Trigonometry $\frac{+4}{4}$ Name Rashawn Dixon

HW #17 - More Sum & Difference Date 11/16/15 Period 3

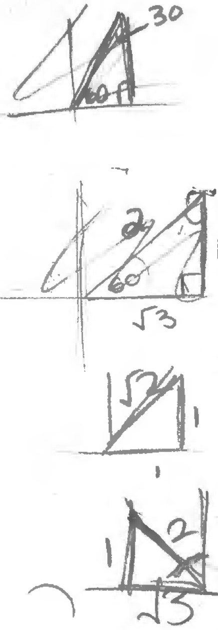
Use the angle sum or difference identity to find the exact value of each.

1) $\cos \frac{7\pi}{12}$ $= \cos 105 = \cos(150 - 45)$

$\cos(A-B) = \cos A \cdot \cos B + \sin A \cdot \sin B$

$= \cos 150 \cdot \cos 45 + \sin 150 \cdot \sin 45$

$-\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$



$-\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$

$\boxed{\frac{-\sqrt{6}+\sqrt{2}}{4}}$

100%

A+

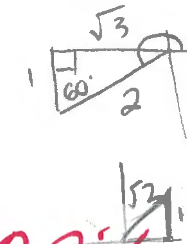
Perfect!!!

2) tan 255°

$\tan 255° = \tan(210° + 45°)$

$= \frac{\tan 210 + \tan 45°}{1 - \tan 210 \cdot \tan 45°}$

$= \frac{\frac{1}{\sqrt{3}} + \frac{1}{1}}{1 - \frac{1}{\sqrt{3}} \cdot \frac{1}{1}}$



$\frac{\left(\frac{1}{\sqrt{3}} + 1\right)}{\left(1 - \frac{1}{\sqrt{3}}\right)} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{(1+\sqrt{3})}{(\sqrt{3}-1)} \cdot \frac{(-\sqrt{3}-1)}{(-\sqrt{3}-1)}$

$\frac{-\sqrt{3} - 1 - \sqrt{9} - \sqrt{3}}{-\sqrt{9} - \sqrt{3} + \sqrt{3} + 1}$

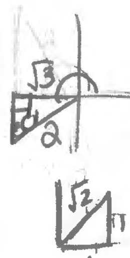
$\frac{-2\sqrt{3} - 1 - 3}{-3 + 1} = \frac{-2\sqrt{3} - 4}{-2}$

$\frac{-2\sqrt{3}}{-2} \; \frac{-4}{-2}$

$= \boxed{\sqrt{3} + 2}$

3) tan 165° $= \tan(210 - 45)$

$= \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B} = \frac{\tan 210 - \tan 45}{1 + \tan 210 \cdot \tan 45}$



$= \frac{\frac{1}{\sqrt{3}} - \frac{1}{1}}{1 + \frac{1}{\sqrt{3}} \cdot \frac{1}{1}} = \frac{\frac{1}{\sqrt{3}} - \frac{1}{1}}{1 + \frac{1}{\sqrt{3}}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{(1-\sqrt{3})}{(\sqrt{3}+1)}$

$\frac{(1-\sqrt{3})}{(\sqrt{3}+1)} \cdot \frac{(-\sqrt{3}+1)}{(-\sqrt{3}+1)}$

$= \frac{-\sqrt{3} + 1 + \sqrt{9} - \sqrt{3}}{-\sqrt{9} + \sqrt{3} - \sqrt{3} + 1}$

$\frac{-2\sqrt{3} + 4}{-2} = \frac{-2\sqrt{3}}{-2} + \frac{4}{-2}$

$= \boxed{\sqrt{3} - 2}$

4) $\tan \frac{5\pi}{12}$ $= \tan 75° \; (45° + 30°)$

$= \frac{\tan 30° + \tan 45°}{1 - \tan 30° \tan 45}$

$= \frac{\frac{1}{\sqrt{3}} + \frac{1}{1}}{1 - \frac{1}{\sqrt{3}} \cdot \frac{1}{1}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{(1+\sqrt{3})}{(\sqrt{3}-1)} \cdot \frac{(-\sqrt{3}-1)}{(-\sqrt{3}-1)}$

$\frac{-\sqrt{3} - 1 - \sqrt{9} - \sqrt{3}}{\sqrt{9} + \sqrt{3} - \sqrt{3} + 1}$

$\frac{-2\sqrt{3} - 4}{-2} = \frac{-2\sqrt{3}}{-2} \cdot \frac{-4}{-2}$

$= \boxed{\sqrt{3} + 2}$

Trigonometry

Name Bashawn Dixon

Angle Sum or Difference Identities

Date 11/18/15 Period 3

Use the angle sum or difference identity to find the exact value of each.

