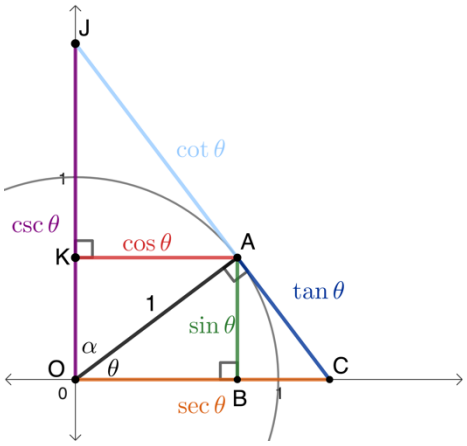
Identity Crisis

Today we'll explore even more relationships between the six trig ratios.

1. As we saw yesterday, the lengths of the segments in the diagram are determined by the values of the six trigonometric functions.

   a. Which other segment has a length of $\sin\theta$?

   b. What is the length of $\overline{OB}$?



2. There are several right triangles in the diagram. How are the side lengths of any right triangle related?

3. Write an equation relating the three side lengths of each of the following triangles.
   a. ΔAOB

   b. ΔCOA

   c. ΔOJA

4. What is the relationship between angles θ and α? Label all angles with θ, α, or a right-angle.

5. What is the relationship between all the right triangles in the diagram? What does this mean?

6. Use the six trig functions to write sine, cosine, and tangent ratios for each triangle.

	ΔAOB	ΔOJA	ΔCOA
$\sin\theta$			
$\cos\theta$			
$\tan\theta$			

7. Why might it be helpful to have these alternate definitions for sine, cosine, and tangent?

8. Use the diagram to write at least two additional statements relating the given trig functions.

Lesson 7.5 – Trigonometric Relationships

QuickNotes

Check Your Understanding

1. If $\sec\theta = 4$, find $\cos\theta$, $\tan\theta$, $\sin\theta$, $\csc\theta$, and $\cot\theta$.

For questions 2-4, simplify each trig expression to one number or one trig expression.

2. $\sec^2\theta\,(1-\sin^2\theta) =$

3. $\frac{\cos^2 x+\sin^2 x}{\sec x} =$

4. $\sec^2 x - \tan^2 x =$

5. Solve $\sin^2 w + \cos^2 w + \cos w = \frac{1}{2}$ for $0 \le w \le 2\pi$.

6. Which of the following is NOT equivalent to $\cot\beta$?

A) $\sqrt{\csc^2\beta - 1}$ B) $\frac{\cos\beta}{\sin\beta}$ C) $\frac{\sec\beta}{\csc\beta}$ D) $\csc\beta\sec\beta - \tan\beta$