Nishant Jindal

HAPPY

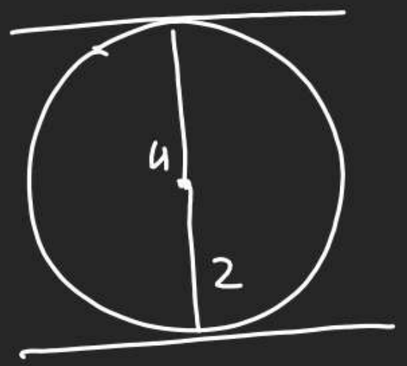
Birthday

GB SIR

Nishant Jindal

$y=\sqrt{3}x+c_1$

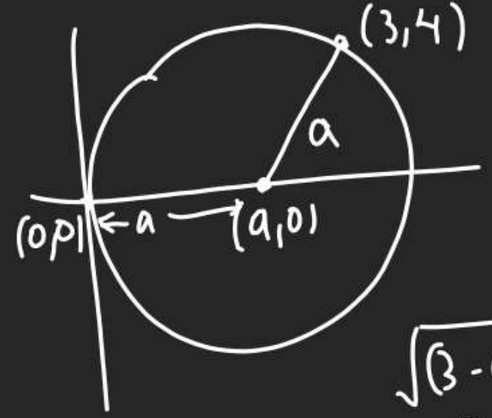
$y=\sqrt{3}x+c_2$



$$\frac{|c_1-c_2|}{\sqrt{(\sqrt{3})^2+(1)^2}}=4$$

$$|c_1-c_2|=8$$

(8)

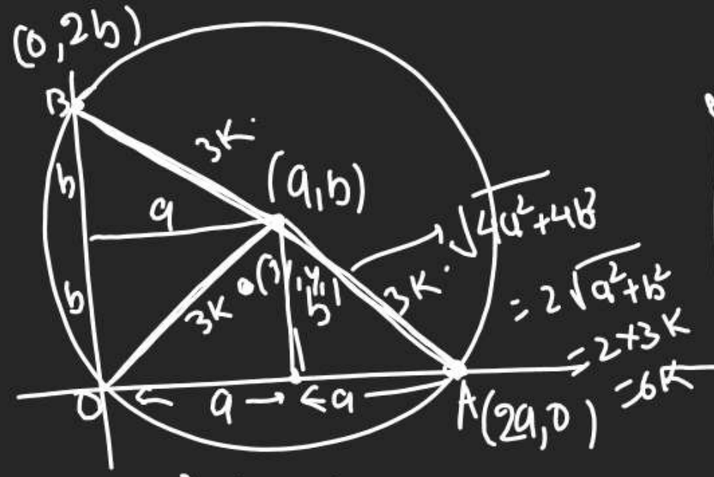


$$\sqrt{(3-a)^2+(4-0)^2}=a$$

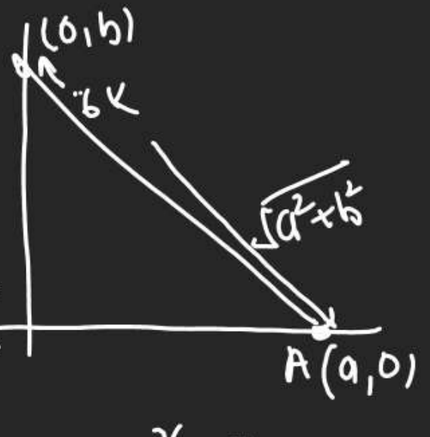
$$a^2-6a+9+16=a^2$$

$$6a=25$$

11)



$$a^2+b^2=9K^2$$



$$\frac{x}{a}+\frac{y}{b}=1$$

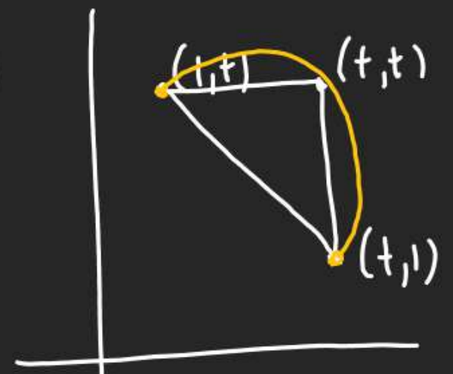
$$x_1=\frac{2a}{3}+0+0 \qquad y_1=0+0+\frac{2b}{3}$$

