30/12/2020

classmate
Date
Page

Ch-10

Exercise 10.2

Q.1 $\sin 45^\circ \sin 30^\circ + \cos 45^\circ \cos 30^\circ$

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

$= \frac{1+\sqrt{3}}{2\sqrt{2}} = \frac{(1+\sqrt{3}) \times 2\sqrt{2}}{2\sqrt{2} \times 2\sqrt{2}} = \frac{2\sqrt{2} + 2\sqrt{6}}{8}$ 4

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

Q.2 $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$

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

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

Q.3 $\cos 60^\circ \cos 45^\circ - \sin 60^\circ \sin 45^\circ$

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

$= \frac{(1-\sqrt{3}) \times 2\sqrt{2}}{2\sqrt{2} \times 2\sqrt{2}} = \frac{2\sqrt{2} - 2\sqrt{6}}{8}$ 4

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

Q.4 $\sin^2 30^\circ + \sin^2 45^\circ + \sin^2 60^\circ + \sin^2 90^\circ$

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

$= \frac{1}{4} + \frac{1}{2} + \frac{3}{4} + 1 = \frac{1+2+3+4}{4} = \frac{10}{4}\,5 = \boxed{\frac{5}{2}}$

Q.5 $\cos^2 30° + \cos^2 45° + \cos^2 60° + \cos^2 90°$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{2}\right)^2 + 0$

$= \frac{3}{4} + \frac{1}{2} + \frac{1}{4} = \frac{3+2+1}{4} = \frac{6}{4}3 = \boxed{\frac{3}{2}}$

Q.6 $\tan^2 30° + \tan^2 60° + \tan^2 45°$

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

$= \frac{1}{3} + 3 + 1 = \frac{1+9+3}{3} = \frac{13}{3} = \boxed{4\frac{1}{3}}$

Q.7 $2\sin^2 30° - 3\cos^2 45° + \tan^2 60°$

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

$= \frac{2}{4}1 - \frac{3}{2} + 3 = \frac{1-3+6}{2} = \frac{4}{2}2 = \boxed{2}$

Q.8 $\sin^2 30° \cos^2 45° + 4\tan^2 30° + \frac{1}{2}\sin^2 90° - 2\sin^2 90°$

$+ \frac{1}{24}\cos 20°.$

$= \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{\sqrt{2}}\right)^2 + 4\left(\frac{1}{\sqrt{3}}\right)^2 + \frac{1}{2}(1)^2 - 2(0)^2 + \frac{1}{24}(1)^2$

$= \left(\frac{1}{4} \times \frac{1}{2}\right) + \frac{4}{3} + \frac{1}{2} - 0 + \frac{1}{24}$

$= \frac{1}{8} + \frac{4}{3} + \frac{1}{2} + \frac{1}{24} = \frac{3+32+12+1}{24} = \frac{4}{24}8 = \boxed{2}$

Q.9 $4(\sin^4 60° + \cos^4 30°) - 3(\tan^2 60° - \tan^2 45°) + 5\cos^2 45°$

$= 4\left[\left(\frac{\sqrt{3}}{2}\right)^4 + \left(\frac{\sqrt{3}}{2}\right)^4\right] - 3\left[(\sqrt{3})^2 - (1)^2\right] + 5\left(\frac{1}{\sqrt{2}}\right)^2$

$= 4\left[\frac{9}{16} + \frac{9}{16}\right] - 3[3-1] + 5\left(\frac{1}{2}\right)$

$= 4\left(\frac{9+9}{16}\right) - 6 + \frac{5}{2} = \frac{9}{2} - 6 + \frac{5}{2} = \frac{14}{2} - 6$

$= 7 - 6 = \boxed{1}$

Q.10 $(\text{cosec}^2 45° \sec^2 30°)(\sin^2 30° + 4\cot^2 45° - \sec^2 60°)$

$= \left[(\sqrt{2})^2\left(\frac{2}{\sqrt{3}}\right)^2\right] \times \left[\left(\frac{1}{2}\right)^2 + 4(1)^2 - (2)^2\right]$

$= \left[2 \times \frac{4}{3}\right] \times \left[\frac{1}{4} + 4 - 4\right] = \frac{8}{3} \times \frac{1}{4} = \boxed{\frac{2}{3}}$

