What's the Difference?

WhatsTheDifference.tns

Name ______________________

Class ______________________

Problem 1 – Exploring the Angle Difference Formula for Cosine

1. The *x*-coordinate of every ordered pair of a point on the unit circle represents the ________________________ of the corresponding angle.

2. The *y*-coordinate of every ordered pair of a point on the unit circle represents the ________________________ of the corresponding angle.

Use the graph on page 1.3 to answer the following questions.

3. What is the sine of $\angle AOC$ when its measure is about 100°?

4. What is the cosine of $\angle AOC$ when its measure is about 100°?

5. What is the sine of $\angle BOC$ when its measure is about 20°?

6. What is the cosine of $\angle BOC$ when its measure is about 20°?

7. What is the sine of $\angle AOC - \angle BOC$ when $m\angle AOC = 100°$ and $m\angle BOC = 20°$? Use the graph on page 1.4 to obtain your solution.

8. What is the cosine of $\angle AOC - \angle BOC$ when $m\angle AOC = 100°$ and $m\angle BOC = 20°$? Use the graph on page 1.4 to obtain your solution.

9. Do you think the relationship between the values of sine and cosine for $\angle AOC - \angle BOC$ is quickly and easily obtained from the two individual angles as shown on page 1.3. Explain your answer.

Problem 2 – Applying the Angle Difference Formula

When you finish each of the following problems, check your results on pages 2.2 through 2.4.

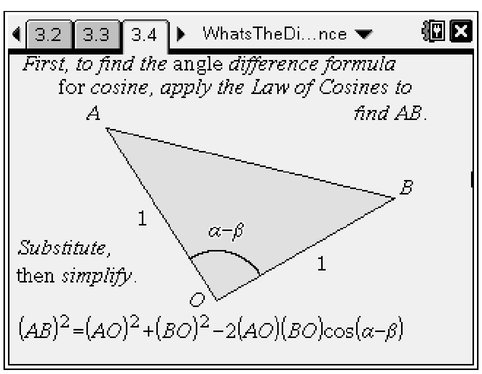
10. Find the value of cos 15° by finding cos(60° – 45°).

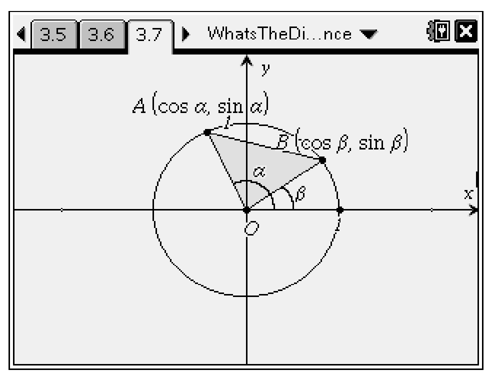
11. Find the value of cos 75° by finding cos(120° – 45°).

12. Find the value of cos 105° by finding cos(? – ?). You choose the angles! Choose values that you recall from the unit circle.

Extension – Derivation of the Angle Difference Formula for Cosine

The angle difference formula for cosine will be derived using the diagrams below.





13. Apply the Law of Cosines to the figure on page 3.4 to find an equation representing AB^2.

14. Apply the distance formula to the figure on page 3.7 to find an equation representing AB^2.

15. Combine the two equations obtained in Exercises 13 and 14 by setting them equal to each other. Solve for $\cos(\alpha - \beta)$. Test your resulting equation by entering values of your choice on page 3.3. Does your result agree with the provided angle difference value? If not, check for algebraic and calculator entry errors.

Extension – Derivation of the Angle Sum Formula for Cosine

16. Now substitute $-\beta$ in place of β into the angle difference formula for cosine and simplify the resulting equation. Test your resulting equation by entering values of your choice on page 3.3. Does your result agree with the provided angle sum value? If not, check for algebraic and calculator entry errors.