November 20

Using the sum and difference formula and your unit circle

(but no calculator).

Find the values of sin(15) and cos(15).

$$\cos(u-v) = \cos u \cos v + \sin u \sin v$$

$$\sin(u-v) = \sin u \cos v - \cos u \sin v$$

(Hint: 15 = 45-30)

$\sin(15) = \sin(45-30)$
$= \sin(45)\cos(30) - \cos(45)\sin(30)$
$= \frac{\sqrt{2}}{2}\left(\frac{\sqrt{3}}{2}\right) - \frac{\sqrt{2}}{2}\left(\frac{1}{2}\right)$
$= \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} = \frac{\sqrt{6}-\sqrt{2}}{4}$

$\cos(15) = \cos(45-30)$
$= \cos(45)\cos(30) + \sin(45)\sin(30)$
$= \frac{\sqrt{2}}{2}\left(\frac{\sqrt{3}}{2}\right) + \frac{\sqrt{2}}{2}\left(\frac{1}{2}\right)$
$= \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6}+\sqrt{2}}{4}$

November 20

Students will verbally explain how to use the double angle and half angle formulas

(using the words:
identity, reciprocal, quotient ...)

Double-Angle Formulas:

$\sin 2u = 2\sin u \cos u$ $\cos 2u = \cos^2 u - \sin^2 u$ $\cos 2u = 1 - \sin^2 u$ $\tan 2u = \dfrac{2\tan u}{1-\tan^2 u}$

Using the double angle formula, which expression is equivalent to $2\cos(2x)$?

- $2\sin(x)\cos(x)$
- $4\sin(x)\cos(x)$
- $2(\cos^2 x - 1)$
- $4\cos(x)$

$\cos 2u = 2\cos^2 u - 1$

$2(\cos 2x)$

$2(2\cos^2 x - 1)$

$4\cos^2 x - 2$

Double-Angle Formulas:

$\cos 2u = \cos^2 u - \sin^2 u$ $\cos 2u = 1 - \sin^2 u$ $\tan 2u = \dfrac{2\tan u}{1-\tan^2 u}$

$\cos 2u = 2\cos^2 u - 1$

Using the double angle formula, which expression is equivalent to $2\sin(x)\cos(x)+2$?

- $\sin(2x)+1$
- $\sin(2x)+2$
- $\cos(2x)+1$
- $\cos(2x)+2$

$2\sin x \cos x + 2$

$\sin 2u = 2\sin u \cos u$

$\sin 2x + 2$

Double-Angle Formulas:

$\sin 2u = 2\sin u \cos u$ $\quad \cos 2u = \cos^2 u - \sin^2 u$ $\quad \cos 2u = 1 - \sin^2 u$

$\cos 2u = 2\cos^2 u - 1$

Using the double angle formula, which expression is equivalent to $7\tan(2x)$?

- $\frac{14\tan(x)}{1-\tan^2(x)}$
- $\frac{14\tan(x)}{1+\tan^2(x)}$
- $\frac{7\tan(x)}{1-\tan^2(x)}$
- $\frac{7\tan(x)}{1+\tan^2(x)}$

$$\tan 2u = \frac{2\tan u}{1-\tan^2 u}$$

$7(\tan 2x)$

$7\left(\frac{2\tan x}{1-\tan^2 x}\right) = \frac{14\tan x}{1-\tan^2 x}$

Double-Angle Formulas:

$\cos 2u = \cos^2 u - \sin^2 u$ $\quad \cos 2u = 1 - \sin^2 u$

$\cos 2u = 2\cos^2 u - 1$

$$\tan 2u = \frac{2\tan u}{1-\tan^2 u}$$

Using the double angle formula, which expression is equivalent to $4\sin(x)\cos(x)$?

$$\sin 2u = 2\sin u \cos u$$

$4\sin(x)\cos(x) = 2(2\sin x \cos x)$

$= 2(\sin 2x)$

$$\cos\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1+\cos u}{2}} \qquad \tan\left(\frac{u}{2}\right)=\frac{\sin u}{1+\cos u}$$

Using the half angle formula, which expression is equivalent to $\sin(75)$?

- $\pm\sqrt{\frac{1-\cos(75)}{2}}$
- $\pm\sqrt{\frac{1-\cos(150)}{2}}$
- $\pm\sqrt{\frac{1+\cos(75)}{2}}$
- $\pm\sqrt{\frac{1+\cos(150)}{2}}$

$$\sin\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1-\cos u}{2}}$$

$75=\frac{u}{2}$

$2(75)=\frac{u}{2}\cdot 2$

$150=u$

$\sin(75)$

$\sin\left(\frac{150}{2}\right)=\pm\sqrt{\frac{1-\cos(150)}{2}}$

$$\sin\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1-\cos u}{2}} \qquad \cos\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1+\cos u}{2}} \qquad \tan\left(\frac{u}{2}\right)=\frac{\sin u}{1+\cos u}$$

Using the half angle formula, which expression is equivalent to $\cos\left(\frac{11\pi}{12}\right)$?

- $\pm\sqrt{\frac{1-\cos\left(\frac{11\pi}{12}\right)}{2}}$
- $\pm\sqrt{\frac{1+\cos\left(\frac{11\pi}{12}\right)}{2}}$
- $\pm\sqrt{\frac{1-\cos\left(\frac{11\pi}{6}\right)}{2}}$
- $\pm\sqrt{\frac{1+\cos\left(\frac{11\pi}{6}\right)}{2}}$

$2\cdot\frac{11\pi}{12}=\frac{u}{2}\cdot 2$

$\frac{22\pi}{12}=u$

$\frac{11\pi}{6}=u$

$$\sin\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1-\cos u}{2}}$$

$$\tan\left(\frac{u}{2}\right)=\frac{\sin u}{1+\cos u}$$

Using the half angle formula, which expression is equivalent to $\sqrt{\frac{1+\cos(4x)}{2}}$?

$u=4x$

$$\cos\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1+\cos u}{2}}$$

$\cos\left(\frac{4x}{2}\right)=\cos(2x)$

- $\cos(2x)$
- $\cos(4x)$
- $\sin(2x)$
- $\sin(4x)$

$$\cos\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1+\cos u}{2}}$$

$$\tan\left(\frac{u}{2}\right)=\frac{\sin u}{1+\cos u}$$

Using the half angle formula, write an expression is equivalent to $\sqrt{\frac{1-\cos(x-1)}{2}}$.

$u=x-1$

$$\sin\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1-\cos u}{2}}$$

$\sin\left(\frac{x-1}{2}\right)$

pg 227 # 1 - 10 AND

Pick one:

#11 – 31 (odd)

OR

#11 – 44 (every 3rd problem)

pg 247 # 21 - 30

Pg 257 # 19 - 22, 29 - 34,
53 - 56, 61 - 80