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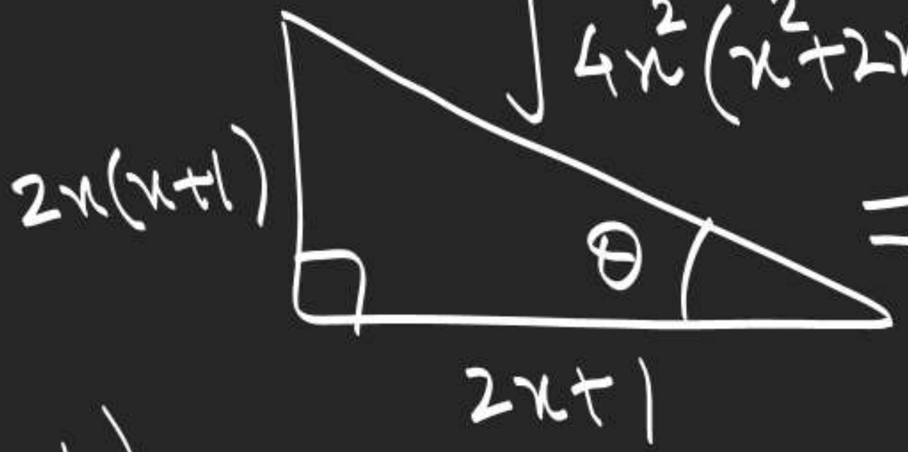
19. $\sec^2\theta + \sec\theta - 1 = 5$

22.



$$\sqrt{4x^2(x^2+2x+1)+(4x^2+4x+1)}$$

$$= \sqrt{4x^4+8x^3+8x^2+4x+1}$$

$$= \sqrt{(2x^2+2x+1)^2}$$

$$= 2x^2+2x+1$$

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

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$\cos(\underline{540}^\circ + 30^\circ) = -\cos 30^\circ = -\frac{\sqrt{3}}{2}$

$180 + 30$

$\cos(-73^\circ) = \cos 73^\circ = \sin 17^\circ$

$\sin(540 - 30^\circ) = \sin(180^\circ - 30^\circ) = \sin 30^\circ = \frac{1}{2}$

180°

$\cos(-208^\circ) = \cos 208^\circ = \cos(180^\circ + 28^\circ)$

$= -\cos 28^\circ$

$\operatorname{cosec} A = -2$

$\sin A = -\frac{1}{2}$

$180^\circ + 30^\circ$

$360^\circ - 30^\circ$

12.

$\cot A = -\sqrt{3}$

$\tan A = -\frac{1}{\sqrt{3}} =$

$A =$

$180 - 30^\circ$

$360 - 30^\circ$

$-\sin 65^\circ = -\cos(\underline{90^\circ - 65^\circ})$

$= -\cos 25^\circ$

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Compound Angles

$A - B + C$, $A + 2B$

$$\boxed{\begin{aligned}
\sin(A+B) &= \sin A\cos B + \sin B\cos A \\
\sin(A-B) &= \sin A\cos B - \sin B\cos A \\
\cos(A+B) &= \cos A\cos B - \sin A\sin B \\
\cos(A-B) &= \cos A\cos B + \sin A\sin B
\end{aligned}}$$

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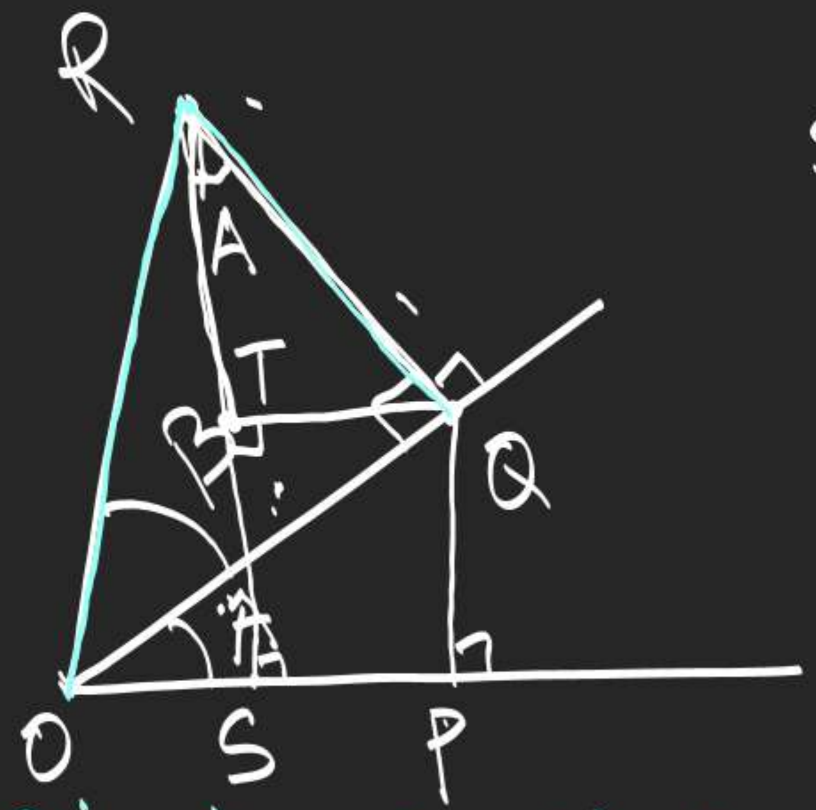

