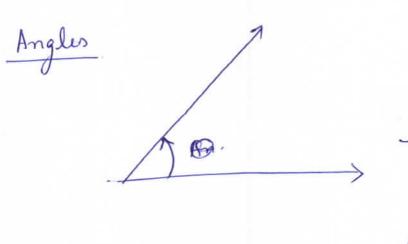
TRIGONOMETRY .



2nd Quadrant

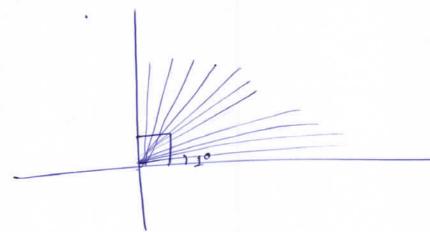
1 1 ST Quadrant

3rd Quadrant

4th Quadrant

Anticlockwise + ve Clockwise - ve

Sexagesimal System.



1 st angle = 90° 1 twon = 4 st angle = 360°

Circular System

1 sadian i

Radian(0) = are length.

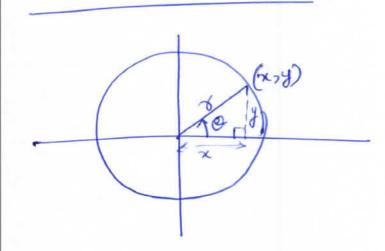
1 turn.

Q = 2xx = 2x rad

I radian is angle subtended at center of circle by an arc that is equal to the radius.

$$\begin{array}{rcl}
2x & \text{rad} & = & 360^{\circ} \text{ b} \\
\hline
x & \text{rad} & = & 180^{\circ} \\
\hline
\frac{\pi}{2} & \text{rad} & = & 90^{\circ} & \\
\hline
\frac{\pi}{4} & \text{rad} & = & 45^{\circ} \\
\hline
\frac{\pi}{6} & \text{rad} & = & 30^{\circ} \\
\hline
\frac{\pi}{6} & \text{rad} & = & \frac{\pi}{6} & \text{rad}.
\end{array}$$

Basic Identities



Cosec
$$Q = \frac{1}{\sin Q} = \frac{x}{y}$$

 $\sec Q = \frac{1}{\cos Q} = \frac{x}{x}$
 $\cot Q = \frac{1}{\tan Q} = \frac{x}{y}$

$$\tan \theta = \frac{\gamma}{x} = \frac{Sm\theta}{\cos \theta}$$

$$n^2 + y^2 = r^2$$

$$Sin^2 \theta + (os^2 \theta) = \frac{\gamma^2}{r^2} + \frac{\chi^2}{r^2}$$

$$Sin^2 \theta + (os^2 \theta) = 1$$

Sm 0 = 7

Coso = x

$$1 + 60t^{2}\theta = 1 + \frac{\chi^{2}}{y^{2}} = \frac{\chi^{2} + y^{2}}{y^{2}} = \frac{\chi^{2}}{y^{2}} = \frac{680c^{2}\theta}{y^{2}}$$

$$-1 + 60t^{2}\theta = 680c^{2}\theta$$

$$\frac{1}{1} + \frac{1}{4} + \frac{1}{4} = \frac{1}{12} = \frac$$

Prove that

(a) If
$$\log a \circ 0 - \sin 0 = a^3$$
 & $\sec 0 - \cos 0 = b^3$
find $a^2b^2(a^2+b^2)$ given $ab \neq 0$

$$\frac{(3 - 40)^{2} - (6 - 8)^{2}}{(3 - 40)^{2} - (6 - 8)^{2}} = \frac{(5 - 40)^{2} + (6 - 8)^{2}}{(5 - 40)^{2} + (6 - 8)^{2}} = \frac{(5 - 40)^{2} + (6 - 8)^{2}}{(5 - 40)^{2} + (6 - 8)^{2}} = \frac{(5 - 40)^{2} + (6 - 8)^{2}}{(5 - 40)^{2} + (6 - 8)^{2}} = \frac{(5 - 40)^{2}}{(5 - 40)^{2} + (6 - 8)^{2}} = \frac{(5 - 40)^{2}}{(5 - 40)^{2}} = \frac{(5 - 40)^{2}}{(5 - 40)^{2}}$$

