


Grade 8 Mathematics

Measurement: Lesson 6

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol () by them.

Purpose of Lesson 6:

- In this lesson, the tutor and the students will
 - ✓ find the circumference and area of circles.

Equipment/Materials Needed:

- Copies of Student Sheets 95 and 96
- Paper and pencils
- Chalkboard
- A few pieces of string for each student
- Scissors

Preparations before beginning Lesson 6:

- Run one copy of Student Sheets 95 and 96 for each student.
- Have paper and pencils available.
- You may want to look back at Lesson 2 in Geometry.
- Gather the string for the students.
- Either cut a piece of string the length of the diameter in Part 2 of Student Sheet 95 or have scissors available for the students to do so.

Lesson 6: Measurement

Say:

In Lesson 2 of Geometry, you looked at the parts of a circle. Let's review some of the ideas you learned.

📄 Give Student Sheet 95 part A to the students.

Answers to Part A:

1. A
2. \overline{ED} or \overline{DE} , \overline{JC} or \overline{CJ}
3. \overline{AG} or \overline{GA} , \overline{DA} or \overline{AD} , \overline{CA} or \overline{AC} , etc.; A must be one of the points named.
4. 5 units
5. 16 units
6. \overline{BK} or \overline{KB} , \overline{HI} or \overline{IH} , or any of the diameters listed in Problem 2.

📄 Give Student Sheet 95 part B to the students.

Say:

In this lesson, you are going to find the circumference and area of circles. What is the distance around a rectangle or triangle called? (perimeter) The *circumference* is just a special name for the perimeter of a circle. The *circumference* is the distance around a circle. Look at the circles in Part B of Student Sheet 95. What is the name of segment \overline{DE} in each circle? (diameter) Cut a piece of string the length of the diameter of each circle. Use the string for Circle A. About how many of these pieces of string would you need to go around the circle? (about 3) Do the same for Circles B and C. How many diameter lengths of string are needed to find the distance around the circles? (about 3) We can say that the circumference of the circle is about 3 times the diameter. This estimation works for any circle. The formula for the circumference of a circle is $C = pd$.

p is the symbol for the Greek word *Pi*, and is about 3, but a little bit larger. When you use p , you want to be a little more accurate, so you should use $p = 3.14$ or $\frac{22}{7}$. How could you find the circumference if I gave you the radius instead of the diameter? (Multiply the radius by two, since the diameter is twice as long as the radius.)

 Give students Student Sheet 96, Part A.

Answers:

1. $C = \pi d$
2. $C = 2\pi r$
3. 88 mm
4. 28 can be evenly divided by seven, so $22/7$ is easy to use.
5. 62.8 yards or about 63 yards
6. 10 or 20 cannot be easily divided by seven, so it is easier to use the decimal form of π .


Say:

When you want to find the amount of material that it would take to cover a circle, you are looking for the area of the circle. The formula for the area of a circle is $A = \pi r^2$. The units in your answer will be square units.

 Give students Part B of Student Sheet 96.

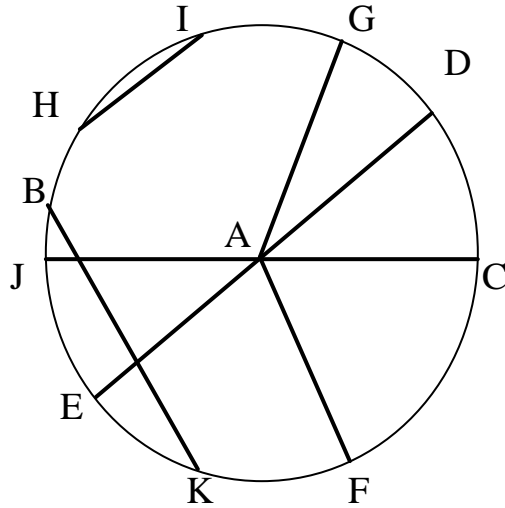
Answers:

7. $A = \pi r^2$
8. 8. about 28 sq. ft. or 28.26 sq. ft
9. 9. 30 cm
10. about 154 sq. ft.
11. $C = 2\pi r$
12. $A = \pi r^2$
13. Divide the diameter by 2 to find the radius.

 Have one student summarize today's lesson. Finding the circumference and area of circles is very useful in daily life. Students must also be able to find these measurements before they can find the surface area and volume of cylinders.

Student Sheet 95 (Measurement: Lesson 6)

Part A

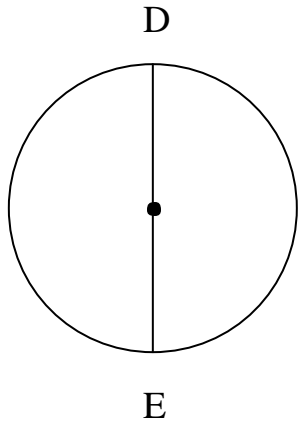


1. What point is the center of the circle?
2. Name a diameter. Name a second diameter.
3. Name a radius. Name a second radius.
4. If the diameter of the circle is 10 units long, how long is the radius?
5. If the radius is eight units long, how long is the diameter?
6. A chord is a line segment that connects two points on the circle. It can go through the center, but does not have to. Name a chord. Name a second chord.

