pi$. What is the length of the radius of the circle?
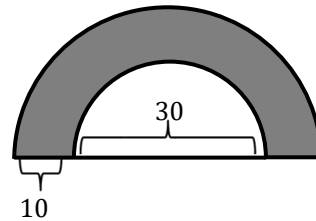
15. The ratio between the sector areas of two sectors of the same circle is 4 : 9. What is the ratio between the central angles of those two sectors?
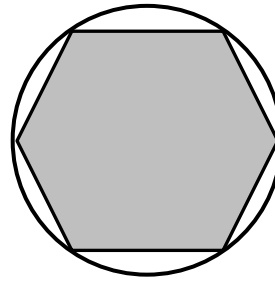
16. The regular hexagon above is inscribed in a circle with radius 6 m. What is the area of the unshaded region above?
    A) $18\pi - 27\sqrt{3}$
    B) $36\pi - 54\sqrt{3}$
    C) $36\pi - 27\sqrt{3}$
    D) $36\pi - 18\sqrt{3}$
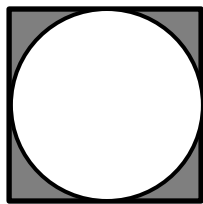


17. What is the area of the shaded region above, which is formed by two semicircles which share the same center?
    A) $100\pi$
    B) $200\pi$
    C) $300\pi$
    D) $400\pi$

18. If the radius of a circle is 4, what is the area of one-sixth of that circle?
    A) $\frac{4\pi}{3}$
    B) $\frac{8\pi}{3}$
    C) $\frac{12\pi}{3}$
    D) $\frac{16\pi}{3}$

19. A circle with radius 3.5 is inscribed inside of a square, as shown above. What is the area of the shaded region?
   A) $\frac{49}{4} - \frac{49\pi}{16}$
   B) $\frac{49}{2} - 7\pi$
   C) $49 - 14\pi$
   D) $49 - \frac{49\pi}{4}$

20. The central angle of a circle is $\frac{\pi}{2}$ radians. If the sector containing that central angle has an arc length of $6\pi$, what is the circumference of the circle?
   A) $12\pi$
   B) $18\pi$
   C) $20\pi$
   D) $24\pi$

Questions 21 through 23 use the following information:
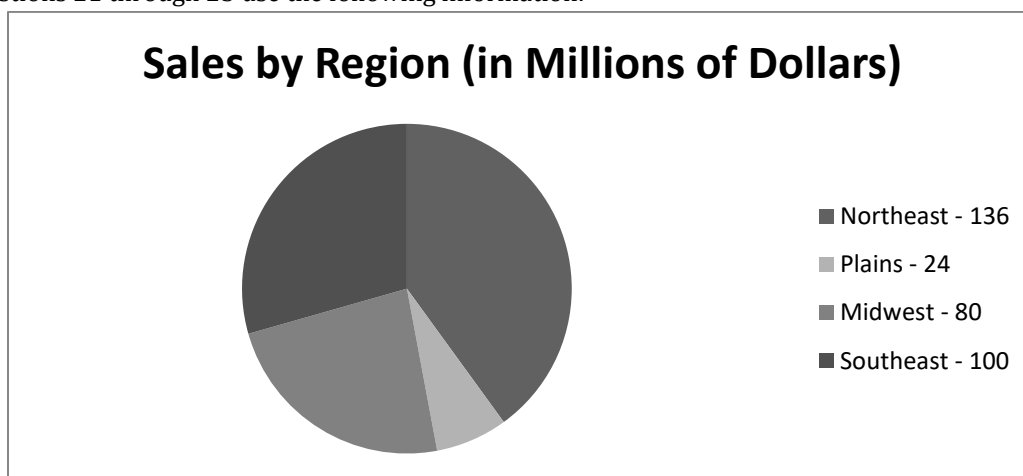


21. What is the approximate central angle of the Midwest data of the region above?
   A) 25.4°
   B) 84.7°
   C) 105.9°
   D) 144.0°

22. The chart above needs to be reproduced on a square piece of poster board that is 2 meters long. If the pie chart is inscribed inside the poster board, what is the area of the Northeast region, in square meters?
   A) 0.52
   B) 0.63
   C) 0.74
   D) 1.26

23. A fifth region, California, is to be added to the pie chart above. If California has sales of $60 million, how big will its central angle be when added to the pie chart?
   A) 15.0°
   B) 54.0°
   C) 63.5°
   D) 72.0°

24. If the central angle of a circle is $\frac{\pi}{4}$ radians and the circle's radius is 20. If the area of the sector of the circle containing that central angle is $x\pi$, what is the value of $x$?

25. How many centimeters does the tip of a $\frac{12}{\pi}$ cm long minute hand of a clock move in 24 minutes?