Lesson 16: Similar Triangles in Circle-Secant (or Circle-Secant-Tangent) Diagrams

Classwork

Opening Exercise

Identify the type of angle and the angle/arc relationship, and then find the measure of $x$.

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**Example 1**

Measure the lengths of the chords in centimeters and record them in the table.

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| Circle # | $a$ (cm) | $b$ (cm) | $c$ (cm) | $d$ (cm) | Do you notice a relationship? |
| a |  |  |  |  |  |
| b |  |  |  |  |  |
| c |  |  |  |  |  |
| d |  |  |  |  |  |

**Example 2**

Measure the lengths of the chords in centimeters and record them in the table.

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| --- | --- | --- | --- | --- | --- |
| Circle # | $a$ (cm) | $b$ (cm) | $c$ (cm) | $d$ (cm) | Do you notice a relationship? |
| a |  |  |  |  |  |
| b |  |  |  |  |  |
| c |  |  |  |  |  |
| d |  |  |  |  |  |

**The inscribed angle theorem and its family**:

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| Diagram | How the two shapes overlap | Relationship between $a$,$ b, c$ and $d$ |
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Lesson Summary

Theorems:

* When secant lines intersect inside a circle, use $a∙b=c∙d$*.*
* When secant lines intersect outside of a circle, use $a\left(a+b\right)=c(c+d)$.

Relevant Vocabulary

**Secant to a circle:** A *secant line to a circle* is a line that intersects a circle in exactly two points.

Problem Set

|  |  |
| --- | --- |
| 1. Find $x$.

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| 1. $DF< FB, DF\ne 1, DF<FE.$ Prove $DF=3$

 | 1. $CE=6$, $CB=9$, $CD=18$. Show $CF=3$.

 |
| 1. Find $x$.

 | 1. Find $x$.

 |
| 1. Find $x$.

 | 1. Find $x$.

 |

1. In the circle shown, $DE=11$, $BC=10$, $DF=8$. Find $FE$, $BF$, $FC$.
2. In the circle shown, $m\hat{DBG}=150°, m\hat{DB}=30°, m∠CEF=60°, $ $DF=8, DB=4, GF=12.$
	1. Find $m∠GDB$.
	2. Prove $∆DBF\~∆ECF$.
	3. Set up a proportion using sides $\overbar{CE}$ and $\overbar{GE}$.
	4. Set up an equation with $\overbar{CE}$ and $\overbar{GE}$ using a theorem for segment lengths from this section.
	5. Solve for $CE$ and $GE$.