Simo = 1-Simo = 6000. 9 ma + sm20 = 1 Sma(1+Sm0) = 1 Sm60 + 35m50 + 35m40 + 5m30 35m40 (1+5m0) 3 Sm40 (Coseco) 35,0030. Sim60 + Sim30 = Sim30 (1+Sim30) = Sin30(1+Simo) (Sin20+1-Simo)

 $= \sin^{3} \alpha (1 + \sin \alpha) (\sin^{2} \alpha + 1 - \sin^{2} \alpha)$ $= \sin^{3} \alpha (1 + \sin \alpha) (\sin^{2} \alpha + 1 - \sin^{2} \alpha)$ = 1. $\sin^{6} \alpha + \sin^{3} \alpha + 3\sin^{3} \alpha (\sin^{2} \alpha + \sin \alpha)$ $\sin^{6} \alpha + \sin^{3} \alpha + 3\sin^{3} \alpha (\sin^{2} \alpha + \sin \alpha)$ = 1. $\sin^{6} \alpha + \sin^{3} \alpha + 3\sin^{3} \alpha (\sin^{2} \alpha + \sin \alpha)$ = 1.

		1				
T		0°	30°	4s°	60°	90°
	Sim	0	1/2	1/52	13/2	1
	los	1	13/2	1/12	1/2_	O
	tan.	0	1/13	1	V3	0

1ST Quadrant.

$$Sim(90-0) = + Cos 0$$

 $Cos(90-0) = + Sim 0$
 $team(90-0) = + Cot 0$
 $Cot(90-0) = + team 0$
 $Sec(90-0) = + Cosec 0$
 $Cosec(90-0) = + Sec 0$

2 rd Quatrant.

$$S_{m}(180-0) = + S_{m}0$$

 $(os(180-0) = - (os0)$
 $tan(180-0) = - tan0$
 $(o+(180-0) = - (o+0)$
 $Sec(180-0) = - Sec0$
 $(ose(180-0) = + (ose0)$

2nd Quadrant Sin(90+0) = + Cos

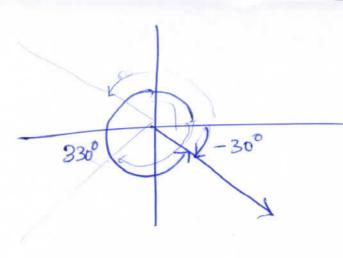
$$Sin(90+0) = + cos 0$$

 $cos(90+0) = - Sin0$
 $tan(90+0) = - cot 0$
 $cot(90+0) = - tan 0$
 $sec(90+0) = - cosec 0$
 $cosec(90+0) = + Sico$

3rd Quadrant.

$$Sm(180+0) = -Sm0$$

 $los(180+0) = -los0$
 $ton(180+0) = +ton0$
 $lot0$
 $lot0$
 $lot0$
 $lose(180+0) = -losee0$
 $lose(180+0) = -losee0$
 $lose(180+0) = -losee0$



(i)
$$\tan 330^{\circ}$$

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

$$+ \tan \left(\frac{\pi}{6}\right) = +\frac{1}{13}$$

$$Sm\left(2\pi-\frac{\pi}{6}\right)$$

$$Sm\left(\frac{11\pi}{6}\right)$$
 $Sm\left(2\pi-\frac{\pi}{6}\right) = -Sm\left(\frac{\pi}{6}\right)$
= $-\frac{1}{2}$

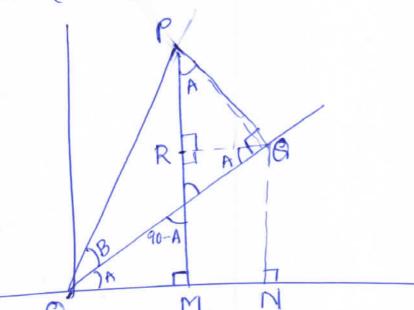
$$\tan(360-30) = -\tan 30 = -\frac{1}{\sqrt{3}}$$

