

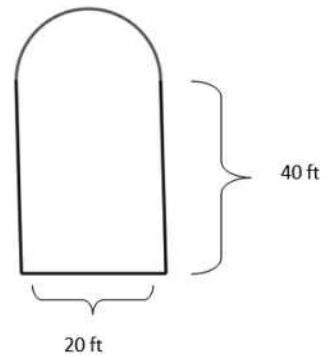
Name \_\_\_\_\_

Date \_\_\_\_\_

## The Most Famous Ratio of All

Brianna's parents built a swimming pool in the back yard. Brianna says that the distance around the pool is 120 feet.

1. Is she correct? Explain why or why not.

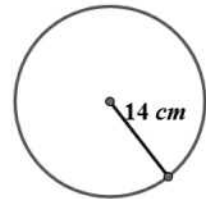


2. Explain how Brianna would determine the distance around the pool so that her parents would know how many feet of stone to buy for the edging around the pool.

3. Explain the relationship between the circumference of the semicircular part of the pool and the width of the pool.

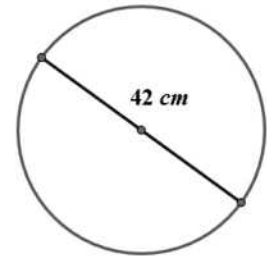
1. Find the circumference.

- Give an exact answer in terms of  $\pi$ .
- Use  $\pi \approx \frac{22}{7}$  and express your answer as a fraction in lowest terms.
- Use *the*  $\pi$  button on your calculator and express your answer to the nearest hundredth.

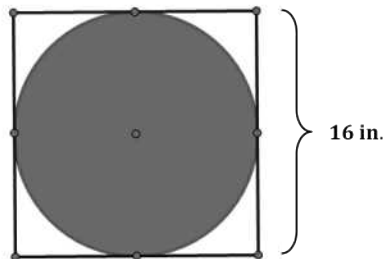


2. Find the circumference.

- Give an exact answer in terms of  $\pi$ .
- Use  $\pi \approx \frac{22}{7}$  and express your answer as a fraction in lowest terms.

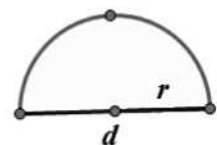


3. The figure shows a circle within a square. Find the circumference of the circle. Let  $\pi \approx 3.14$ .



4. Consider the diagram of a semicircle shown.

- Explain in words how to determine the perimeter of a semicircle.
- Using " $d$ " to represent the diameter of the circle, write an algebraic expression that will result in the perimeter of a semicircle.
- Write another algebraic expression to represent the perimeter of a semicircle using  $r$  to represent the radius of a semicircle.



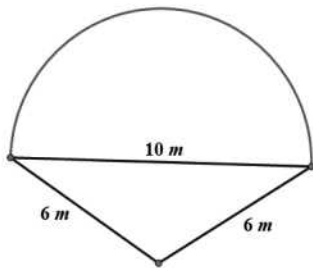
5. Find the perimeter of the semicircle. Let  $\pi \approx 3.14$ .



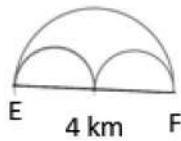
6. Ken's landscape gardening business makes odd-shaped lawns that include semicircles. Find the length of the edging material needed to border the two lawn designs. Use 3.14 for  $\pi$ .
- a. The radius of this flower bed is 2.5 m.



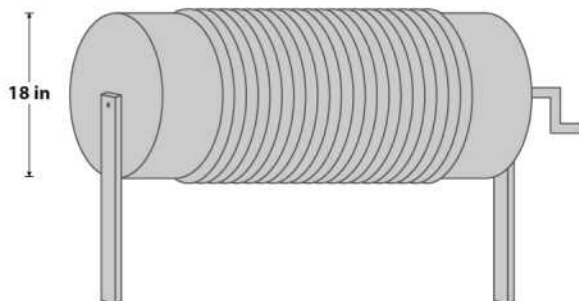
- b. The diameter of the semicircular section is 10 m, and the lengths of the sides of the two sides are 6 m.



