$\sin(2\angle BAC)$ $\boxed{54}$

$\sin(2a)$

$\sin(a+a)$

$= \sin a\cos a + \sin a\cos a$

$= 2\sin a\cos a$

$2\left(\frac{4}{5}\right)\left(\frac{3}{5}\right) = \frac{24}{25}$

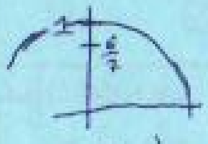
$\left(\frac{8}{5}\right)\left(\frac{3}{5}\right) = \frac{24}{25}$ ✓

$\sin\left(\frac{3\pi}{12}\right)$

$\frac{2\pi}{\frac{3\pi}{12}} = \frac{24\pi}{7\pi}$

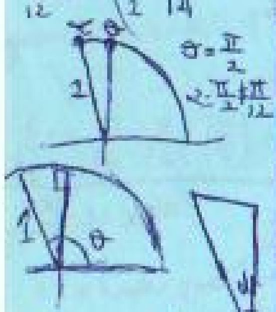
$\sin\left(\frac{2\pi}{12}\right) = \frac{\pi}{2}\cdot\frac{12}{7\pi} = \frac{12\pi}{14\pi}$

$\sin\left(\frac{2\pi}{12}\right) = \frac{12}{14} = \frac{6}{7}$



$\frac{7\pi}{12} = \left(\frac{1}{2} + \frac{3\pi}{12}\right)$

$\theta = \frac{\pi}{2}$



$x = \frac{\pi}{12}$ $\cos\left(\frac{\pi}{12}\right)$

$\theta = \frac{\pi}{3} = 60$

$\theta = \frac{\pi}{6} = 30$

2020

$\frac{\pi}{4} = 45°$

$\frac{\pi}{6} = \frac{2\pi}{12}$ $\frac{\pi}{3} = \frac{4\pi}{12}$

$\frac{\pi}{4} = \frac{3\pi}{12}$

$\sin\left(\frac{7\pi}{12}\right) = \sin\left(\frac{3\pi}{12} + \frac{4\pi}{12}\right)$

$= \sin\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$

$= \sin\frac{\pi}{4}\cos\frac{\pi}{3} + \cos\frac{\pi}{4}$

$\sin\frac{\pi}{3} = \frac{\sqrt{2}}{2}\cdot\frac{1}{2} + \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}$

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

$\sin\left(\frac{5\pi}{12}\right)$ $\boxed{55}$

$\sin\left(\frac{5\pi}{12}\right) = \sin\left(\frac{3\pi}{12} + \frac{2\pi}{12}\right)$

$\sin(a)\cos(b) + \sin b\cos a$

$\sin\left(\frac{\pi}{4}\right)\cos\left(\frac{\pi}{6}\right) + \sin\left(\frac{\pi}{6}\right)$

$\cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{1}{2}\cdot\frac{\sqrt{2}}{2}$

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

$\frac{\sqrt{6}+\sqrt{2}}{4}$ ✓

$\sin\left(\frac{11\pi}{12}\right)$ $\boxed{56}$

$\frac{11\pi}{12} = \frac{3\pi}{12} + \frac{4\pi}{12} + \frac{4\pi}{12}$

$= 2\left(\frac{4\pi}{12}\right) + \frac{3\pi}{12}$

$\sin(a+b) =$

$\sin a\cos b + \sin b\cos a$

$\sin\frac{\pi}{4}\cos\frac{\pi}{6} + \sin\frac{\pi}{6}\cos\frac{\pi}{4} =$

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

$\frac{3\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$

$\sin(a-b) = \frac{12}{12} - \frac{4\pi}{12}$

$\sin a\cos b - \sin b\cos a$

$\sin\left(\frac{2\pi}{12}\right)\cos\left(\frac{\pi}{12}\right) -$

$\sin\left(\frac{\pi}{12}\right)\cos\left(\frac{12\pi}{12}\right)$

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

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

$\frac{1}{4} - \frac{3}{4}$

$\left(\frac{3\pi}{12} + \frac{2\pi}{12}\right) + \left(\frac{4\pi}{12} + \frac{2\pi}{12}\right)$

$(45+30) + (60+30)$

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

$\sin\left(5\left(\frac{3\pi}{12}\right) - \frac{4\pi}{12}\right)$

$\sin\left(\frac{2\pi}{12} - \frac{4\pi}{12}\right)$

$\sin\left(\frac{\pi}{4}\right)\cos\left(\frac{\pi}{3}\right) - \sin\left(\frac{\pi}{3}\right)$

$\cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}\cdot\frac{1}{2} - \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}$