Q.11 $\text{cosec}^3 30° \cos 60° \tan^3 45° \sin^2 90° \sec^2 45° \cot 30°$

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

$= 4 \times \frac{1}{2} \times 1 \times 1 \times 2 \times \sqrt{3} = 4 \times 2 \times \sqrt{3} = \boxed{8\sqrt{3}}$

Q.12 $\cot^2 30° - 2\cos^2 60° - \frac{3}{4}\sec^2 45° - 4\sec^2 30°$

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

$= 3 - 2\left(\frac{1}{4}\right) - \frac{3}{4}(2) - 4\left(\frac{4}{3}\right)$

$= 3 - \frac{1}{2} - \frac{3}{2} - \frac{16}{3} = \frac{18 - 3 - 9 - 32}{6} = \frac{-26}{6}\frac{13}{3}$

$= \boxed{\frac{-13}{3}}$

Q.13 $(\cos 0° + \sin 45° + \sin 30°)(\sin 90° - \cos 45° + \cos 60°)$

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

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

$= \frac{9}{4} - \frac{1}{2} = \frac{9-2}{4} = \boxed{\frac{7}{4}}$

Q.14 $\dfrac{\sin 30° - \sin 90° + 2\cos 0°}{\tan 30° \tan 60°}$

$= \dfrac{\frac{1}{2} - 1 + 2(1)}{\frac{1}{\sqrt{3}} \times \sqrt{3}} = \dfrac{\frac{1}{2} - 1 + 2}{1} = \dfrac{\frac{1}{2} + 1}{1}$

$= \boxed{\frac{3}{2}}$

Q.15 $\dfrac{4}{\cot^2 30°} + \dfrac{1}{\sin^2 60°} - \cos^2 45°$

$= \dfrac{4}{(\sqrt{3})^2} + \dfrac{1}{\left(\frac{\sqrt{3}}{2}\right)^2} - \left(\frac{1}{\sqrt{2}}\right)^2$

$= \frac{4}{3} + \frac{4}{3} - \frac{1}{2} = \frac{8}{3} - \frac{1}{2} = \frac{16-3}{6}$

$= \boxed{\frac{13}{6}}$

Q.16 $4(\sin^4 30° + \cos^2 60°) - 3(\cos^2 45° - \sin^2 90°) - \sin^2 60°$

$= 4\left[\left(\frac{1}{2}\right)^4 + \left(\frac{1}{2}\right)^2\right] - 3\left[\left(\frac{1}{\sqrt{2}}\right)^2 - (1)^2\right] - \left(\frac{\sqrt{3}}{2}\right)$

$$= 4\left[\frac{1}{16} + \frac{1}{4}\right] - 3\left[\frac{1}{2} - 1\right] - \frac{3}{4}$$

$$= 4\left[\frac{1+4}{16}\right] - 3\left[\frac{-1}{2}\right] - \frac{3}{4}$$

$$= \cancel{4}\left[\frac{5}{\cancel{16}\,4}\right] + \frac{3}{2} - \frac{3}{4} = \frac{5}{4} + \frac{3}{2} - \frac{3}{4}$$

$$= \frac{5+6-3}{4} = \frac{11-3}{4} = \frac{\cancel{8}\,2}{\cancel{4}} = \boxed{2}$$

Q.17 $\dfrac{\tan^2 60° + 4\cos^2 45° + 3\sec^2 30° + 5\cos^2 90°}{\operatorname{cosec} 30° + \sec 60° - \cot^2 30°}$

$$= \frac{(\sqrt{3})^2 + 4\left(\frac{1}{\sqrt{2}}\right)^2 + 3\left(\frac{2}{\sqrt{3}}\right)^2 + 5(0)^2}{2 + 2 - (\sqrt{3})^2}$$

$$= \frac{3 + \cancel{4}^{2}\left(\frac{1}{\cancel{2}}\right) + \cancel{3}\left(\frac{4}{\cancel{3}}\right) + 0}{4 - 3} = \frac{3+2+4}{1} = \boxed{9}$$

Q.18 $\dfrac{\sin 30°}{\sin 45°} + \dfrac{\tan 45°}{\sec 60°} - \dfrac{\sin 60°}{\cot 45°} - \dfrac{\cos 30°}{\sin 90°}$