7. Mary and Margaret are looking at a map of a running path in a local park. Which is the shorter path from  $E$  to  $F$ , along the two semicircles or along the larger semicircle? If one path is shorter, how much shorter is it? Let  $\pi \approx 3.14$ .



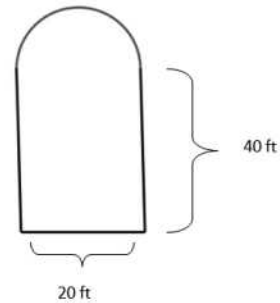
8. Alex the electrician needs 34 yards of electrical wire to complete a job. He has a coil of wiring in his workshop. The coiled wire is 18 inches in diameter and is made up of 21 circles of wire. Will this coil be enough to complete the job? Let  $\pi \approx 3.14$ .



Brianna's parents built a swimming pool in the back yard. Brianna says that the distance around the pool is 120 feet.

1. Is she correct? Explain why or why not.

*Brianna is incorrect. The distance around the pool is 131.4 ft. She found the distance around the rectangle only and did not include the distance around the semicircular part of the pool.*



2. Explain how Brianna would determine the distance around the pool so that her parents would know how many feet of stone to buy for the edging around the pool.

*In order to find the distance around the pool, Brianna must first find the circumference of the semicircle, which is  $C = \frac{1}{2} \cdot \pi \cdot 20$  ft, or  $10\pi$  ft, or about 31.4 ft. The sum of the three other sides is (20 ft. + 40 ft. + 40 ft. = 100 ft.); the perimeter is (100 ft. + 31.4 ft.) = 131.4 ft.*

3. Explain the relationship between the circumference of the semicircular part of the pool and the width of the pool.

*The relationship between the circumference of the semicircular part and the width of the pool is the same as half of  $\pi$  because this is half the circumference of the entire circle.*

Students should work in cooperative groups to complete the tasks for this exercise.

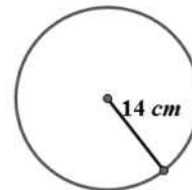
1. Find the circumference.

- a. Give an exact answer in terms of  $\pi$ .

$$C = 2\pi r$$

$$C = 2\pi \cdot 14 \text{ cm}$$

$$C = 28\pi \text{ cm}$$



- b. Use  $\pi \approx \frac{22}{7}$  and express your answer as a fraction in lowest terms.

$$C \approx 2 \cdot \frac{22}{7} \cdot 14 \text{ cm}$$

$$C \approx 88 \text{ cm}$$

- c. Use *the*  $\pi$  button on your calculator and express your answer to the nearest hundredth.

$$C \approx 2 \cdot \pi \cdot 14 \text{ cm}$$

$$C \approx 87.96 \text{ cm}$$

2. Find the circumference.

a. Give an exact answer in terms of  $\pi$ .

$$d = 42 \text{ cm}$$

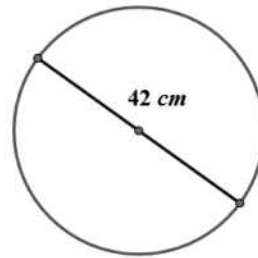
$$C = \pi d$$

$$C = 42\pi \text{ cm}$$

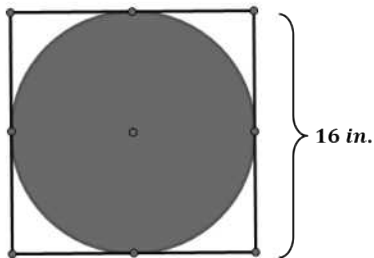
b. Use  $\pi \approx \frac{22}{7}$  and express your answer as a fraction in lowest terms.

$$C \approx 42 \text{ cm} \cdot \frac{22}{7}$$

$$C \approx 132 \text{ cm}$$



3. The figure shows a circle within a square. Find the circumference of the circle. Let  $\pi \approx 3.14$ .



*The diameter of the circle is the same as the length of the side of the square.*

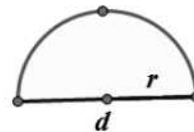
$$C = \pi d$$

$$C = \pi \cdot 16$$

$$C \approx 3.14 \cdot 16 \text{ in.}$$

$$C \approx 50.24 \text{ in.}$$

4. Consider the diagram of a semicircle shown.



a. Explain in words how to determine the perimeter of a semicircle.

