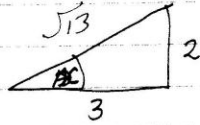## Test Questions A.

Q1

$$x^2 = 3^2 + 2^2$$
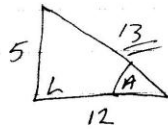$$x = \sqrt{13}$$

$$\sin 2x = 2 \sin x \cos x$$
$$\sin 2x = 2 \left(\frac{2}{\sqrt{13}}\right)\left(\frac{3}{\sqrt{13}}\right)$$
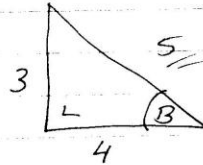$$= \frac{12}{13}$$

Q2 $\tan A = \frac{5}{12}$ $\tan B = \frac{3}{4}$

$$x^2 = 5^2 + 12^2$$
$$x = 13$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$
$$= \left(\frac{12}{13}\right)\left(\frac{4}{5}\right) + \left(\frac{5}{13}\right)\left(\frac{3}{5}\right)$$
$$\frac{48}{65} + \frac{15}{65} = \frac{63}{65}$$
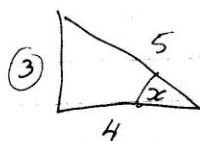
Q3

$-$ Q3 Show

$$\left(\cos A + \sin A\right)^2 = 1 + \sin 2A$$

$$\cos^2 A + 2\cos A \sin A + \sin^2 A.$$

$1 + 2\cos A \sin A$

$1 + \sin 2A$ \qquad\qquad RHS

Q4 $\cos x = \dfrac{4}{5}$ \qquad find $\tan 2x$
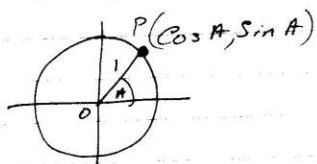

$$\tan 2x = \frac{2\tan A}{1 - \tan^2 A}$$

$$= \frac{2\left(\frac{3}{4}\right)}{1 - \left(3/4\right)^2} = \frac{\frac{6}{4}}{1 - \frac{9}{16}}$$

$$= \frac{\frac{6}{4}}{7/16} = \frac{6}{4} \times \frac{16}{7} = \frac{24}{7}$$

Q5 Prove $\sin^2 A + \cos^2 A = 1$

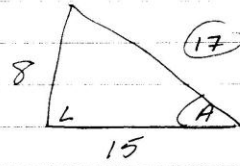$P(\cos A, \sin A)$

$$|OP| = \sqrt{(\cos A - 0)^2 + (\sin A - 0)^2}$$

$$1 = \sqrt{\cos^2 A + \sin^2 A}$$

sq both sides

$$1 = \cos^2 A \ \sin^2 A \qquad QED$$

Q6 $\tan A = \dfrac{8}{15}$

$x^2 = 8^2 + 15^2$

$x = 17$

(i) $\cos A = \dfrac{A}{H}$

$\cos A = \dfrac{15}{17}$

(ii) $\sin 2A = 2 \sin A \cos A$

$= 2 \left(\dfrac{8}{17}\right)\left(\dfrac{15}{17}\right) = \dfrac{240}{289}$

Q7 $\sin 75 \cos 15 - \cos 75 \sin 15$ $\quad [\sin(A-B)]$

$= \sin(75-15) = \sin 60 = \dfrac{\sqrt{3}}{2}$

Q8 (ii) Prove $2 + 2\cos 2x = 4\cos^2 x$

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

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

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

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

$2 + 4\cos^2 x - 2$

$= 4\cos^2 x \qquad\qquad RHS$

8. $\tan 75° = a + b\sqrt{3}$ find a & b.

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

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

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

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

$$= 2 + \sqrt{3} \quad \Rightarrow \quad a = 2 \text{ and } b = 1$$
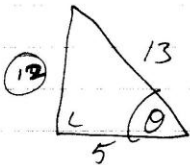
Q9 show $\tan\theta \sin\theta + \cos\theta = \sec\theta$.

$$\frac{\sin\theta}{\cos\theta} \sin\theta + \frac{\cos\theta}{1}$$

$$\frac{\sin^2\theta + \cos^2\theta}{\cos\theta}$$

$$\frac{1}{\cos\theta} = \sec\theta \qquad RHS$$

(ii) $\cos\theta = \frac{5}{13}$

$$\sin 2\theta = 2\sin\theta \cos\theta$$
$$= 2\left(\frac{12}{13}\right)\left(\frac{5}{13}\right)$$
$$= \frac{120}{169}$$

Q10

(i) $\quad Sin\ 75 - Sin\ 15 = \dfrac{1}{\sqrt{K}}$

$Sin\ (45+30) - Sin\ (45-30)$

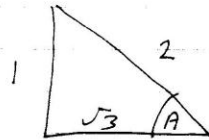$(Sin\ 45\ Cos\ 30 + Cos\ 45\ Sin\ 30) - (Sin\ 45\ Cos\ 30 - Cos\ 45\ Sin\ 30)$

$\left[\left(\dfrac{1}{\sqrt{2}}\right)\left(\dfrac{\sqrt{3}}{2}\right) + \left(\dfrac{1}{\sqrt{2}}\right)\left(\dfrac{1}{2}\right)\right] - \left[\left(\dfrac{1}{\sqrt{2}}\right)\left(\dfrac{\sqrt{3}}{2}\right) - \left(\dfrac{1}{\sqrt{2}}\right)\left(\dfrac{1}{2}\right)\right]$

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

$\dfrac{1}{2\sqrt{2}} + \dfrac{1}{2\sqrt{2}} = \dfrac{2}{2\sqrt{2}} = \dfrac{1}{\sqrt{2}}$

$\Rightarrow K = 2$

(ii) $\quad A = Sin^{-1}\ \dfrac{1}{2}$

$2^2 - 1^2 = x^2$

$\sqrt{3} = x$

$\cancel{2\ Tan\ 2A} =$

$Tan\ 2A = \dfrac{2\ Tan\ A}{1 - Tan^2 A}$

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

$= \dfrac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}} = \dfrac{2/\sqrt{3}}{2/3}$

$= \dfrac{2}{\sqrt{3}} \times \dfrac{3}{2} = \dfrac{3}{\sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}}$

$= \dfrac{3\sqrt{3}}{3} = \sqrt{3}$