$$\sin(A+B) = \frac{RS}{OR}$$

$$= \frac{RT + TS}{OR}$$

$$= \frac{RT}{OR} + \frac{TS}{OR} = \frac{RT}{OR} + \frac{PQ}{OR}$$

$$= \left(\frac{RT}{QR}\right)\frac{QR}{OR} + \frac{PQ}{OQ}\,\frac{OQ}{OR}$$

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

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

$A \to A, \quad B \to -B$

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

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

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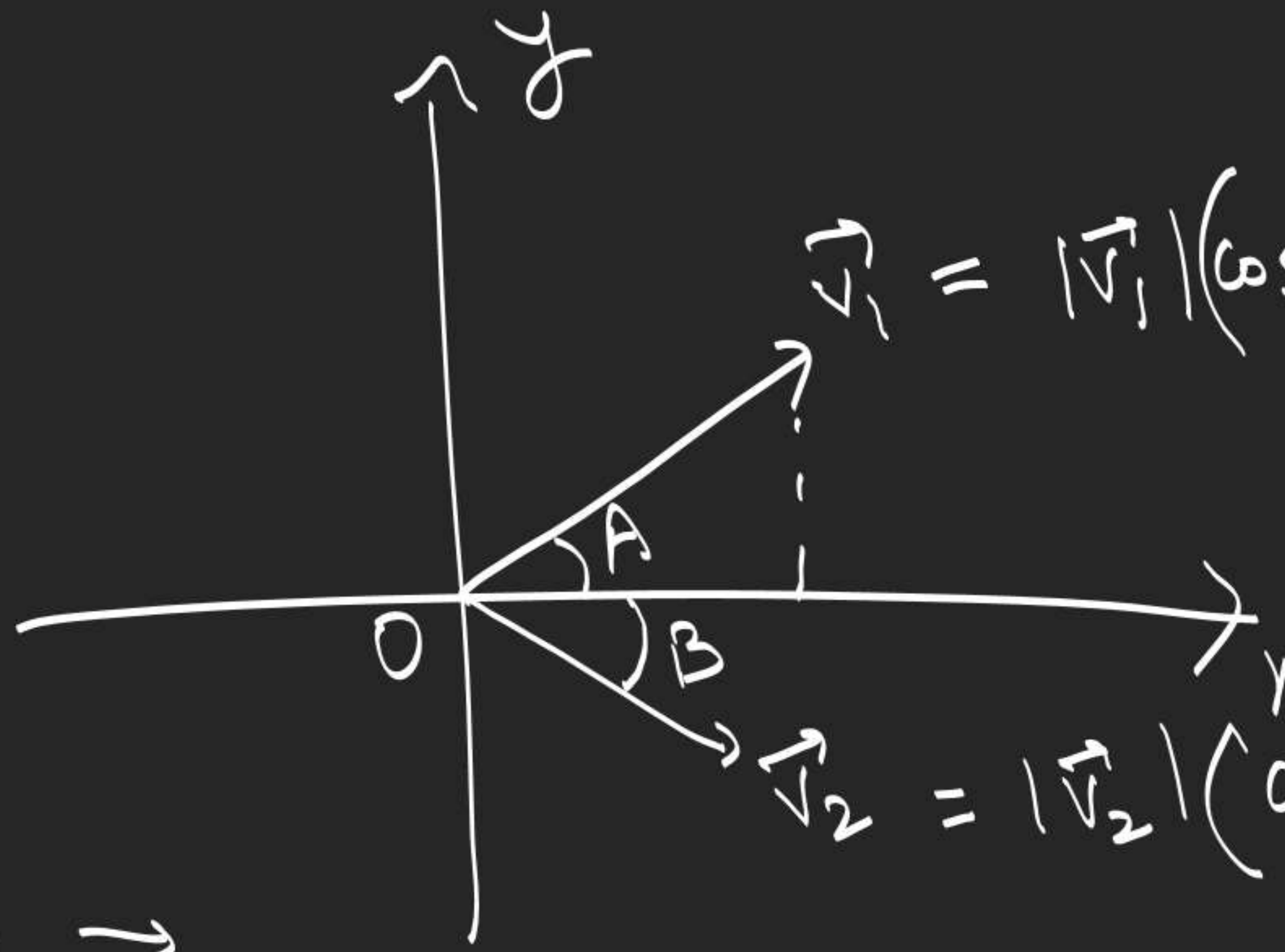
$\cos(A+B)$