*The perimeter is the sum of the length of the diameter and half of the circumference of a circle with the same diameter.*

b. Using "d" to represent the diameter of the circle, write an algebraic expression that will result in the perimeter of a semicircle.

$$P = d + \frac{1}{2}\pi d$$

c. Write another algebraic expression to represent the perimeter of a semicircle using r to represent the radius of a semicircle.

$$P = 2r + \frac{1}{2}\pi \cdot 2r$$

$$P = 2r + \pi r$$

5. Find the perimeter of the semicircle. Let  $\pi \approx 3.14$ .



$$P = d + \frac{1}{2}\pi d$$

$$P \approx 17 + \frac{1}{2} \cdot 3.14 \cdot 17$$

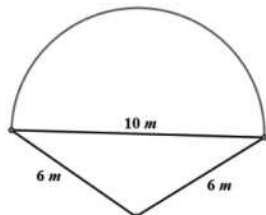
6. Ken's landscape gardening business makes odd-shaped lawns that include semicircles. Find the length of the edging material needed to border the two lawn designs. Use 3.14 for  $\pi$ .

- a. The radius of this flowerbed is 2.5 m.



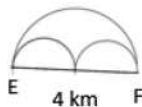
A semicircle has half of the circumference of a circle. If the circumference of the semicircle is  $C = \frac{1}{2}(\pi \cdot 2 \cdot 2.5 \text{ m})$ , then the circumference approximates 7.85 m. The length of the edging material must include the circumference and the diameter (7.85 m + 5 m = 12.85 m). Ken needs 12.85 meters of edging to complete his design.

- b. The diameter of the semicircular section is 10 m, and the lengths of the two sides are 6 m.



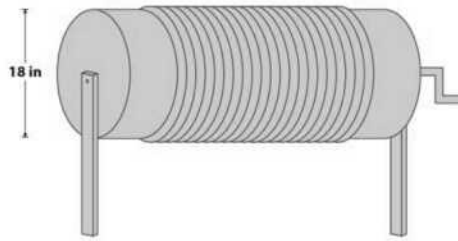
The circumference of the semicircular part has half of the circumference of a circle. The circumference of the semicircle is  $C = \frac{1}{2}\pi \cdot 10$ , which is approximately 15.7 m. The length of the edging material must include the circumference of the semicircle and the perimeter of two sides of the triangle (15.7 m + 6 m + 6 m = 27.7 m). Ken needs 27.7 meters of edging to complete his design.

7. Mary and Margaret are looking at a map of a running path in a local park. Which is the shorter path from E to F, along the two semicircles or along the larger semicircle? If one path is shorter, how much shorter is it? Let  $\pi \approx 3.14$ .



A semicircle has half of the circumference of a circle. The circumference of the large semicircle is  $C = \frac{1}{2}\pi \cdot 4 \text{ km}$  or 6.28 km. The diameter of the two smaller semicircles is 2 km. The total circumference would be the same as the circumference for a whole circle with the same diameter. If  $C = \pi \cdot 2 \text{ km}$ , then  $C = 6.28 \text{ km}$ . The distance around the larger semicircle is the same as the distance around both of the semicircles. So, both paths are equal in distance.

8. Alex the electrician needs 34 yards of electrical wire to complete a job. He has a coil of wiring in his workshop. The coiled wire is 18 inches in diameter and is made up of 21 circles of wire. Will this coil be enough to complete the job? Let  $\pi \approx 3.14$ .



The circumference of the coil of wire is  $C = \pi \cdot 18$  in., or approximately 56.52 in. If there are 21 circles of wire, then the number of circles times the circumference will yield the total number of inches of wire in the coil. If

$56.52 \text{ in.} \cdot 21 \approx 1186.92 \text{ in.}$ , then  $\frac{1186.92 \text{ in.}}{36 \text{ in.}} \approx 32.97 \text{ yd.}$  (1 yd. = 3 ft. = 36 in. When converting inches to yards, you must divide the total inches by the number of inches in a yard, which is 36 inches.) Alex will not have enough wire for his job in this coil of wire.