$$a=\frac{3x_1}{2},\ b=\frac{3y_1}{2}$$

$$a^2+b^2=9K^2$$

$$\frac{9x_1^2}{4}+\frac{9y_1^2}{4}=9K^2$$

12)



$$(x-1)(x-t)+(y-t)(y-1)=0$$

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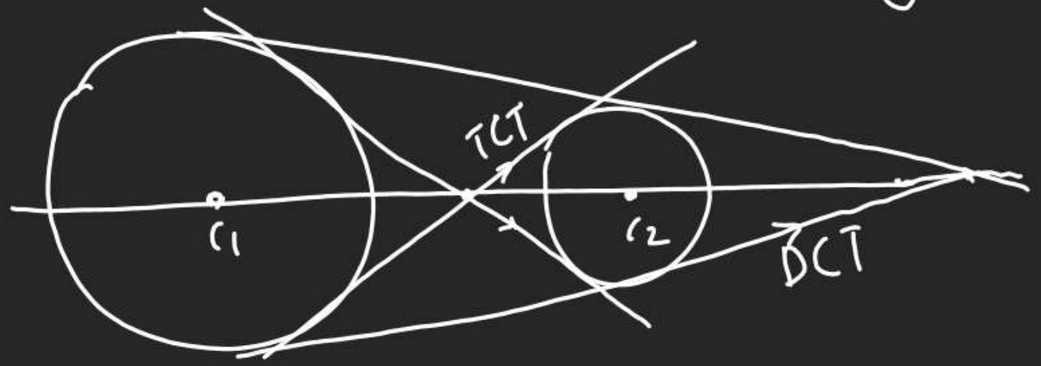
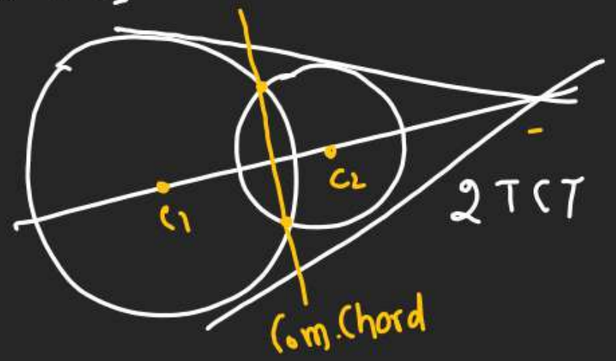
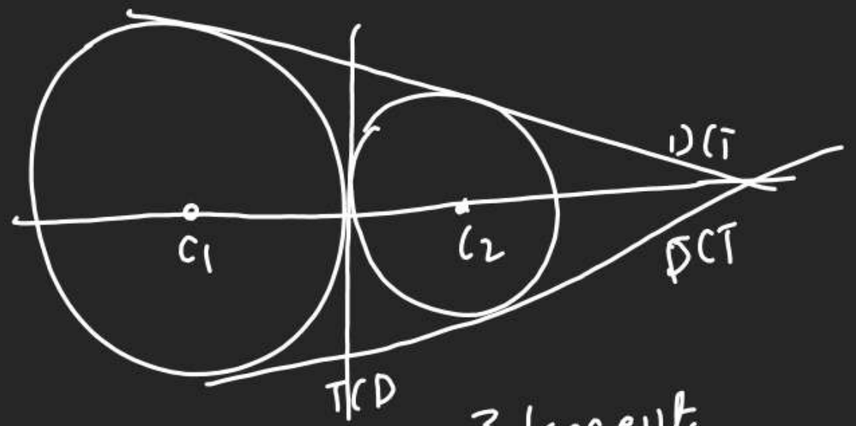
Position of 2 Circles [Common tangent Bet^n Circles]





