

Lesson 44: Circles

Weekly Focus: circles

Weekly Skill: area, circumference

LESSON 44: Circles

Lesson Summary: For the warm up, students will solve a problem about average speeds. In Activity 1, students will learn vocabulary and formulas related to circles. In Activity 2, students will compute the area and circumference of circles. In Activity 3, they will solve word problems about circles. The Application Activity has students compare the costs of pizzas with different areas. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 44:

- Video (length 1:31) on circles. The video is recommended for teachers and optional for students.
- String, rulers or tape measures, round objects like cans, lids, etc.
- 2 Worksheets (44.1 and application activity) with answers (attached)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book* (pages 100 – 101)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Workbook* (pages 138 – 141)
- Application activity (link embedded in lesson plan)

Objectives: Students will be able to:

- Solve the review word problem about averages
- Calculate the area and circumference of circles
- Solve area and circumference of circles word problems

ACES Skills Addressed: N, CT, LS

CCRS Mathematical Practices Addressed: Mathematical Fluency, Look for and Express Regularity in Repeated Reasoning

Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, and Application

Notes:

You can add more examples if you feel students need them before they work. Any ideas that concretely relate to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

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This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 44 Warm-up: Solve the average problem

Time: 5 Minutes

Write on the board: A police scanner is measuring car drivers' speeds on a street. The mean for the first 5 cars is 35 miles per hour. The speeds of the first 4 cars are 40, 31, 37, and 35 mph.

Basic Question:

- What is the average speed of the first 4 cars? ($40+31+37+35/4 = 35.75$ mph)

Extension Questions:

- What was the speed of the fifth car?
o $\frac{40+31+37+35+x}{5} = 35$ so $x = 32$ mph
- What is the median speed?
o The median is 35 mph (31, 32, 35, 37, 40)

Lesson 44 Activity 1: Vocabulary and Formulas of Circles

Time: 10 Minutes

1. Introduce the study of circles by asking students when circles are used in real-life. Students may give common answers such as wheels, basketball hoops, etc. Other more recent uses are: roundabouts instead of traffic lights, GPS uses 3 circles (triangulation), farmers use sprinkler systems that irrigate their crops in circle formation.
2. Give students string, rulers/tape measures, and round items.
3. Draw a circle on the board and draw a diameter.
4. Have students measure the **diameter** of a round item (circle) and the **circumference (the perimeter of a circle)** of the same item. Do an example first and write on the board as you measure.
5. What is the relationship of the diameter to the circumference? Students will discover that the circumference is about 3 times the diameter. This explains the formula for the circumference of a circle: $C = \pi d$. $\pi \approx 3.14$ or $22/7$.

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6. Explain that the **radius** is half the diameter from the center of the circle to a point on the circle. We can measure the circumference of the circle by using $C = 2\pi r$.
7. The **area of a circle** can be measured with either the radius or the diameter. The formula is $A = \pi r^2$.
8. If given the diameter, divide it in half to get the radius.
9. We can solve any area or circumference problem given the radius or the diameter.
10. Note: Students should also have geometry notes from Lesson 41 for reference.

Lesson 44 Activity 2: Compute the area and circumference of circles	Time: 20-25 Minutes
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1. Example A: A city is building a circular water fountain with a diameter of 15 feet. What is the approximate circumference of the fountain? $C = 15 (3.14) \approx 47$ feet
2. Example B: The radius of a circle is 11 yards. What are the diameter and area of the circle?
 - a. $A = \pi r^2$.
 - b. $A = 3.14 (11)^2$
 - c. $A = 379.94 \text{ yd}^2$ and $d = 22$ yards
3. Do **Worksheet 44.1**.
4. Have volunteers solve a few problems on the board.

Lesson 44 Activity 3: Circle Word Problems	Time: 60 Minutes
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1. Do the problems in the **student book pages 100 – 101** together.
2. Now students can work independently in the **workbook pages 138 – 141**.
3. Choose some of the challenging problems to do on the board.

