11.3 Sum and Difference Identities

NOTES

Write your questions here!

Is it true?

$\sin(45° + 30°) = \sin 45° + \sin 30°$

Ex 1:

Sum/Difference Identities

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \sin\beta\cos\alpha$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$$

Ex 2:

Ex 3:

Ex 4: Write the expression as the sine, cosine, or tangent of an angle.

Ex 5: Find sin (x - y) given the following:

Ex 6: Is the equation an identity?

Now, summarize your notes here!

SUMMARY:

11.3 Sum and Difference Identities

PRACTICE

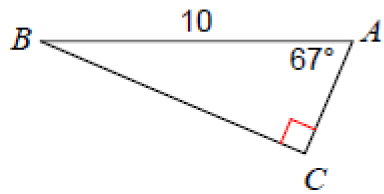
Directions: Tell whether each statement is true or false.		
1) $\sin 75 = \sin 50 \cos 25 - \cos 25 \sin 25$	2) $\cos 15 = \cos 60 \cos 45 + \sin 60 \sin 45$	3) $\tan 225 = \dfrac{\tan 180 - \tan 45}{1 + \tan 180 \tan 45}$

Directions: Write the expression as the sine, cosine or tangent of an angle.		
4) $\sin 42 \cos 17 - \cos 42 \sin 17$	5) $\dfrac{\tan 19+\tan 47}{1-\tan 19 \tan 47}$	6) $\cos\frac{\pi}{3}\cos\frac{\pi}{4} + \sin\frac{\pi}{3}\sin\frac{\pi}{4}$

Directions: Use the sum or difference identity to find the exact value.	
7) $\tan 195°$	8) $\cos 255°$
9) $\sin 165°$	10) $\cos\frac{13\pi}{12}$

11) $\sin\frac{5\pi}{12}$	12) $\tan\frac{\pi}{12}$
Directions: Find the exact value.	
13) $\sin(\propto -\beta)$ Given: $\cos \propto = \frac{3}{5}, where\ 0 < \propto < \frac{\pi}{2}$ $\tan\beta = \frac{12}{5}, where\ 0 < \beta < \frac{\pi}{2}$	14) $\tan(x - y)$ Given: $\cos \mathrm{x} = \frac{7}{25}, where\ 0° < x < 90°$ $\cos y = -\frac{4}{5}, where\ 90° < y < 180°$
15) $\sin(\propto +\beta)$ Given: $\sin \propto = \frac{4}{5}, where\ \propto is\ in\ Quadrant\ I$ $\cos\beta = -\frac{24}{25}, where\ \beta\ is\ in\ Quadrant\ III$	16) $\cos(x + y)$ Given: $\cos x = \frac{15}{17}, where\ \frac{3\pi}{2} < x < 2\pi$ $\tan y = \frac{4}{3}, where\ \pi < y < \frac{3\pi}{2}$

Directions: Is the equation an identity? Explain using the sum or difference identities	
17) $\cos(x - \pi) = \cos x$	18) $\sin(x - \pi) = \sin x$

REVIEW SKILLZ: Directions: Solve each triangle.	
1) 	2) 

11.3 Application and Extension

1) Find the exact value.

$\cos 285°$

2) Find the exact value.

$\cos(x + y)$

Given: $\cos x = \frac{15}{17}, where\ \frac{3\pi}{2} < x < 2\pi$

$\tan y = \frac{4}{3}, where\ \pi < y < \frac{3\pi}{2}$

3) Verify the following DOUBLE ANGLE IDENTITIES. (Hint….sin (2x) = sin (x + x)

a) $\sin(2x) = 2\sin x \cos x$

b) $\cos(2x) = 2\,cos^2 x - 1$

5) When a wave travels through a taut string (like guitar string), the displacement y of each point on the string depends on the time t and the point's position x. The equation of a standing wave can be obtained by adding the displacements of two waves traveling in opposite directions. Suppose two waves can be modeled by the following equations:

$$y_1 = A\cos\left(\frac{2\pi t}{3} - \frac{2\pi x}{5}\right) \qquad y_2 = A\cos\left(\frac{2\pi t}{3} + \frac{2\pi x}{5}\right)$$

Find $y_1 + y_2$

6) Mr. Sullivan has been carrying the other Algebros on his back for the last several years. He knows from Mr. Rahn's physics' class that the force F (in pounds) on a person's back when he bends over at an angle θ is:

$$F = \frac{0.6W\sin(\theta + 90°)}{\sin 12°}$$

Simplify the above formula.