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

$A \to \frac{\pi}{2}+A \quad , \quad B \to B$

$$\sin\left(\frac{\pi}{2}+\underbrace{A+B}\right) = \sin\left(\frac{\pi}{2}+A\right)\cos B + \sin B\cos\left(\frac{\pi}{2}+A\right)$$

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



$$\vec{V_1} = |\vec{V_1}|(\cos A\,\hat{i} + \sin A\,\hat{j})$$

$$\vec{V_2} = |\vec{V_2}|(\cos B\,\hat{i} - \sin B\,\hat{j})$$

$$\vec{V_1}\cdot\vec{V_2} = |\vec{V_1}||\vec{V_2}|\cos(A+B) = |\vec{V_1}||\vec{V_2}|(\cos A\cos B - \sin A\sin B)$$

$$\boxed{\cos(A+B) = \cos A\cos B - \sin A\sin B}$$

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$$\sin(15^\circ) = \sin(45^\circ - 30^\circ) = \sin 45^\circ \cos 30^\circ - \sin 30^\circ \cos 45^\circ$$
$$= \frac{1}{\sqrt{2}}\frac{\sqrt{3}}{2} - \frac{1}{2}\frac{1}{\sqrt{2}} = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$\sin(75^\circ) = \sin(45^\circ + 30^\circ) = \frac{1}{\sqrt{2}}\frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}}\frac{1}{2} = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$\tan 15^\circ = \left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right) \Big/ \frac{\sqrt{3}+1}{2\sqrt{2}}$$
$$= \frac{\sqrt{3}-1}{\sqrt{3}+1}$$
$$= \frac{(\sqrt{3}-1)^2}{2}$$
$$= 2-\sqrt{3}$$

$$\sin 15^\circ = \sin\frac{\pi}{12} = \frac{\sqrt{3}-1}{2\sqrt{2}} = \frac{\sqrt{6}-\sqrt{2}}{4} = \cos 75^\circ = \cos\frac{5\pi}{12}$$

$$\sin 75^\circ = \sin\frac{5\pi}{12} = \frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{4} = \cos 15^\circ = \cos\frac{\pi}{12}$$

$$\tan 15^\circ = \tan\frac{\pi}{12} = 2-\sqrt{3} = \cot\frac{5\pi}{12} = \cot 75^\circ$$

$$\tan 75^\circ = \tan\frac{5\pi}{12} = 2+\sqrt{3} = \cot\frac{\pi}{12} = \cot 15^\circ$$

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

$$= \sin^2 A\cos^2 B-\sin^2 B\cos^2 A$$

$$= \sin^2 A(1-\sin^2 B)-\sin^2 B(1-\sin^2 A)$$

$$= \sin^2 A-\sin^2 B$$

$$= \cos^2 B-\cos^2 A$$

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

$$= \cos^2 A\cos^2 B-\sin^2 A\sin^2 B$$

$$\cos^2 B-\sin^2 A = \cos^2 A-\sin^2 B = \cos^2 A(1-\sin^2 B)-(1-\cos^2 A)\sin^2 B$$

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$$\boxed{\begin{aligned} \sin(A+B)\sin(A-B) &= \sin^2 A - \sin^2 B \\ \cos(A+B)\cos(A-B) &= \cos^2 A - \sin^2 B \end{aligned}}$$

$$\sin^2 A + \sin^2 B = 1 - \cos^2 A + \sin^2 B$$

$$= 1 - (\cos^2 A - \sin^2 B)$$

$$= 1 - \cos(A-B)\cos(A+B)$$

Nishant Jindal

1. $\sin 99^\circ \cos 21^\circ + \cos 99^\circ \sin 21^\circ = ?$

$= \sin(99^\circ + 21^\circ) = \sin(120^\circ) = \sin(180 - 60^\circ)$

$= \sin 60^\circ$

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

2. $\sin^2 127.5^\circ + \cos^2(22.5^\circ)$

$1 + (\sin^2 127.5^\circ - \sin^2 22.5^\circ)$

$1 + \sin 105^\circ \sin \underline{150^\circ}$

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

Nishant Jindal

$$\sin(A+B) = \sin A\cos B + \sin B\cos A \quad — ①$$
$$\sin(A-B) = \sin A\cos B - \sin B\cos A \quad — ②$$
$$\cos(A+B) = \cos A\cos B - \sin A\sin B \quad — ③$$
$$\cos(A-B) = \cos A\cos B + \sin A\sin B \quad — ④$$

① + ②
$$2\sin A\cos B = \sin(A+B) + \sin(A-B)$$

① − ②
$$2\sin B\cos A = \sin(A+B) - \sin(A-B)$$

③ + ④
$$2\cos A\cos B = \cos(A+B) + \cos(A-B)$$

④ − ③
$$* \; 2\sin A\sin B = \cos(A-B) - \cos(A+B)$$

HW (S.L. Loney)

Ex − 13

Q. 4 to Q.12

and

Ex − 10 (28 to 36)