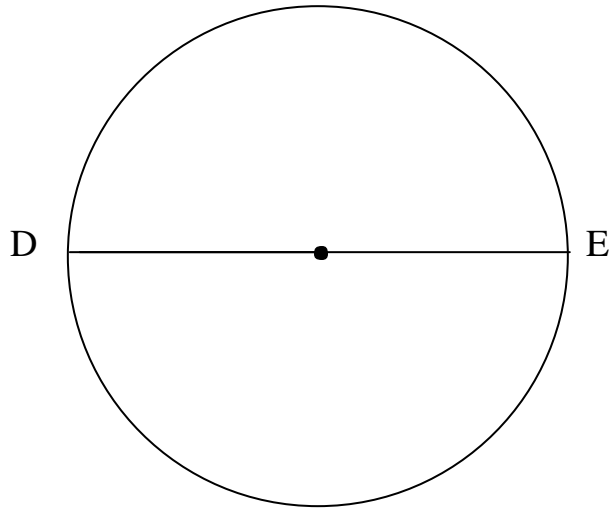
Student Sheet 95 (Measurement: Lesson 6) continued

Part B

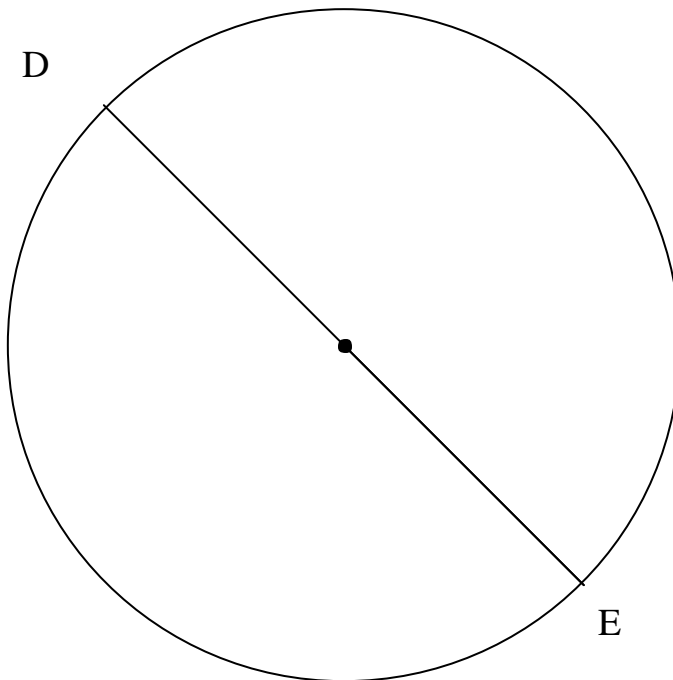
A.



B.



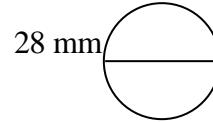
C.



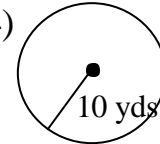
Student Sheet 96 (Measurement: Lesson 6)

Part A

1. What is the formula for finding the circumference using the diameter?
2. What is the formula for finding the circumference using the radius?
3. A quarter has a diameter of 28 millimeters. What is the circumference of a quarter? (Use $\frac{22}{7}$ for π .)



4. Why did I have you use $\pi = \frac{22}{7}$ in Problem 3, rather than 3.14.
5. Queenie wants a fence built to enclose a circular exercise area for her pony. If the radius of the exercise area will be 10 yards, approximately how many yards long must the fence be? (Use $\pi = 3.14$)



6. Why did I have you use $\pi = 3.14$ in Problem 5, rather than $\frac{22}{7}$.

Part B

7. What is the formula for finding the area of a circle?
8. Byron has a small pool in his back yard. It has a radius of three feet. How much ground will the pool cover?
9. A record has a diameter of 60 cm. What is the radius of the record?
10. Bernard must make two circular tablecloths for a reception. The diameter of each tablecloth must be 14 feet. How many square feet of fabric must be used to make each tablecloth? (Use $\frac{22}{7}$ for π .)
11. Which formula would you use to find the distance around a circle?
 $A = \pi r^2$ or $C = 2\pi r$? Explain your choice.
12. Which formula would you use to find the amount of material needed to cover a circle, $A = \pi r^2$ or $C = 2\pi r$? Why?
13. The formula for circumference on the reference sheet is $C = 2\pi r$. What should you do if I give you the diameter in a problem?