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

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

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

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

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

Q.19 $\frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ}$

$= \frac{1}{2} + \frac{2}{1} - \frac{5(1)}{2(1)} = \frac{1}{2} + \frac{2}{1} - \frac{5}{2}$

$= \frac{1 + 4 - 5}{2} = \frac{5 - 5}{2} = \frac{0}{2} = \boxed{0}$

Q.20 $2 \sin 3x = \sqrt{3}$

$\sin 3x = \frac{\sqrt{3}}{2}$

$\sin 3x = \sin 60^\circ \quad \left(\sin 60^\circ = \frac{\sqrt{3}}{2} \right)$

$3x = 60^\circ$

$\boxed{x = 20^\circ}$

Q.21 $2 \sin \frac{x}{2} = 1$

$\sin \frac{x}{2} = \frac{1}{2}$

$\sin \frac{x}{2} = \sin 30^\circ \quad \left(\sin 30^\circ = \frac{1}{2} \right)$

$\frac{x}{2} = 30^\circ$

$\boxed{x = 60^\circ}$

Q.22 $\sqrt{3} \sin x = \cos x$

$\frac{\sin x}{\cos x} = \frac{1}{\sqrt{3}}$

$\tan x = \frac{1}{\sqrt{3}} \quad \left(\tan 30^\circ = \frac{1}{\sqrt{3}} \right)$

$\tan x = \tan 30^\circ$

$\boxed{x = 30^\circ}$

Classmate
Date
Page

Q.23 $\tan x = \sin 45° \cos 45° + \sin 30°$

$\tan x = \left(\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}\right) + \frac{1}{2}$

$\tan x = \frac{1}{2} + \frac{1}{2}$

$\tan x = 1 \qquad (\tan 45° = 1)$

$\tan x = \tan 45°$

$\boxed{x = 45°}$

Q.24 $\sqrt{3} \tan 2x = \cos 60° + \sin 45° \cos 45°$

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

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

$\sqrt{3} \tan 2x = 1$

$\tan 2x = \frac{1}{\sqrt{3}} \qquad \left(\tan 30° = \frac{1}{\sqrt{3}}\right)$

$\tan 2x = \tan 30°$

$2x = 30°$

$\boxed{x = 15°}$

Q.25 $\cos 2x = \cos 60° \cos 30° + \sin 60° \sin 30°$

$\cos 2x = \left(\frac{1}{2} \times \frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{3}}{2} \times \frac{1}{2}\right)$

$\cos 2x = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4}$

$\cos 2x = \frac{2\sqrt{3}}{4}$

$\cos 2x = \cos 30° \qquad \left(\cos 30° = \frac{\sqrt{3}}{2}\right)$

$2x = 30°$

$\boxed{x = 15°}$

Q. 26 $\theta = 30°$ (given

(i) $\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

$\tan 2(30°) = \frac{2\tan 30°}{1-\tan^2 30°}$

$\tan 60° = \frac{2\tan 30°}{1-\tan^2 30°}$

LHS $= \tan 60° = \boxed{\sqrt{3}}$

RHS $= \frac{2\tan 30°}{1-\tan^2 30°} = \frac{2(1/\sqrt{3})}{1-(1/\sqrt{3})^2}$

$= \frac{2/\sqrt{3}}{1-(1/3)} = \frac{2}{\sqrt{3}} \times \frac{3}{2}\sqrt{3} = \boxed{\sqrt{3}}$

LHS = RHS

Hence, proved

(ii) $\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta}$

$\sin 2(30°) = \frac{2\tan 30°}{1+\tan^2 30°}$

$\sin 60° = \frac{2\tan 30°}{1+\tan^2 30°}$

LHS $= \sin 60° = \boxed{\frac{\sqrt{3}}{2}}$

RHS $= \frac{2\tan 30°}{1+\tan^2 30°} = \frac{2(1/\sqrt{3})}{1+(1/\sqrt{3})^2}$

$= \frac{2/\sqrt{3}}{1+(1/3)} = \frac{2}{\sqrt{3}} \times \frac{3}{4}\sqrt{3} = \boxed{\frac{\sqrt{3}}{2}}$

