Lesson 14: Secant Lines; Secant Lines That Meet Inside a Circle

Classwork

Opening Exercise

$\overleftrightarrow{DB}$ is tangent to the circle as shown.

* 1. Find the values of $a$ and $b$.
	2. Is $\overbar{CB}$ a diameter of the circle? Explain.

Exercises 1–2

1. In circle $P$, $\overbar{PO}$ is a radius, and $m\hat{MO}=14°$. Find $m∠MOP,$ and explain how you know.
2. In the circle shown, $m\hat{CE}=55°$. Find $m∠DEF$ and $m\hat{EG}$. Explain your answer.

**Example 1**

* 1. Find $x$. Justify your answer.

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* 1. Find $x.$

We can state the results of part (b) of this example as the following theorem:

**Secant angle theorem: interior case:** The measure of an angle whose vertex lies in the interior of a circle is equal to half the sum of the angle measures of the arcs intercepted by it and its vertical angle.

Exercises 3–7

In Exercises 3–5, find $x $and$ y$.

3. 4.

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5.

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1.  In circle, $\overbar{BC}$ is a diameter. Find $x$ and $y$.
2. In the circle shown, $\overbar{BC}$ is a diameter$. DC: BE=2:1$. Prove
$y=180- \frac{3}{2}x$ using a two-column proof.

Lesson Summary

Theorems:

* Secant angle theorem: interior case. The measure of an angle whose vertex lies in the interior of a circle is equal to half the sum of the angle measures of the arcs intercepted by it and its vertical angle.

 **Relevant Vocabulary**

* **Tangent to a circle:** A *tangent line to a circle* is a line in the same plane that intersects the circle in one and only one point. This point is called the *point of tangency*.
* **Tangent segment/ray**: A segment is a *tangent segment* *to a circle* if the line that contains it is tangent to the circle and one of the end points of the segment is a point of tangency. A ray is called a *tangent ray to a circle* if the line that contains it is tangent to the circle and the vertex of the ray is the point of tangency.
* **Secant to a circle:** A *secant line to a circle* is a line that intersects a circle in exactly two points.

Problem Set

In Problems 1–4, find $x.$

1. 2.

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 3. 4.

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****5. Find$ x$ ($m\hat{CE})$ and $y (m\hat{DG})$.

6. Find the ratio of $m\hat{EFC}:m\hat{DGB}$.



7. $\overbar{BC}$ is a diameter of circle $A$. Find $x.$

1. Show that the general formula we discovered in Example 1 also works for central angles. (Hint: Extend the radii to form $2$ diameters, and use relationships between central angles and arc measure.)