$$Sim(330^{\circ})$$

= $Sim(360-30)$
= $-Sim 30^{\circ}$

$$\log(\pi - \frac{\pi}{6}) = -\log \frac{\pi}{6}$$

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



$$Sim(A+B) = \frac{PM}{OP}$$

$$= \frac{PR + RM}{OP}$$

$$= \frac{PR}{OP} + \frac{RM}{OP}$$

$$= \frac{PR}{OP} + \frac{ON}{OP}$$

$$= \frac{PR \times P0}{P0 \times OP} + \frac{ON}{OB} \times \frac{O0}{OP}$$
$$= \cos A \times \sin B + \sin A \cos B.$$

$$Sim(A+B) = SimAlosB + losASimB$$
 $Sim(A-B) = SimAlos(-B) + losASim(-B)$
 $Sim(A-B) = SimAlosB - losASimB$
 $los(A-B) = Sim(90-(A+B)) = Sim(90-A)-B$
 $los(A+B) = Sim(90-A)losB - los(90-A)simB$
 $los(A+B) = losAlosB + SimASimB$
 $los(A-B) = losAlosB + SimASimB$

$$$\sin 75^\circ = \sin (30 + 45^\circ) = \sin 30^\circ \cos 4 \cos^\circ + \cos 30^\circ \sin 45^\circ$$

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

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

$$= \tan 45^\circ = \tan 30^\circ = 1 - \frac{1}{\sqrt{3}}$$

$$= \tan 45^\circ + \tan 30^\circ = 1 + \frac{1}{\sqrt{3}}$$

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

Double Angles & Tople Angles > tan (A+A) Cos 2 A Sim 2A = tan A + ten A I - tan A-tan A (OS (A+A) = 2 tan A Sm(A+A) = losa losa - Smasma I - tanz A SIMA LOSA + LOSA SIMA = Cos2A - Sin2A = 1-25m2A = 2 SmAlosA. = 2652A-1 tan 3A = Stan A - tan 3A Find SinsA Cos 3A 1-3tan2A =4653A-365A = 35mA-45m3A Sin (A+ZA) = SinAloszA + CosASmZA = Sin A (1-25m2A) + los A (25mAlosA) = SIMA-2SIM3A + 2SIMA(1-SIM2A) = SIMA-25m3A +25mA-25m3A

= 35m A - 45m3A

$$Sm\left(\frac{A}{2}\right)$$

(600)
$$\cos 2A = 1 - 2\sin^2 A$$
.
 $\cos A = 1 - 2\sin^2 A$.
 $2\sin^2 A = 1 - \cos A$.
 $\sin^2 A = 1 - \cos A$.
 $\cos A = 1 - \cos A$.

$$\cos 2A = 2\cos^2 A - 1$$
.
 $\cos A = 2\cos^2 A - 1$.
 $\cos A = 1 + \cos A$.

$$\frac{1}{2} = \frac{5mA}{2} = \pm \sqrt{\frac{1+\cos A}{2}}$$

$$\frac{1+\cos A}{2} = \pm \sqrt{\frac{1-\cos A}{1+\cos A}}$$

$$= \pm \frac{1-\cos A}{1+\cos A}$$

$$= \pm \frac{1-\cos A}{\sin A}$$

Product -> Sum transformation

= $2 \operatorname{Sim} \times (\operatorname{os} Y)$ = $2 \operatorname{Sim} \left(\frac{A+B}{2}\right) \operatorname{los} \left(\frac{A-B}{2}\right)$

$$A = X + Y$$
 $B = X - Y$

$$X = A + B$$
 $Y = A - B$ Z

$$(SA - los B = -2 Sin(A+B) Sin(A-B)$$

$$= 2 Sin(A+B) Sin(B-A)$$

$$Sim A - Sim B = 2 Sim \left(\frac{A-B}{2}\right) los \left(\frac{A+B}{2}\right)$$

Find

tan 15° =
$$\tan (45^{\circ}-30^{\circ}) = \frac{\tan u \cdot s^{\circ} - \tan 30^{\circ}}{1 + \tan u \cdot s^{\circ} + \tan 30^{\circ}} = \frac{1 - 1/3}{1 + 1/3} = \frac{1}{\sqrt{3} + 1} = 2 - \sqrt{3}$$