1) $\sin \frac{13\pi}{12}$ $= \sin 195°$

$\sin 195° = \sin(150+45)$

$\sin(A+B) = \sin A \cdot \cos B + \cos A \cdot \sin B$

$= \sin 150 \cdot \cos 45 + \cos 150 \cdot \sin 45$

$= \sin \frac{1}{2} \cdot \cos \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} + \left(-\frac{\sqrt{3}}{2}\right) \cdot \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

S A
T C

$\frac{1}{2} \cdot \frac{\sqrt{2}}{2} + \left(-\frac{\sqrt{3}}{2}\right) \cdot \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{4} + \left(-\frac{6}{4}\right)$

$\boxed{\frac{\sqrt{2}-\sqrt{6}}{4}}$

2) $\sin \frac{11\pi}{12}$ $= \sin 165 = \sin(120+45)$

$\sin(A+B) = \sin(120+45)$

$= \sin A \cdot \cos B + \cos A \cdot \sin B$

$= \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \left(-\frac{1}{2}\right) \cdot \frac{\sqrt{2}}{2}$

$\frac{\sqrt{6}}{4} + \left(-\frac{\sqrt{2}}{4}\right)$

$= \frac{\sqrt{6}-\sqrt{2}}{4}$

3) $\sin -75°$

$\sin -75 = (-30 - 45))$

$\sin A+B = \sin A \cdot \cos B - \cos A \cdot \sin B$

$= \sin(-30) \cdot \cos -45 - \cos -30 \cdot \cancel{\sin -45}$

S A
T C

$= -\frac{1}{2} \cdot \frac{\sqrt{2}}{2} - \left(\frac{\sqrt{3}}{2}\right) \cdot \frac{\sqrt{2}}{2}$

$-\frac{\sqrt{2}}{4} - \left(\frac{\sqrt{6}}{4}\right) = \frac{-\sqrt{2}-\sqrt{6}}{4}$

4) $\sin \frac{5\pi}{12}$ $= \sin 75° \ (30+45)$

$= \sin A \cdot \cos B + \cos A \cdot \sin B$

30 45 30 45

$\frac{1}{2} \cdot \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} = \boxed{\frac{\sqrt{2}+\sqrt{6}}{4}}$

#1 → 5) $\sin 195°$

look at #1

#3

6) $\sin -\frac{5\pi}{12}$ $= \sin -75°$

(look at #3)

7) $\cos \frac{7\pi}{12}$ $= \cos 105 \ (60+45)$

$\cos A+B = \cos A \cdot \cos B - \sin A \cdot \sin B$

$= \frac{1}{2} \cdot \frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4} = \boxed{\frac{\sqrt{2}-\sqrt{6}}{4}}$

8) $\cos 255°$ $\cos(210° + 45)$

$= \cos A \cdot \cos B - \sin A \cdot \sin B$

S A
T C

$-\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \left(-\frac{1}{2}\right) \cdot \frac{\sqrt{2}}{2}$

$-\frac{\sqrt{6}}{4} - \left(-\frac{\sqrt{2}}{4}\right)$

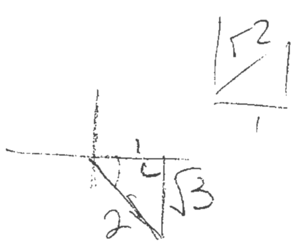
$\boxed{\frac{-\sqrt{6}+\sqrt{2}}{4}}$

9) $\sin -15°$ $(-60+45)$

$\sin A+B = (\sin A \cdot \cos B + \cos A \cdot \sin B)$

$= \sin -60 \cdot \cos 45 + \cos -60 \cdot \cos 45$

$-\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$



$-\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$

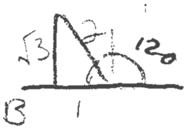
$\frac{-\sqrt{6}+\sqrt{2}}{4}$

10) $\cos \frac{7\pi}{12}$ look at # 7

11) $\tan 165°$ $(120+45)$

$\tan 165$

$= \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$



$= \frac{\tan 120 + \tan 45}{1 - \tan 120 \cdot \tan 45}$

FOIL
first outside
Inside
LAST

$= \frac{-\frac{\sqrt{3}}{1} + \frac{1}{1}}{1 - \left(\frac{\sqrt{3}}{1}\right) \cdot \frac{1}{1}}$