No Com. Chord + No Com tmgent



3 tangents

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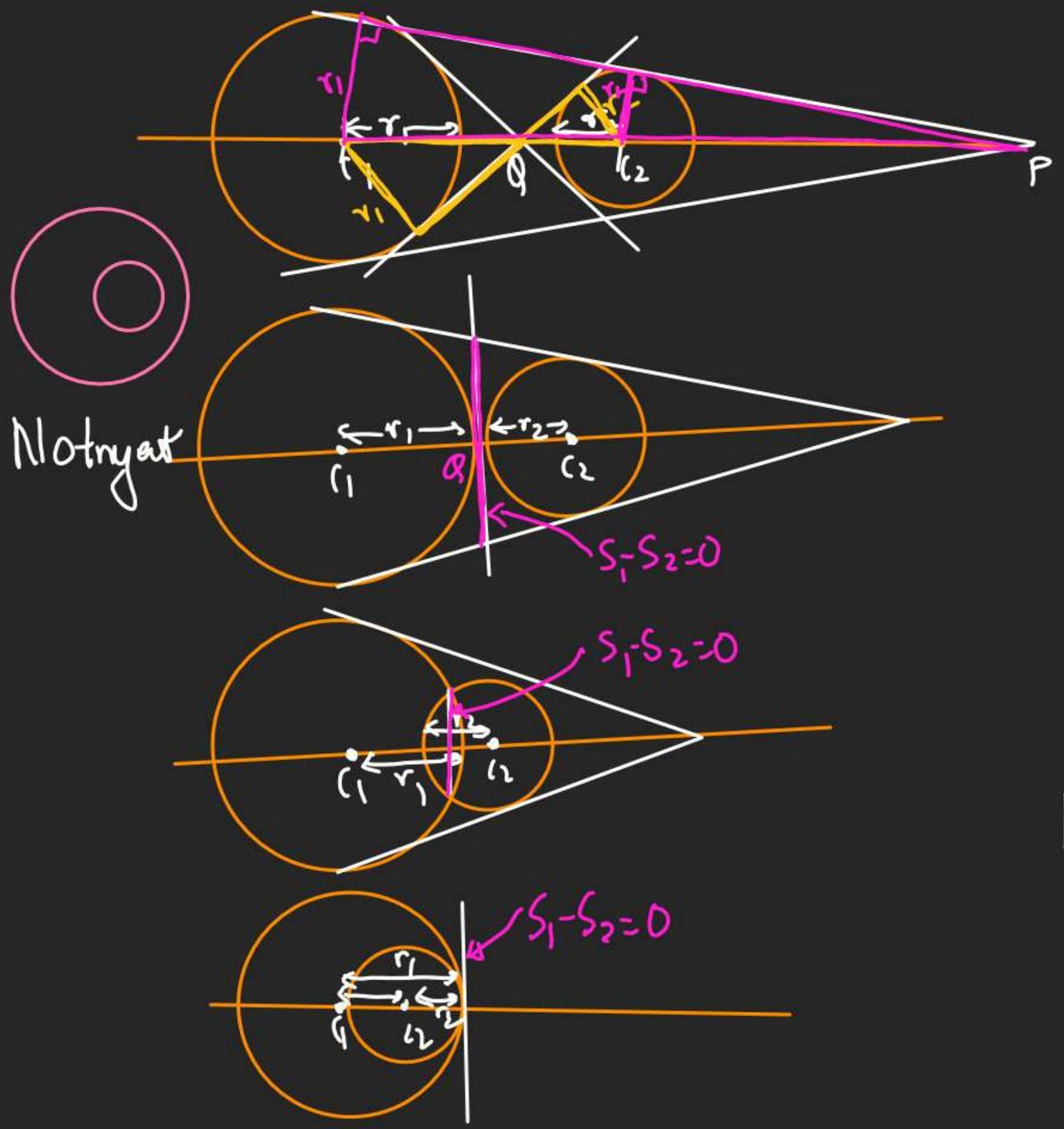

Circles seperated. $|C_1C_2| > r_1+r_2$

4 tmgent = 2 TCT + 2 DCT.

Q is POI of TCT → $\frac{C_1Q}{C_2Q} = \frac{r_1}{r_2}$

P is POI of DCT $\frac{C_1P}{C_2P} = \frac{r_1}{r_2}$ → P divides $r_1 : r_2$ Externally

Circles toaching $|C_1C_2| = r_1+r_2$

3 tmgents 2 DCT + 1 Com. tmgent

Circle Intersecting $|r_1-r_1| < |C_1C_2| < r_1+r_1$

2 tmgents → 2 DCT + 1 Com. chord

Circles toaching Internally. $|C_1C_2| = |r_1 \ominus r_2|$

1 tmgent → Common tmgent

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Q Check Positions of Circles

$S_1: x^2+y^2=2$ &

$S_2: x^2+y^2-6x-6y+10=0$ &

find No of Tangents.

