← ULTIMATE MATHEMATICS →

(BY: AJAY MITTAL : 9891067390)

← TRIGONOMETRY ~ CLASS NO: 2 (T-2) →

Famulae

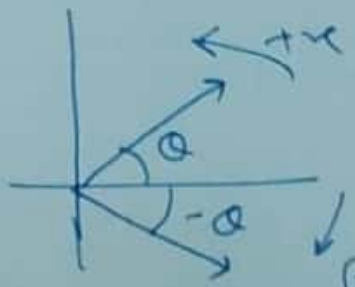
Set - I

(1) $\sin(-\theta) = -\sin\theta$ (3) $\tan(-\theta) = -\tan\theta$

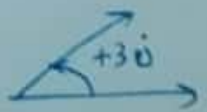
(2) $\operatorname{cosec}(-\theta) = -\operatorname{cosec}\theta$ (4) $\cot(-\theta) = -\cot\theta$

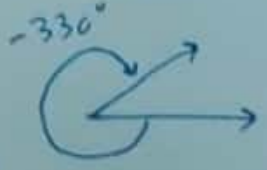
*(5) $\boxed{\cos(-\theta) = \cos\theta}$ (6) $\sec(-\theta) = \sec\theta$

-ve angle



(1)





$\boxed{30^\circ \approx -330^\circ}$ $60^\circ = -300^\circ$; $330^\circ = -30^\circ$

eg $\sin(-30^\circ) = \sin(330^\circ) = \sin(360-30^\circ) = -\sin(30^\circ)$

$\cos(-30^\circ) = \cos(330^\circ) = \cos(360-30^\circ) = \cos(30)$

Qns find value of $\operatorname{cosec}(-1410^\circ)$

$= -\operatorname{cosec}(1410^\circ)$

$= -\operatorname{cosec}(15\times 90^\circ + 60^\circ)$

$= +\sec(60^\circ) = 2$ Ans

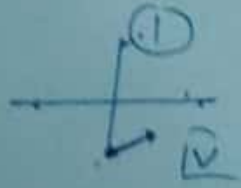
$90\overline{)1410}\ (15$

90

510

450

60



← ULTIMATE MATHEMATICS →

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SET-2

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

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

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

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

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

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

(7) $\cot(A+B) = \dfrac{\cot A \cot B - 1}{\cot A + \cot B}$

(8) $\cot(A-B) = \dfrac{\cot A \cot B + 1}{\cot B - \cot A}$

Qn 1 find $\sin(15^\circ)$

$= \sin(45^\circ - 30^\circ)$

$A - B$

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

$= \dfrac{1}{\sqrt{2}} \times \dfrac{\sqrt{3}}{2} - \dfrac{1}{\sqrt{2}} \times \dfrac{1}{2}$

$\sin(15) = \dfrac{\sqrt{3}-1}{2\sqrt{2}}$ Ans

Rationalise

$\sqrt{\ } - \sqrt{\ }$ ✓

$\sqrt{\ } - \square$ ✓

$\square - \sqrt{\ }$ ✓

$\sqrt{\ }$ ✗

Qn 2 $\tan(105^\circ) = \tan(60+45^\circ)$

$= \dfrac{\tan(60) + \tan(45)}{1 - \tan(60)\tan(45^\circ)}$

ULTIMATE MATHEMATICS

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

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

Q No 3 $\tan\left(13\frac{\pi}{12}\right)$

$= \tan\left(13 \times \frac{180^\circ}{12}\right)$

$= \tan(13 \times 15^\circ)$

$= \tan(195^\circ)$

$= \tan(180^\circ + 15^\circ)$ (III)

$= \tan(15^\circ)$

$= \tan(45^\circ - 30^\circ)$ (A − B)

