THE NATION'S NEWSPAPER

Math TODAY®
Teacher Edition

USA TODAY
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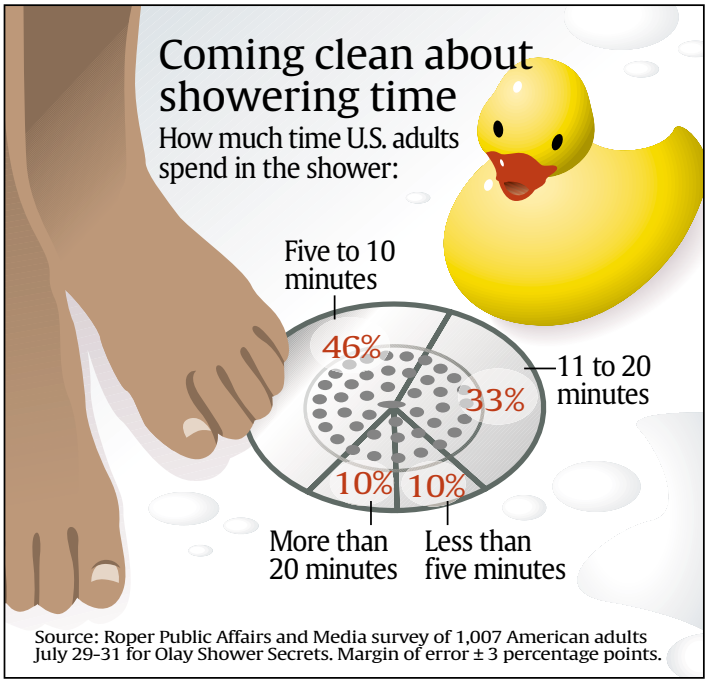
Coming clean about showering time

by: Bob Tower

USA TODAY Snapshots®



Source: Roper Public Affairs and Media survey of 1,007 American adults July 29-31 for Olay Shower Secrets. Margin of error ± 3 percentage points.

By Mary Cadden and Alejandro Gonzalez, USA TODAY

Activity Overview:

In this activity using the USA TODAY Snapshot,® "Coming clean about showering time," students will find the measures of central angles and arcs of a circle. They will use circumference, radius, concentric circles and degrees in a circle to determine the measures of the central angles and arc length.

Activity at a Glance:

- Grade level: 9-12
- Subject: Geometry
- Estimated time required: 20-30 minutes

Materials:

- TI-83 Plus family or TI-84 Plus family
- Overhead view screen calculator for instruction/demonstration
- Student Handout
- Transparency
- USA TODAY newspapers (recommended)
- Cabri® Jr. Application

Prerequisites:

Students should:

- know how to use Cabri Jr.
- have prior knowledge about radius and circumference of a circle

These activities work with TI navigator A Classroom Learning System

Coming clean about showering time

Concepts:

- Measure of a central angle
- Measure the length of an arc of a circle
- The measure of the arc formed by two adjacent arcs is the sum of the two arcs

Objectives:

Students will:

- find the measure of central angles and arcs
- use the circumference to determine arc length
- compare arc lengths for concentric circles

Background:

The purpose of this lesson is to help students to develop a better understanding of central angles and arc length. Students will find measurements of a circle to examine relationships about the measure of a central angle and arc length. Students will identify concentric circles and determine what the difference is between the arc lengths.

Preparation:

- Provide one graphing calculator for each student.
- Each student should have a copy of the corresponding student activity sheet.
- Provide each student with the following AppVars ***CIRCLE.***

Classroom Management Tips:

- Have the students link the AppVars ***CIRCLE*** as part of the class period on the previous day or during the beginning of the class period when you are going to use this activity.
- Review opening an AppVars using Cabri Jr. with your class before starting the activity.
- Students can work individually or in groups to assist each other during the activity.
- Have students discuss their discoveries while they work to better understand the relationships.
- Before starting the AppVars ***CIRCLE***, remind students to carefully read the opening screen and find where the radius and circumference will be placed.

Data Source:

Roper Public Affairs and Media survey of 1,007 American adults July 29-31 for Olay Shower Secrets.

National Council of Teachers of Mathematics (NCTM) Standards:

Geometry Standard

- Use visualization, spatial reasoning, and geometric modeling to solve problems

Problem Solving Standard

- Solve problems that arise in mathematics and in other contexts.

Connections Standard

- Recognize and apply mathematics in contexts outside of mathematics.

Document Links:

TI Technology Guide,
for information on the following:

- TI-83 Plus family or TI-84 Plus family
- Cabri Jr.

Coming clean about showering time

Activity Extension:

- Challenge the students to find and bring in other examples of this type of graph from USA TODAY. Use these as additional problems for students to continue working on this topic or use as a review for an exam.

Curriculum Connection:

- Physical Science
- Physics

Assessment and Evaluation:

Activity 1: You will explore the relationship of the measure of a central angle of a circle. Complete Activity 1 before answering the Focus Questions.

Q. What do you notice about this sum as you change the measures of the central angles?

A. The total remains the same and is always equal to 360°.

Q. Using your definition from above determine the measure of the arc in the USA TODAY Snapshot "Coming clean about showering time" for those that responded five to 10 minutes and for those that responded more than 20 minutes.

A. 56°

Procedure:

Complete the following table using the Calculate feature from the F5 menu.

Degree measure of each central ∠	(Central ∠ measure) 360	Length of each arc
Example: 20°	**20/360 = 0.06**	**0.06*circumference**
80°	80/360 = 0.22	0.22 * 18.85 = 4.15
68°	68/360 = 0.19	3.58
90°	90/360 = 0.25	4.71
122°	122/360 = 0.34	6.41
		Sum = circumference

Teacher Notes:

Coming clean about showering time

Find the sum of the last column for the four central angles from the Snapshot. How does this value compare to the circumference of the outer circle?

Sum of last column = 18.85. This value should equal or approximate the circumference of the circle. You may find a value close to the circumference because of rounding.

Activity 2. Use the information from Activity 1 and the USA TODAY Snapshot "Coming clean about showering time" to answer the focus questions.

Q. Each section of the circle graph represents a measurable quantity. What is that quantity?

A. The time that U.S. adults spend in the shower.

Q. How many people spend 10 minutes or less in the shower?

A. Approximately 564 of the 1,007 U.S. adults surveyed spend 10 minutes or less in the shower.

Q. The USA TODAY Snapshot "Coming clean about showering time" shows that 79% of the respondents spend five to 20 minutes in the shower. What is the measure of the angle (in degrees) formed by these two groups?

A. The measure of the angle is 284°.

Q. What is the measure of the length of the arc formed by the two adjacent arcs?

A. Arc length is 14.89 (this is calculated using a circumference of 18.85).

Q. Identify the two concentric circles in the USA TODAY Snapshot "Coming clean about showering time." How much farther is it around the outer circle? (If the radius of the outer circle is 25 mm and the distance from the outer to the inner circle is 5 mm).

A. Outer circle: radius = 25mm, circumference = 157 (50π)mm
Inner circle: radius = 20mm, circumference = 126 (40π)mm

The distance around the outer circle is 10 π mm (about 31 mm) greater than the inner circle.

Teacher Notes:

If you are using the TI-Navigator Classroom Learning System, send the provided LearningCheck assessment to your class to gauge student understanding of the concepts presented in the activity. See the TI-Navigator Basic Skills Guide for addtiional information on how this classroom learning system may be integrated into the activity.