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

$\sin\left(\frac{\pi}{12}\right)$ $\boxed{57}$

$\sin\left(\frac{3\pi}{12} - \frac{2\pi}{12}\right)$

$\sin a\cos b - \sin b\cos a$

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

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

$\sin(255)$ $\boxed{58}$

$255 = \frac{\pi}{12} - \frac{1}{4}\left(\frac{3\pi}{12}\right)$

$270 - 15$

$300 - 45$

$5\left(\frac{2\pi}{12}\right) - \left(\frac{\pi}{2}/3\right)$

$\sin(a-b)$

$\sin a\cos b - \sin b\cos a$

$\sin\frac{\pi}{6}\cos\frac{\pi}{4} - \sin\frac{\pi}{4}\cos\frac{\pi}{6}$

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

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

$180 + 45 + 30$

$(45\times5) + 30$

$\frac{\pi}{4}\times5 = \frac{5\pi}{4}\times5$

$\frac{\pi}{6} = \frac{\pi}{12}\times5$

$(a+b) = ab + ba$

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

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

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

$255 = 120 + 135°$

$\frac{2\pi}{12} + \frac{3\pi}{12}$

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

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

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

$= \frac{-\sqrt{6}-\sqrt{2}}{4}$ ✓

$\cos\left(\frac{5\pi}{12}\right)$ $\frac{\pi}{4} + \frac{\pi}{6}$ $\boxed{59}$

$\frac{5\pi}{12} = \frac{3\pi}{12} + \frac{2\pi}{12}$

$\cos(a+b)$

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

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

$\frac{\sqrt{6}-\sqrt{2}}{4}$ ✓

$\tan(75°)$ $\boxed{60}$

$75 = \frac{3\pi}{12}$

$\tan = \frac{\sin}{\cos}$

$\tan(75) = \frac{\sin(75)}{\cos(75)}$

$75 = 135 - 60$

$\frac{3\pi}{12} - \frac{2\pi}{12} = 75$

$\sin\left(\frac{3\pi}{12} - \frac{2\pi}{12}\right)$ $\frac{\pi}{4}$ $\frac{\pi}{6}$

$\cos\left(\frac{3\pi}{12} - \frac{2\pi}{12}\right)$

$\sin(a-b) =$

$\sin a\cos b - \sin b\cos a$

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

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

$\cos(a-b) =$

$\cos a\cos b + \sin a\sin b$

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

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

$48 - 4\sqrt{2}\ {-24} - 8 = 16$

$75 = 30 + 45$

$\frac{\pi}{6} + \frac{\pi}{4}$

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

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

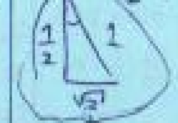
$= \frac{3+\sqrt{3}}{3-\sqrt{3}}$

$\tan(195)$ $\boxed{61}$

$\tan(135+60)$

$\tan(135+60) + 1$

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



$\tan(195) = \frac{1+\sqrt{3}}{\sqrt{3}}$

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

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

$195 = \frac{2\pi}{12} + \frac{3\pi}{12}$

$\frac{\pi}{6} + \frac{\pi}{4}$

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

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

$\tan\left(\frac{1+3\sqrt{3}}{\sqrt{3}}\right)$

$225 - 30 = 195$

$\tan(225) - \tan(30)$

$1 + \tan(225) - \tan(30)$

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

$= \frac{3-\sqrt{3}}{3+\sqrt{3}}$ ✓

$\sin(285)$ $\boxed{62}$

$225 + 60 = 285$

$\frac{\pi}{4} + \frac{\pi}{6}$

$\sin(a+b) =$

$\sin a\cos b + \sin b\cos a$

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

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

$315 - 30 = 285$

$\frac{\pi}{4} - \frac{\pi}{6} \to \frac{\sqrt{2}\cdot\sqrt{6}}{4}$ ✓

	30	45	60
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
tan	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

$\cos\left(\frac{19\pi}{12}\right)$ $\boxed{67}$

$\cos\left(\frac{4\pi}{12} + \frac{3\pi}{12}\right)$ $\frac{\pi}{3}$ $\frac{\pi}{4}$

$\cos a\cos b - \sin a\sin b$

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

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

$\sin\left(\frac{13\pi}{12}\right)$ $\boxed{64}$

$\sin\left(\frac{4\pi}{12} - \frac{3\pi}{12}\right)$ $\frac{\pi}{3} - \frac{\pi}{4}$

$\sin a\cos b - \cos a\sin b$

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

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

$\cos\left(\frac{\pi}{12}\right) = \frac{3\pi}{12} - \frac{2\pi}{12}$ $\boxed{65}$

$\cos(a-b) =$

$\cos a\cos b + \sin a\sin b$

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

$\frac{\sqrt{6}+\sqrt{2}}{4}$ ✓

$\cos\left(\frac{13\pi}{12}\right) = \frac{16\pi}{12} - \frac{3\pi}{12}$ $\boxed{66}$

$\cos(a-b) = \frac{4\pi}{12} - \frac{3\pi}{12}$

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

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

05/10/20 $\boxed{67}$

$\cos(345°) = 360 - 15$

$135 + 210 = \frac{3\pi}{4} + \frac{7\pi}{6}$

$\cos(345°) =$

$300 + 45 = \frac{2\pi}{12} + \frac{\pi}{4}$

$\cos\left(\frac{\pi}{6} + \frac{\pi}{4}\right) = \cos(a+b)$

$= \cos a\cos b - \sin a\sin b$

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

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