Proceed

Ans $2-\sqrt{3}$

Q No 4 Given $\sin A = 3/5$ & $\cos B = -\frac{12}{13}$

$0 < A < \pi/2$ (I) $\quad \pi < B < 3\pi/2$ (III)

find $\sin(A+B)$ and $\tan(A-B)$

Soln $\sin^2 A + \cos^2 A = 1$

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

$\cos^2 A = 1 - \frac{9}{25}$

$\cos^2 A = \frac{16}{25} \Rightarrow \cos A = \pm \frac{4}{5} \Rightarrow \cos A = 4/5$ (Ist quad)

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

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

$= 1 - \left(\frac{-12}{13}\right)^2$

$= 1 - \frac{144}{169}$

$\sin^2 B = \frac{25}{169}$

$\sin B = \pm \frac{5}{13} \Rightarrow \boxed{\sin B = \frac{-5}{13}}$

III.

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

$= \left(\frac{3}{5}\right)\left(\frac{-12}{13}\right) + \left(\frac{4}{5}\right)\left(\frac{-5}{13}\right)$

$= -\frac{36}{65} - \frac{20}{65} = -\frac{56}{65}$ Ans

(ii) $\tan(A-B)$

$\tan A = \frac{\sin A}{\cos A} = \frac{3/5}{4/5} = 3/4$

$\tan B = \frac{\sin B}{\cos B} = \frac{-5/13}{-12/13} = \frac{5}{12}$

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

Q.15 Show that $\tan(54^\circ) = \frac{\cos(9^\circ) + \sin(9^\circ)}{\cos 9^\circ - \sin 9^\circ}$

Hint $\tan(54^\circ) = \tan(45^\circ + 9^\circ) = \tan(A+B)$

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Q16 given $\tan\alpha = \frac{m}{m+1}$ & $\tan\beta = \frac{1}{2m+1}$

Show $\alpha+\beta = \frac{\pi}{4}$

We have $\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

$$= \frac{\frac{m}{m+1} + \frac{1}{2m+1}}{1 - \frac{m}{m+1} \times \frac{1}{2m+1}}$$

L.C.M

$$\therefore \tan(\alpha+\beta) = 1$$

$$\Rightarrow \alpha+\beta = \pi/4$$

Q17 (1M) Show $\cos\left(\frac{\pi}{4}-A\right)\cdot\cos\left(\frac{\pi}{4}-B\right) - \sin\left(\frac{\pi}{4}-A\right)\cdot\sin\left(\frac{\pi}{4}-B\right) = \sin(A+B)$

Sol: LHS $\cos(45^\circ - A)\cdot\cos(45^\circ - B) - \sin(45^\circ - A)\cdot\sin(45^\circ - B)$

$= \cos(45^\circ - A + 45^\circ - B)$

$= \cos(90^\circ - A - B)$

$= \cos(90^\circ - (A+B))$

$= \sin(A+B)$

Class XI TRIGONOMETRY WORKSHEET NO: 2

Topic Date

Q No. 1 → If $\sin A = \frac{3}{5}$ and $\cos B = -\frac{12}{13}$; $0 < A < \frac{\pi}{2}$ and $\pi < B < \frac{3\pi}{2}$. Find the value of the following:

(i) $\sin(A-B)$ (ii) $\cos(A+B)$ (iii) $\tan(A-B)$

Q No. 2 → If $\cos A = \frac{4}{5}$, $\cos B = \frac{12}{13}$; $\frac{3\pi}{2} < A, B < 2\pi$. Find the value of the following

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

Q No. 3 → If $\cot\alpha = 1/2$, $\sec\beta = -\frac{5}{3}$; $\pi < \alpha < \frac{3\pi}{2}$ and $\frac{\pi}{2} < \beta < \alpha$. Find the value of $\tan(\alpha+\beta)$

Q No. 4 → If $\tan A = \frac{3}{4}$, $\cos B = \frac{9}{41}$ where $\pi < A < \frac{3\pi}{2}$ and $0 < B < \frac{\pi}{2}$. Find the value of $\tan(A+B)$

