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$$NOTION Q = \frac{3}{R} = \frac{-\sqrt{40}}{7} = \frac{-2\sqrt{10}}{7}$$

$$Con \theta = \frac{3}{7}$$

$$Con \theta = \frac{R}{7} = \frac{-7}{\sqrt{40}} \cdot \frac{\sqrt{40}}{\sqrt{40}} = \frac{-7\sqrt{40}}{40}$$

$$tan \theta = \frac{-\sqrt{40}}{3} = \frac{-2\sqrt{10}}{3}$$

$$Cot \theta = \frac{-3}{\sqrt{40}} = -\frac{3\sqrt{40}}{40} = -\frac{6\sqrt{10}}{40}$$

$$= -\frac{3\sqrt{10}}{20}$$

Pythagorean Identity

$$(1) (\sin \theta)^{2} + (\cos \theta)^{2} = 1; \text{ true}$$
Motation: $\sin^{2} \theta + \cos^{2} \theta = 1$ for any angle θ

 $(2)(\tan \theta)^{2} + 1 = (\operatorname{sec} \theta)^{2}, \text{ for any}$ Notation: $\tan^{2}\theta + 1 = \operatorname{sec}^{2}\theta$ angle θ (Reason why this is true: $|HS = \left(\frac{y}{x}\right)^{2} + 1 = \frac{y^{2}}{x^{2}} + 1 = \frac{y^{2}}{x^{2}} + \frac{x^{2}}{x^{2}} + \frac{x^{2}}{x^{2}} + \frac{y^{2}}{x^{2}} + \frac{y^{2}}{x^{2$ $=\frac{y^2+x^2}{x^2}=\frac{R^2}{x^2}=\left(\frac{R}{x}\right)^2$ $= (sec \theta)^2 = RHS$ (3) $(c^2 \Theta + 1)$ = crc²O, true for all angles O for which coto & cosco are defined.

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hagorean Identity: 1) $\sin^2\theta + \cos^2\theta =$ (2) $\tan^2 \Theta + 1 = \sec^2 \Theta$ $1 \cot^2 \theta + 1 = \csc^2 \theta$ Quotient Identities: $\frac{1}{\cos \Theta} = \tan \Theta \quad (provided that \\ \cos \Theta \neq O \\)$ $\frac{\cos\theta}{\sin\theta} = \cot\theta \text{ (provided that}$ $\sin\theta \neq 0$

$$E \cdot g \cdot Given that \cos\theta = -\frac{\sqrt{3}}{4} \text{ and } \sin\theta > 0$$

$$Q \cdot Use Identities to find nin \theta and tan \theta$$

$$Sol: nin^{2}\theta + \cos^{2}\theta = 1$$

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

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

$$nin^{2}\theta = \frac{1}{16} = 1$$

$$nin^{2}\theta = \frac{13}{16} = 1$$

$$nin^{2}\theta = \frac{13}{16} = \frac{13}{16}$$

$$rin\theta = \pm \frac{\sqrt{13}}{4} = \frac{13}{16}$$
Since we are given that nin > 0, we nust have $\sin\theta = \frac{\sqrt{3}}{-\frac{\sqrt{3}}{4}} = -\frac{\sqrt{13}}{4} = \frac{\sqrt{13}}{\sqrt{3}} = \frac{\sqrt{13}}{\sqrt{3}}$

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E.g. Given that $\tan \theta = \frac{4}{3}$ and θ is in quadrant III. Find mo and cort using identities.

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$$\begin{aligned} \operatorname{Ain}^{2} \Theta + (\operatorname{con}^{2} \Theta) &= 1\\ \operatorname{Ain}^{2} \Theta + \left(-\frac{3}{5}\right)^{2} &= 1\\ \operatorname{Ain}^{2} \Theta + \frac{9}{25} &= 1\\ \operatorname{Ain}^{2} \Theta &= \frac{16}{25}\\ \operatorname{Ain} \Theta &= \pm \frac{4}{5}\\ \operatorname{Since} \Theta \text{ is in quadrant III, } \operatorname{Ain} \Theta &= -\frac{4}{5}. \end{aligned}$$

$$\begin{aligned} & 2^{nd} \operatorname{way} \text{ to find } \operatorname{Ain} \Theta.\\ & + \operatorname{an} \Theta &= \frac{\operatorname{Ain} \Theta}{\operatorname{con} \Theta} \quad (\operatorname{Quotient Identily})\\ & \frac{4}{3} &= \frac{\operatorname{Ain} \Theta}{-\frac{3}{5}} \quad \operatorname{Ain} \Theta &= -\frac{4}{5}. \end{aligned}$$