LHS = RHS

Hence, proved

(iii) $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

$\cos 2(30^\circ) = \frac{1-\tan^2 30^\circ}{1+\tan^2 30^\circ}$

$\cos 60^\circ = \frac{1-\tan^2 30^\circ}{1+\tan^2 30^\circ}$

$LHS = \cos 60^\circ = \boxed{\frac{1}{2}}$

$RHS = \frac{1-\tan^2 30^\circ}{1+\tan^2 30^\circ} = \frac{1-(1/\sqrt{3})^2}{1+(1/\sqrt{3})^2}$

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

LHS = RHS

Hence, proved

(iv) $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

$\cos 3(30^\circ) = 4\cos^3 30^\circ - 3\cos 30^\circ$

$\cos 90^\circ = 4\cos^3 30^\circ - 3\cos 30^\circ$

$LHS = \cos 90^\circ = \boxed{0}$

$RHS = 4\left(\frac{\sqrt{3}}{2}\right)^3 - 3\left(\frac{\sqrt{3}}{2}\right) = \frac{4 \times 3\sqrt{3}}{8} - \frac{3\sqrt{3}}{2}$

$= \frac{12\sqrt{3} - 12\sqrt{3}}{8} = \frac{0}{8} = \boxed{0}$

LHS = RHS

Hence, proved

31/12/2020

Ch-10
Exercise 10.2

Q.27 $A = B = 60°$ (given)

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

LHS $= \cos(A-B)$

$= \cos(60° - 60°) = \cos 0° = \boxed{1}$

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

$= \cos 60° \cos 60° + \sin 60° \sin 60°$

$= \cos^2 60° + \sin^2 60°$

$= \boxed{1}$ $(\cos^2\theta + \sin^2\theta = 1)$

LHS = RHS

Hence, proved

(ii) $\sin(A-B) = \sin A \cos B - \cos A \sin B$ $\tan A - \tan B$

LHS $= \sin(A-B)$

$= \sin(60° - 60°) = \sin 0° = \boxed{0}$

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

$= \sin 60° \cos 60° - \cos 60° \sin 60°$

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

$= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = \boxed{0}$

LHS = RHS

Hence, proved

(iii) $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}$

LHS $= \tan(A-B)$

$= \tan(60° - 60°) = \tan 0° = \boxed{0}$

RHS $= \dfrac{\tan A - \tan B}{1 + \tan A \tan B} = \dfrac{\tan 60° - \tan 60°}{1 + \tan 60° \tan 60°}$

$= \dfrac{\sqrt{3} - \sqrt{3}}{1 + \sqrt{3} \times \sqrt{3}} = \dfrac{0}{1+3} = \dfrac{0}{4} = \boxed{0}$

LHS = RHS

Hence, proved

Q. 28 $A = 30°$, $B = 60°$ } given

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

LHS $= \sin(A+B) = \sin(30° + 60°)$

$= \sin 90° = \boxed{1}$

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

$= \sin 30° \cos 60° + \cos 30° \sin 60°$

$= \left(\dfrac{1}{2} \times \dfrac{1}{2}\right) + \left(\dfrac{\sqrt{3}}{2} \times \dfrac{\sqrt{3}}{2}\right) = \dfrac{1}{4} + \dfrac{3}{4} = \dfrac{4}{4} = \boxed{1}$

LHS = RHS

Hence, proved

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

LHS $= \cos(A+B) = \cos(30° + 60°)$

$= \cos 90° = \boxed{0}$

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

$= \cos 30° \cos 60° - \sin 30° \sin 60°$

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

$= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = \boxed{0}$

$\underline{LHS = RHS}$

$\underline{\text{Hence, proved}}$

Q.29 $\sin(A+B) = 1$

$\sin(A+B) = \sin 90°$ $(\sin 90° = 1)$

$A + B = 90°$ ——— ①

$\cos(A-B) = 1$

$\cos(A-B) = \cos 0°$ $(\cos 0° = 1)$

$A - B = 0°$

$A = B$ ——— ②

In ①,

$A + B = 90°$

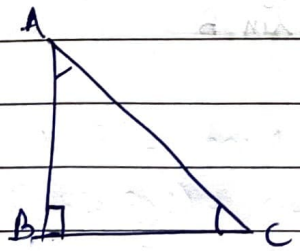
$B + B = 90°$ (From ②)