$S_1: x^2+y^2=2$

C_1: Centre $=(0,0)$, Rad. $=\sqrt{2}=r_1$

$S_2: x^2+y^2-6x-6y+10=0$

C_2: Centre $=(3,3)$, Rad $=\sqrt{9+9-10}$

$=\sqrt{8}=2\sqrt{2}=r_2$

$C_1C_2=\sqrt{(3-0)^2+(3-0)^2}=3\sqrt{2}$

$r_1+r_2=\sqrt{2}+2\sqrt{2}=3\sqrt{2}$

$C_1C_2=r_1+r_2$ (touching eachother)

3 tangents

Q Find Cond^n if

$S_1: x^2+y^2+2ax+c=0$

$S_2: x^2+y^2+2by+c=0$

touches eachother.

touching

$C_1C_2=r_1\pm r_2$

$C_1=(-a,0)$, $r_1=\sqrt{a^2+0-c}$

$C_2=(0,-b)$, $r_2=\sqrt{0+b^2-c}$

$C_1C_2=\sqrt{a^2+b^2}=\sqrt{a^2-c}\pm\sqrt{b^2-c}$

$\Rightarrow a^2+b^2=(a^2-c)+(b^2-c)\pm 2\sqrt{a^2-c}\sqrt{b^2-c}$

$2c=\pm 2\sqrt{(a^2-c)(b^2-c)}$

$c^2=(a^2-c)(b^2-c)=a^2b^2-((a^2+b^2)+c^2$

$\Rightarrow a^2b^2=c(a^2+b^2)$

$\frac{1}{c}=\frac{a^2+b^2}{a^2b^2}\Rightarrow \boxed{\frac{1}{c}=\frac{1}{a^2}+\frac{1}{b^2}}$

Q Check Positions of

$S_1: x^2+y^2-4x-10y+4=0$

$S_2: x^2+y^2-6x-12y-55=0$

1) $C_1: (2,5)$ $r_1=\sqrt{4+25-4}=5$

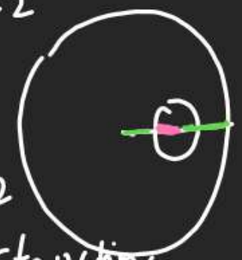
$C_2: (3,6)$ $r_2=\sqrt{9+36+55}=10$

2) $C_1C_2=\sqrt{(-1)^2+(-1)^2}=\sqrt{2}$

$r_1+r_2=5+10=15>C_1C_2$

3) $|r_1-r_2|=|10-5|=5$

$|r_1-r_2|>C_1C_2$



Circle Nrether touching Externally nor Internally But Inside Somewhere.

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Q Find Eq^n of Com. tangent for circle.

$S_1: x^2+y^2=2$

$S_2: x^2+y^2-6x-6y+10=0$

① $C_1: (0,0)$, $C_2: (3,3)$ $\Big\}$ $C_1C_2 = \sqrt{3^2+3^2} = 3\sqrt{2} = 3\times1.4 = 4.2$

② $r_1 = \sqrt{2}$

$r_2 = \sqrt{3^2+3^2-10} = \sqrt{8} = 2\sqrt{2}$

$r_1+r_2 = 3\sqrt{2} = C_1C_2$ (2 pt)

③ Com. tangent $\to S_1 - S_2 = 0$

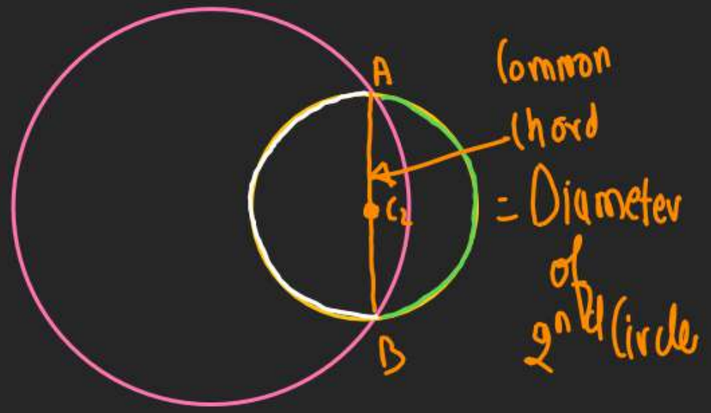
$(x^2+y^2-2) - (x^2+y^2-6x-6y+10) = 0$

$6x+6y-12=0$

$x+y=2$

Q If Circle $x^2+y^2+2g_1x+2f_1y+c_1=0$ Bisects Circumference $x^2+y^2+2g_2x+2f_2y+c_2=0$ then