Lesson 44 Application: Compare the Costs of Round and Square Pizzas	Time: 15 Minutes
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1. Begin by asking students what shape pizza is sold in. Most will say circles, but some may have seen square pizzas.
2. When you buy pizza, how do you know which pizza is a better deal? (by the area)
3. Download [the activity](#) from yummymath.com. The solution can be accessed if you are a member. Students can work together to solve the problems.

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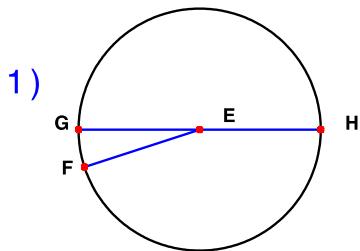
4. Notes:

- a. The answers for #1 are given for many different sizes of pizza, but only the 15 inch measurement is necessary to answer the questions.
- b. For #2, assume that the Sbarro's pizza has 8 slices at \$2 each.

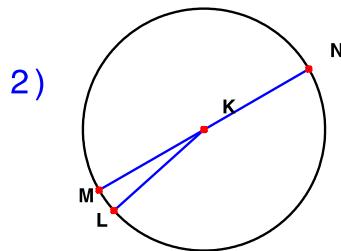
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Worksheet 44.1

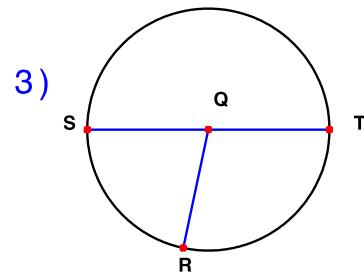
Solve the missing elements for each problem. Use 3.14 for π . Area = πr^2 ; C = πD



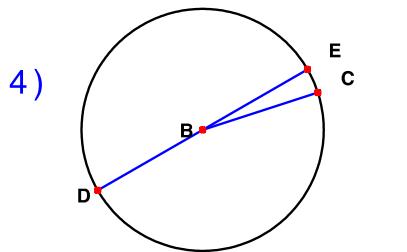
Radius: _____
Diameter: 12 inches
Circumference: _____
Area: _____



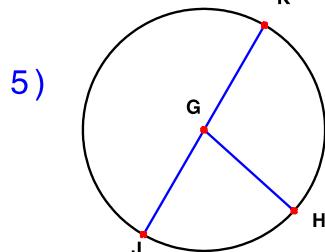
Radius: _____
Diameter: 40 cm
Circumference: _____
Area: _____



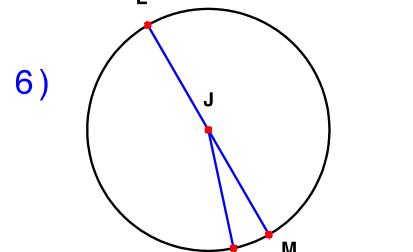
Radius: _____
Diameter: 22 inches
Circumference: _____
Area: _____



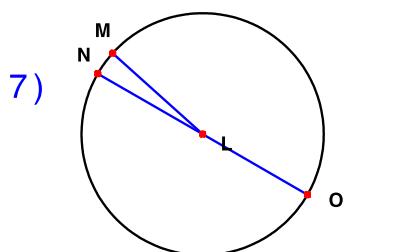
Radius: 17 cm
Diameter: _____
Circumference: _____
Area: _____



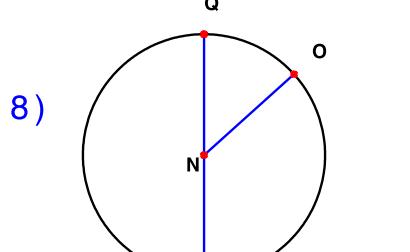
Radius: _____
Diameter: 4 inches
Circumference: _____
Area: _____



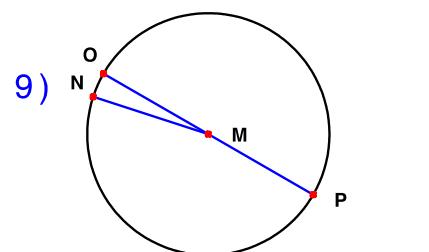
Radius: 3 cm
Diameter: _____
Circumference: _____
Area: _____