$B = \frac{90°}{2} 45$

$\boxed{B = 45°}$

$\boxed{A = 45°}$

Q.32



$\angle B = 90°$
$\angle A = \angle C$ } given

$\angle A + \angle B + \angle C = 180°$ (Angle sum prop. of Δ)

$\angle A + \angle A = 180° - 90°$

$2\angle A = 90°$

$\angle A = \angle C = \boxed{45°}$

(i) $\sin A \cos C + \cos A \sin C$

$= \sin 45° \cos 45° + \cos 45° \sin 45°$

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

$= \frac{1}{2} + \frac{1}{2} = \boxed{1}$

(ii) $\sin A \sin B + \cos A \cos B$

$= \sin 45° \sin 90° + \cos 45° \cos 90°$

$= \left(\frac{1}{\sqrt{2}} \times 1\right) + \left(\frac{1}{\sqrt{2}} \times 0\right)$

$= \frac{1}{\sqrt{2}} + 0 = \boxed{\frac{1}{\sqrt{2}}}$

Q.33 $\sin(A+2B) = \frac{\sqrt{3}}{2}$

$\sin(A+2B) = \sin 60°$ ($\sin 60° = \sqrt{3}/2$)

$A + 2B = 60°$ ——— (1)

$\cos(A+4B) = 0°$

$\cos(A+4B) = \cos 90°$ ($\cos 90° = 0°$)

$A + 4B = 90°$ ——— (2)

Subtract ① from ②

$$A + 4B = 90^\circ$$
$$A + 2B = 60^\circ$$
$$(-) \quad (-) \quad (-)$$
$$2B = 30^\circ$$
$$\boxed{B = 15^\circ}$$

Putting value of B in ①

$$A + 2B = 60^\circ$$
$$A + 2(15^\circ) = 60^\circ$$
$$A = 60^\circ - 30^\circ$$
$$\boxed{A = 30^\circ}$$

Q.35 Let A & B be 45° & 30° respectively

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$
$$\sin(45^\circ - 30^\circ) = \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$$
$$\sin 15^\circ = \left(\frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2}\right) - \left(\frac{1}{\sqrt{2}} \times \frac{1}{2}\right)$$
$$\sin 15^\circ = \frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}} = \frac{\sqrt{3}-1}{2\sqrt{2}}$$
$$\sin 15^\circ = \frac{(\sqrt{3}-1) \times 2\sqrt{2}}{2\sqrt{2} \times 2\sqrt{2}} = \frac{2\sqrt{6} - 2\sqrt{2}}{8}$$
$$\boxed{\sin 15^\circ = \frac{\sqrt{6} - \sqrt{2}}{4}}$$

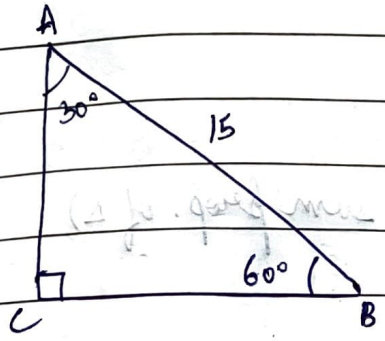
$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$
$$\cos(45^\circ - 30^\circ) = \cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$$
$$\cos 15^\circ = \left(\frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}} \times \frac{1}{2}\right)$$

$$\cos 15^\circ = \frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}} = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$\cos 15^\circ = \frac{(\sqrt{3}+1)\times 2\sqrt{2}}{2\sqrt{2}\times 2\sqrt{2}} = \frac{2\sqrt{6}+2\sqrt{2}}{8}$$

$$\boxed{\cos 15^\circ = \frac{\sqrt{6}+\sqrt{2}}{4}}$$

Q.36



$\angle C = 90^\circ$

$\angle B = 60^\circ$

$AB = 15$ units

} given

$\angle A + \angle B + \angle C = 180^\circ$ (Angle sum prop. of Δ)

