

Angle Measures and Segment Lengths

What You'll Learn

- To find the measures of angles formed by chords, secants, and tangents
- To find the lengths of segments associated with circles

... And Why

To find the measure of an arc of a circular basin, as in Example 2



Check Skills You'll Need

In the diagram at the right, \overline{FE} and \overline{FD} are tangents to $\odot C$. Find each arc measure, angle measure, or length.

- $m\widehat{DE}$ 57
- $m\widehat{AED}$ 180
- $m\widehat{EBD}$ 300
- $m\angle EAD$ 28.5
- $m\angle AEC$ 28.5
- CE 4
- DF 2
- CF about 4.5
- $m\angle EFD$ 123



for Help Lessons 12-1 and 12-3



New Vocabulary • secant

1. Plan

Objectives

- 1 To find the measures of angles formed by chords, secants, and tangents
- 2 To find the lengths of segments associated with circles

Examples

- 1 Finding Angle Measures
- 2 Real-World Connection
- 3 Finding Segment Lengths
- 4 Real-World Connection



Math Background

The Inscribed Angle Theorem establishes the relationships that are summarized below.

Angle Vertex	Measure
Center	$m(\text{arc})$
On circle	$\frac{1}{2} \cdot m(\text{arc})$
Inside circle	$\frac{1}{2} \cdot \text{sum of } m(\text{arcs})$
Outside circle	$\frac{1}{2} \cdot \text{difference of } m(\text{arcs})$

More Math Background: p. 660D

Lesson Planning and Resources

See p. 660E for a list of the resources that support this lesson.



Bell Ringer Practice



Check Skills You'll Need

For intervention, direct students to:

Using the Radius-Tangent Relationship

Lesson 12-1: Example 1
Extra Skills, Word Problems, Proof Practice, Ch. 12

Finding the Measure of an Inscribed Angle

Lesson 12-3: Examples 1, 2
Extra Skills, Word Problems, Proof Practice, Ch. 12



Finding Angle Measures

Vocabulary Tip

The word **secant** may refer to a line, ray, or segment.

A **secant** is a line that intersects a circle at two points. \overrightarrow{AC} is a secant ray, and \overline{AB} is a secant segment.

Angles formed by secants, tangents and chords intercept arcs on circles. The measures of the intercepted arcs can help you find the measures of the angles.



Key Concepts

Theorem 12-11

The measure of an angle formed by two lines that

- (1) intersect inside a circle is half the sum of the measures of the intercepted arcs.

$$m\angle 1 = \frac{1}{2}(x + y)$$



- (2) intersect outside a circle is half the difference of the measures of the intercepted arcs.

$$m\angle 1 = \frac{1}{2}(x - y)$$



Part (1) is proved on the next page. The three cases of Part (2) are proved in Exercises 29 and 30.

Differentiated Instruction

Solutions for All Learners

Special Needs 12-4

Copy the three diagrams in Theorem 12-11 and use colors to label and name each of the following segments: segments of chords, secant segments, exterior secant segments, and tangent segments.

learning style: visual

Below Level 12-4

As students read Theorem 12-11, they should copy the diagrams and clearly label each intercepted arc. Then have the class identify the intercepted arcs.

learning style: visual

12 4 Angle Measures And Segment Lengths Worksheet

**Rashmi Katyal, Dr. S.B.D. Dwivedi, R.S.
Dhauni, B.B. Bhatnagar, Goyal Brothers
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Bhatnagar, Goyal Brothers Prakashan, 2020-04-16 Goyal Brothers Prakashan **Standards-Driven Power Geometry I (Textbook & Classroom Supplement)** Nathaniel Rock, 2005-08 Standards Driven Power Geometry I is a textbook and classroom supplement for students parents teachers and administrators who need to perform in a standards based environment This book is from the official Standards Driven Series Standards Driven and Power Geometry I are trademarks of Nathaniel Max Rock The book features 332 pages of hands on standards driven study guide material on how to understand and retain Geometry I Standards Driven means that the book takes a standard by standard approach to curriculum Each of the 22 Geometry I standards are covered one at a time Full explanations with step by step instructions are provided Worksheets for each standard are provided with explanations 25 question multiple choice quizzes are provided for each standard Seven full length 100 problem comprehensive final exams are included with answer keys Newly revised and classroom tested Author Nathaniel Max Rock is an engineer by training with a Masters Degree in business He brings years of life learning and math learning experiences to this work which is used as a supplemental text in his high school Geometry I classes If you are struggling in a standards based Geometry I class then you need this book E Book ISBN 0 9749392 6 9 ISBN13 978 0 9749392 6 1 **Progress in Mathematics Book For class 5** Rashmi Katyal, Dr. S.B.D. Dwivedi, R.S.

Dhauni, B.B. Bhatnagar, Goyal Brothers Prakashan, 2020-04-01 Goyal Brothers Prakashan **Me n Mine POW Mathematics Class 06** Manisha Mathur, Me n Mine Pullout Worksheets Mathematics is a complete practice material for students in the form of worksheets through which they can revise concepts and identify the areas of improvement Assessment of all the topics can be comprehensively done through these sets The series also comprises solved and unsolved practice papers as per latest CBSE syllabus and guidelines Along with the basic exercises the series also comprises various elements of the formative assessment like puzzles crosswords projects etc *Geometry* Nichols, 1991 A high school textbook presenting the fundamentals of geometry **Merrill Informal Geometry: Teacher annotated ed** Jerry Cummins, 1988 **Geometry Teacher's Activities Kit** Judith A. Muschla, Gary Robert Muschla, 2000-04-12 For all math teachers in grades 6 12 this

practical resource provides 130 detailed lessons with reproducible worksheets to help students understand geometry concepts and recognize and interpret geometry's relationship to the real world. The lessons and worksheets are organized into seven sections each covering one major area of geometry and presented in an easy to follow format including title focusing on a specific topic skill learning objective special materials if any teaching notes with step by step directions answer key and reproducible student activity sheets. Activities in sections 1-6 are presented in order of difficulty within each section while those in Part 7 A Potpourri of Geometry are open ended and may be used with most middle and high school classes. Many activities throughout the book may be used with calculators and computers in line with the NCTM's recommendations.

Me n Mine-Mathematics- Term-2 Saraswati Experts, A text book on Maths **MnM_POW-Mathematics-PM-07**

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