Radius: _____
Diameter: 24 inches
Circumference: _____
Area: _____



Radius: 5 cm
Diameter: _____
Circumference: _____
Area: _____

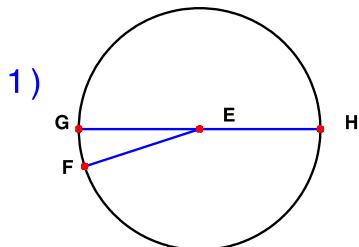


Radius: 13 inches
Diameter: _____
Circumference: _____
Area: _____

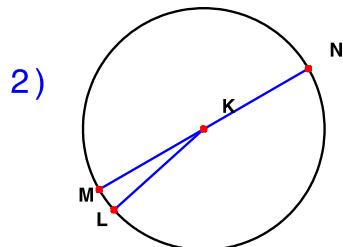
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Worksheet 44.1 Answers

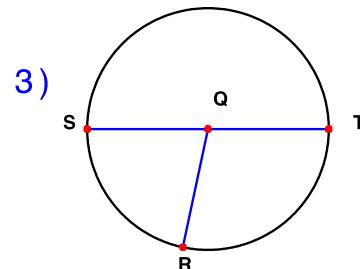
Solve the missing elements for each problem. Use 3.14 for π . Area = πr^2 ; C = πD



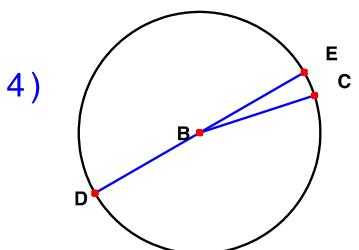
Radius: 6 inches
Diameter: 12 inches
Circumference: 37.68 inches
Area: 113.04 inches



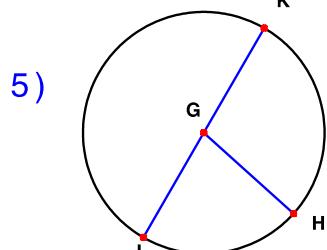
Radius: 20 cm
Diameter: 40 cm
Circumference: 125.6 cm
Area: 1256 cm



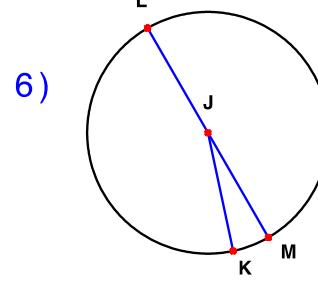
Radius: 11 inches
Diameter: 22 inches
Circumference: 69.08 inches
Area: 379.94 inches



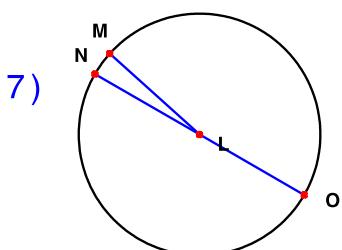
Radius: 17 cm
Diameter: 34 cm
Circumference: 106.76 cm
Area: 907.46 cm



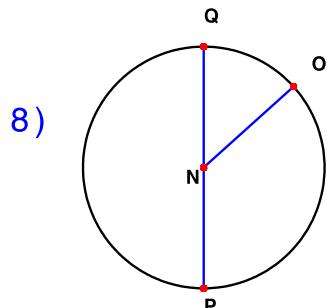
Radius: 2 inches
Diameter: 4 inches
Circumference: 12.56 inches
Area: 12.56 inches



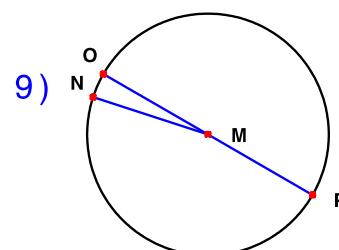
Radius: 3 cm
Diameter: 6 cm
Circumference: 18.84 cm
Area: 28.26 cm



Radius: 12 inches
Diameter: 24 inches
Circumference: 75.36 inches
Area: 452.16 inches



Radius: 5 cm
Diameter: 10 cm
Circumference: 31.4 cm
Area: 78.5 cm



Radius: 13 inches
Diameter: 26 inches
Circumference: 81.64 inches
Area: 530.66 inches