$\angle A = 180^\circ - (90^\circ + 60^\circ)$

$\angle A = 180^\circ - 150^\circ$

$\boxed{\angle A = 30^\circ}$

$$\sin 60^\circ = \frac{AC}{AB}$$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{AC}{15}$$

$$\Rightarrow AC = \frac{\sqrt{3}\times 15}{2}$$

$$\Rightarrow \boxed{AC = \frac{15\sqrt{3}}{2} \text{ units}}$$

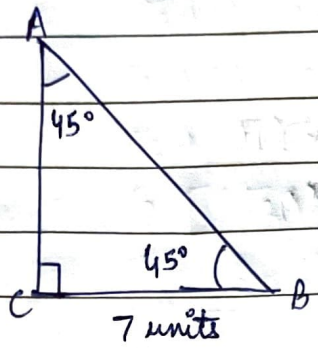
$$\cos 60^\circ = \frac{BC}{AB}$$

$$\Rightarrow \frac{1}{2} = \frac{BC}{15}$$

$$\Rightarrow BC = \frac{15}{2} = 7.5$$

$$\Rightarrow \boxed{BC = 7.5 \text{ units}}$$

Q.37



$\angle C = 90°$
$\angle A = 45°$
$BC = 7$ units
} given

$\angle A + \angle B + \angle C = 180°$ (Angle sum prop. of Δ)

$\angle B = 180° - (90° + 45°)$

$\angle B = 180° - 135°$

$\boxed{\angle B = 45°}$

$\cos 45° = \frac{BC}{AB}$

$\frac{1}{\sqrt{2}} = \frac{7}{AB}$

$\boxed{AB = 7\sqrt{2} \text{ units}}$

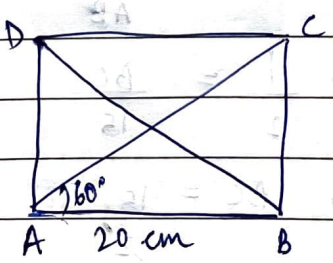
$\sin 45° = \frac{AC}{AB}$

$\frac{1}{\sqrt{2}} = \frac{AC}{7\sqrt{2}}$

$AC = \frac{7\sqrt{2}}{\sqrt{2}}$

$\boxed{AC = 7 \text{ units}}$

Q.38



ABCD is a rectangle
$AB = 20$ cm
$\angle BAC = 60°$
$\angle B = \angle A = \angle C = \angle D = 90°$
} given

In ΔBAC,

$$\cos 60^\circ = \frac{AB}{AC}$$

$$\frac{1}{2} = \frac{20}{AC}$$

$$AC = 20 \times 2$$

$$\boxed{AC = 40 \text{ cm}}$$

$$\boxed{BD = AC = 40 \text{ cm}}$$ (Diagonals of a rectangle are equal)

$$\tan 60^\circ = \frac{BC}{AB}$$

$$\sqrt{3} = \frac{BC}{20}$$

$$\boxed{BC = 20\sqrt{3} \text{ cm}}$$

Q.39 $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$ } given

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{1/2 + 1/3}{1 - (1/2 \times 1/3)}$$

$$= \frac{\frac{3+2}{6}}{1 - \frac{1}{6}} = \frac{5/6}{5/6} = 1$$

$$\tan(A+B) = 1$$

$$\tan(A+B) = \tan 45^\circ \quad (\tan 45^\circ = 1)$$

$$\boxed{A+B = 45^\circ}$$

Q.40 $(\sqrt{3}+1)(3 - \cot 30^\circ) = \tan^3 60^\circ - 2\sin 60^\circ$.

$$LHS = (\sqrt{3}+1)(3-\cot 30^\circ)$$
$$= (\sqrt{3}+1)(3-\sqrt{3})$$
$$= (\sqrt{3}+1)\sqrt{3}(\sqrt{3}-1)$$
$$= \sqrt{3}[(\sqrt{3})^2-(1)^2]$$
$$= \sqrt{3}(3-1)$$
$$= \boxed{2\sqrt{3}}$$

$$RHS = \tan^3 60^\circ - 2\sin 60^\circ$$
$$= (\sqrt{3})^3 - 2\left(\frac{\sqrt{3}}{2}\right)$$
$$= 3\sqrt{3} - \sqrt{3} = \boxed{2\sqrt{3}}$$

LHS = RHS

Hence, proved.