Q No. 5 → Find the value of (1). $\sin(75)$ (2). $\sin(15)$ (3). $\tan(15^\circ)$ (4). $\tan(75^\circ)$ (5). $\tan(105^\circ)$ (6). $\tan(\frac{13\pi}{12})$ (7). $\cos(105^\circ) + \cos(15^\circ)$ (8). $\tan(75^\circ) + \cot(75^\circ)$ (9). $\cos(\frac{13\pi}{12})$ (10). $\sin(\frac{13\pi}{12})$

Q No. 6 → Show that $\sin(n+1)A \cdot \sin(n+2)A + \cos(n+1)A \cos(n+2)A = \cos A$

Q No. 7 → Show that $\cos(\frac{\pi}{4}-A)\cos(\frac{\pi}{4}-B) - \sin(\frac{\pi}{4}-A)\sin(\frac{\pi}{4}-B) = \sin(A+B)$

Q No. 8 → Show that $\frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cdot \cos A} + \frac{\sin(A-B)}{\cos A \cos B} = 0$

Q No. 9 → Show that $\frac{\tan(\frac{\pi}{4}+x)}{\tan(\frac{\pi}{4}-x)} = \left(\frac{1+\tan x}{1-\tan x}\right)^2$

Q No. 10 → Show that $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\sin B \sin C} + \frac{\sin(C-A)}{\sin C \sin A} = 0$

Topic _____ Date _____

Q.No 11 → Show that $\tan(56^\circ) = \dfrac{\cos(11^\circ) + \sin(11^\circ)}{\cos(11^\circ) - \sin(11^\circ)}$

Q.No 12 → Show that $\dfrac{\cos(9^\circ) + \sin(9^\circ)}{\cos(9^\circ) - \sin(9^\circ)} = \tan(54^\circ)$

Q.No 13 → Show that $\dfrac{\cos(8^\circ) - \sin(8^\circ)}{\cos(8^\circ) + \sin(8^\circ)} = \tan(37^\circ)$

Q.No 14 → If $\tan A = 5/6$ and $\tan B = 1/11$ Show that $A + B = \frac{\pi}{4}$

Q.No 15 → If $\tan\alpha = \dfrac{m}{m+1}$ and $\tan\beta = \dfrac{1}{2m+1}$, Show that $\alpha + \beta = \frac{\pi}{4}$

Q.No 16 → Show that $\tan(3A)\tan(2A)\tan A = \tan(3A) - \tan(2A) - \tan A$

Q.No 17 → Show that $\cot A \cdot \cot(2A) - \cot(2A)\cot(3A) - \cot(3A)\cot A = 1$

Q.No 18 → Show that $\tan(130) - \tan(90) - \tan(40) = \tan(130)\tan(90)\tan(40)$

Q.No 19 → Show that $\tan(36^\circ) + \tan 9^\circ + \tan(36^\circ)\tan(9^\circ) = 1$

Q.No 20 → Show that $\tan(70^\circ) = \tan(20^\circ) + 2\tan(50^\circ)$

Q.No 21 → If $A + B = \pi/4$, Show that

(i) $(1 + \tan A)(1 + \tan B) = 2$ (ii) $(\cot A - 1)(\cot B - 1) = 2$

← ANSWERS →

(1) (i) $\frac{-16}{65}$ (ii) $\frac{-33}{65}$ (iii) $\frac{16}{63}$ (2) (i) $\frac{33}{65}$ (ii) $\frac{-16}{65}$ (3). $\frac{2}{11}$ (4). $\frac{-187}{84}$

(5). (1) $\frac{\sqrt{3}+1}{2}$ (2) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (3) $2-\sqrt{3}$ (4) $2+\sqrt{3}$ (5) $-(2+\sqrt{3})$ (6) $2-\sqrt{3}$

(7) $1/\sqrt{2}$ (8) $1/4$ (9) $-\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)$ (10) $\frac{1-\sqrt{3}}{2\sqrt{2}}$ — x —