$\frac{-\sqrt{3}+1}{1+\sqrt{3}} \cdot \frac{(1-\sqrt{3})}{(1-\sqrt{3})}$

$\frac{-\sqrt{3}+\sqrt{9}+1-\sqrt{3}}{1-\sqrt{3}+\sqrt{3}-\sqrt{9}}$

$\frac{-2\sqrt{3}+4}{-2}$

$\frac{-2\sqrt{3}}{-2} \quad \frac{4}{-2}$

$= \sqrt{3}-2$

12) $\tan \frac{5\pi}{12}$ $\tan 75$

$\frac{\tan 30 + \tan 45}{1 - \tan 30 \cdot \tan 45}$

$= \frac{\frac{1}{\sqrt{3}} + \frac{1}{1} = 1}{1 - \frac{1}{\sqrt{3}} \cdot \frac{1}{1} = 1} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \left(\frac{1+\sqrt{3}}{\sqrt{3}-1}\right)\left(\frac{\sqrt{3}-1}{\sqrt{3}-1}\right)$

$\frac{-\sqrt{3}-1-\sqrt{9}-\sqrt{3}}{-\sqrt{9}+\sqrt{3}-\sqrt{3}+1}$

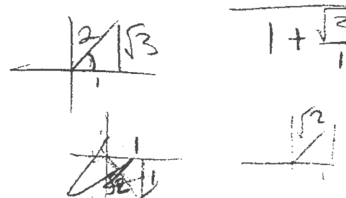
13) $\tan \frac{7\pi}{12}$ $\tan 105$

14) $\tan \frac{\pi}{12}$ $\tan 15$ $(60-45)$

$\tan A-B = \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$

S | A
T | C

$= \frac{\frac{\sqrt{3}}{1} - \frac{1}{1}}{1 + \frac{\sqrt{3}}{1} \cdot \frac{1}{1}} = \frac{\sqrt{3}-1}{1+\sqrt{3}} \cdot \left(\frac{1-\sqrt{3}}{1-\sqrt{3}}\right)$



$\frac{\sqrt{3}-\sqrt{9}-1+\sqrt{3}}{1-\sqrt{3}+\sqrt{3}-\sqrt{9}}$

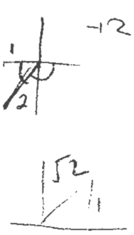
$\frac{2\sqrt{3}-4}{-2}$

$\frac{2\sqrt{3}-4}{-2} = \frac{2\sqrt{3}}{-2} \quad \frac{-4}{-2}$

$= \boxed{-\sqrt{3}+2}$

15) $\tan -\frac{5\pi}{12}$ $\tan 75(-120+45)$

$\tan A.B = \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B} = \frac{\tan -120 + \tan 45}{1 - \tan -120 + 45}$



$= \frac{\frac{\sqrt{3}}{1} + \frac{1}{1}}{1 - \frac{\sqrt{3}}{1} \cdot \frac{1}{1}} = \frac{\sqrt{3}+1}{1-\sqrt{3}} \cdot \left(\frac{1+\sqrt{3}}{1+\sqrt{3}}\right) = \frac{\sqrt{3}+\sqrt{9}+1+\sqrt{3}}{1+\sqrt{3}-\sqrt{3}-\sqrt{9}}$

$\frac{2\sqrt{3}+4}{-2} = \frac{2\sqrt{3}}{-2} + \frac{4}{-2}$

$\boxed{\sqrt{3}-2}$

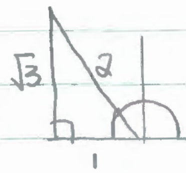
S | A
T | C

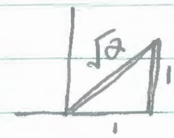
16) $\tan 195°$ $2-\sqrt{3}$

(3) $\tan 165°$

$= \tan(120 + 45°)$

$\dfrac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$





$= \dfrac{-\frac{\sqrt{3}}{1} + \frac{1}{1}}{1 - \left(-\frac{\sqrt{3}}{1}\right) \cdot \frac{1}{1}} = \dfrac{-\sqrt{3}+1}{1+\sqrt{3}} \cdot \dfrac{1+\sqrt{3}}{1+\sqrt{3}}$ $\quad \dfrac{-\sqrt{3}+\sqrt{9}+1-\sqrt{3}}{1-\sqrt{3}+\sqrt{3}-\sqrt{9}}$

$\dfrac{-2\sqrt{3}+4}{-2} = \dfrac{-2\sqrt{3}}{-2} + \dfrac{4}{-2}$

$\sqrt{3} + (-2)$

$= \boxed{\sqrt{3} - 2}$