$2g_2(g_1-g_2)+2f_2(f_1-f_2) = ?$



① Com Chord $\to S_1 - S_2 = 0$

$x^2+y^2+2g_1x+2f_1y+c_1=0$

$x^2+y^2+2g_2x+2f_2y+c_2=0$

$2x(g_1-g_2)+2y(f_1-f_2) = c_2-c_1$

② Com. chord is satisfied by Centre of 2nd Circle (C_2) $(-g_2, -f_2)$

$-2g_2(g_1-g_2)-2f_2(f_1-f_2) = c_2-c_1$

$2g_2(g_1-g_2)+2f_2(f_1-f_2) = c_1-c_2$

Ans c_1-c_2

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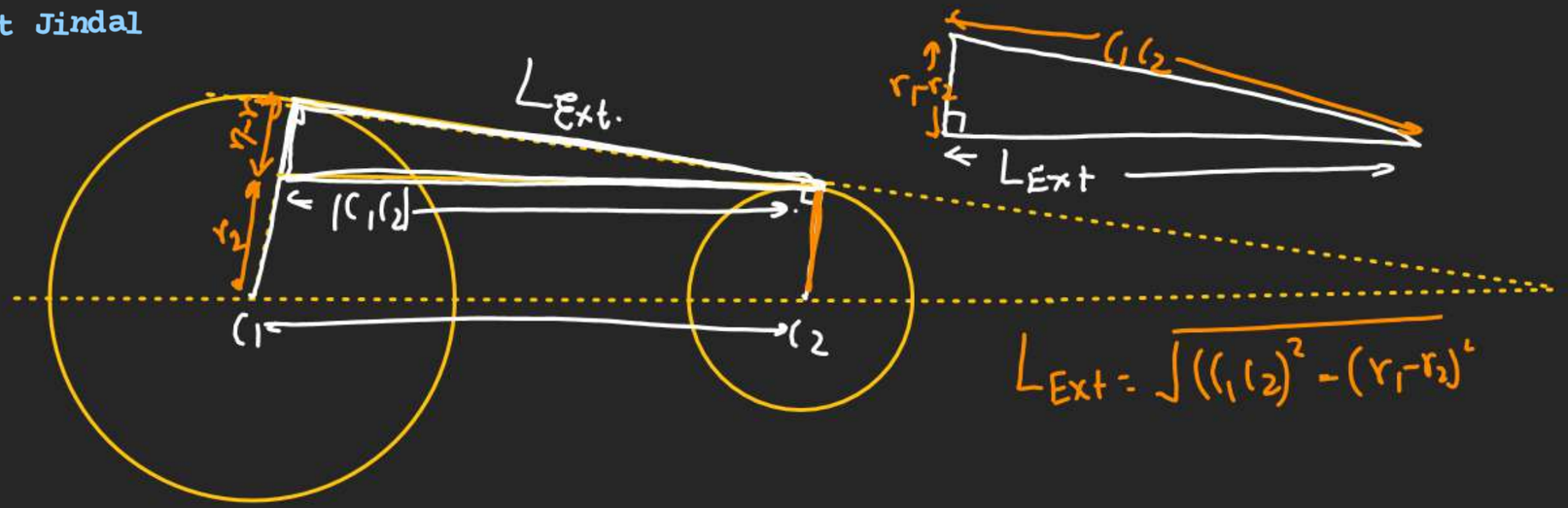
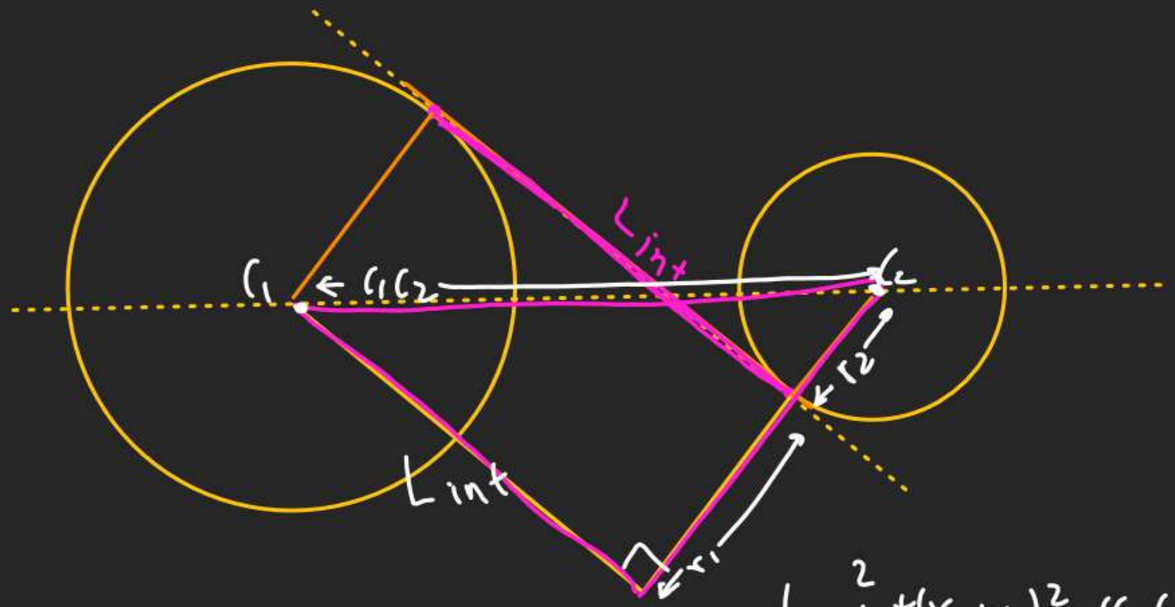