 $\tan 22.5^{\circ} = \tan (\frac{45^{\circ}}{2}) = \frac{1 - (\cos u \cdot s^{\circ})}{5 \cdot m \cdot u \cdot s^{\circ}} = \frac{1 - 1/3}{1 + 1/3} = \sqrt{2} - 1$
 $\tan 67.5^{\circ} = \tan (\frac{135^{\circ}}{2}) = \frac{1 - (\cos 135^{\circ})}{5 \cdot m \cdot 135^{\circ}} = \frac{1 + 1/3}{1 + 1/3} = \sqrt{2} + 1$
 $\tan 75^{\circ} = \tan (u \cdot s^{\circ} + 30^{\circ}) = \frac{\tan u \cdot s^{\circ} + \tan 30^{\circ}}{5 \cdot m \cdot 135^{\circ}} = \frac{1 + 1}{1 + 1/3} = \frac{1 + 1/3}{1 + 1/3} =$

$$S_{1m}72^{\circ} = 2 S_{1m}36^{\circ} (os36^{\circ})$$

 $(os/18^{\circ} = 2(2 S_{1m}18^{\circ} (os18^{\circ})(1-2 S_{1m}^{2}18^{\circ}))$
 $1 = 4 S_{1m}18^{\circ} - 8 S_{1m}^{3}18^{\circ}$

$$85m^{3}18^{6} - 45m18 + 1 = 0$$

$$(25m^{18} - 1)(45m^{3}18 + 25m18 - 1) = 0$$

$$\pm 0$$

$$S_{10}18 = -2 \pm \sqrt{4 + 16}$$

$$= -2 \pm 2\sqrt{5}$$

$$= 2x4$$

$$= \sqrt{5 - 1}$$

$$= 4$$

```
Homework.
        Prove theet
      Sin 470 + Sin 610 - Sin 110 - Sin 250 = Cos 70
Q1
      Find (Sino+ losec a) + (050 + Seco) - (tan 20+6+20)
02
       Find Sin (x-B), los (x-B)
03
         1 (1) Sind = 8 ten = 5 12 de B 1ST Quad.
            ii) (os d = -\frac{12}{12} (of \beta = \frac{24}{7} & 2nd \beta = 15 &
            4 6000 60020 Sec 30 60040 = 1
04
                    1f 90 = x
    2 Sin 54° los 7° - 2 Sin 18° los 7°
        2 (0570 (Sms4-Sm18)
        2 \log 7^{\circ} \left( \frac{\sqrt{s+1}}{4} - \left( \frac{\sqrt{s-1}}{4} \right) \right)
        2657° (1/2) = 657°
(Ansz) (Simo+1 toso
       Sin207+ Cosec20+25m0Cosec0
       + Cos20 (+ Sec2 a + 2 Cosa Sec0.
      - tan20- Co+20.
      1+2+2+1+1 = (7)
```

i) Sin (d-B) = Sindlos B - Losa Sn B

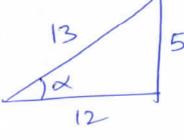
$$Sind = \frac{8}{17}$$
 $losa = \frac{15}{17}$

$$= \frac{8 \times 12}{17 \times 13} - \frac{15 \times 5}{17 \times 13}$$

$$=\frac{21}{17x12}$$

6S(x-B) = Cosx Cos B + Sind SmB.

$$ii) \quad \cos x = -\frac{12}{12}$$



Ans4 T.P 46006000 Sec30 6000 = 1. 90 = 7. 4 605 x 605 2x Set 3x 605 4x 3 Sing 6 6 5 1 60 5 (4x) Sim 2 Sn Alosa = Sm2A 2 Sin 27 605 27 605 47 Sint

$$\frac{2 \operatorname{Sim} \frac{4\pi}{9} \log \frac{\pi}{9}}{\operatorname{Sim} \frac{\pi}{9}} = \frac{\operatorname{Sim} \frac{8\pi}{9}}{\operatorname{Sim} \frac{\pi}{9}} = \frac{\operatorname{Sim} \left(\pi - \frac{\pi}{9}\right)}{\operatorname{Sim} \frac{\pi}{9}} = \frac{\operatorname{Sim} \left(\pi - \frac{\pi}{9}$$