$$L_{Ext} = \sqrt{(C_1C_2)^2 - (r_1-r_2)^2}$$



$$L_{int}^2 + (r_1+r_2)^2 = (C_1C_2)^2$$

$$L_{int} = \sqrt{(C_1C_2)^2 - (r_1+r_2)^2}$$

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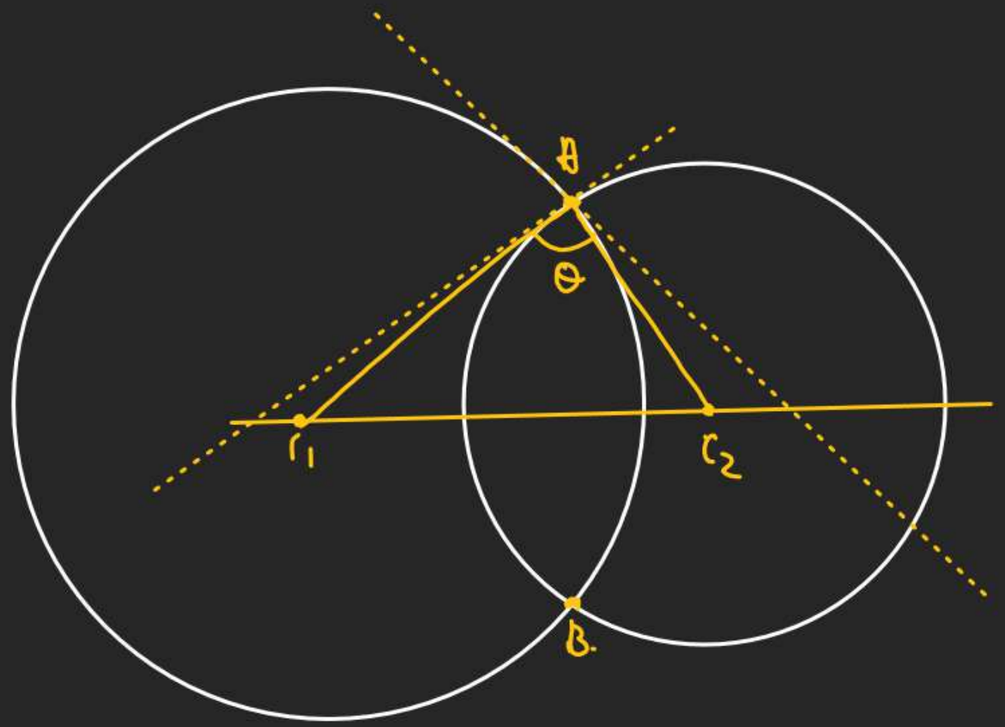
Angle of Intersection of 2 Circles