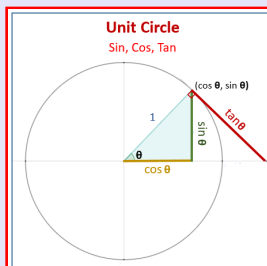


Trigonometry

Lecture 16



Feb 19-8:47 AM

Verify $\frac{\tan A}{\sec A} = \sin A$ ✓

$$\begin{aligned} \frac{\tan A}{\sec A} &= \frac{\frac{\sin A}{\cos A}}{\frac{1}{\cos A}} = \frac{\sin A}{\cos A} \div \frac{1}{\cos A} \\ &= \frac{\sin A}{\cos A} \cdot \frac{\cos A}{1} = \frac{\sin A}{1} = \sin A \end{aligned}$$

Verify $\frac{\cos^2 x}{1 - \sin x} = 1 + \sin x$ ✓

$$\begin{aligned} \frac{\cos^2 x}{1 - \sin x} &= \frac{1 - \sin^2 x}{1 - \sin x} \\ &= \frac{(1 - \sin x)(1 + \sin x)}{1 - \sin x} \\ &= 1 + \sin x \end{aligned}$$

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

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

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

$$1 = 1^2$$

Sep 24-10:26 AM

Verify

$$\csc B - \sin B = \cot B \cos B \quad \checkmark$$

$$\csc B - \sin B = \frac{1}{\sin B} - \frac{\sin^2 B}{\sin B}$$

$$= \frac{1 - \sin^2 B}{\sin B} = \frac{\cos^2 B}{\sin B}$$

$$= \frac{\cos B \cdot \cos B}{\sin B}$$

$$= \boxed{\cot B \cos B} \quad \checkmark$$

$$\frac{\sin B \cdot \sin B}{\sin B} = \frac{\sin^2 B}{\sin B}$$

Sep 24-10:34 AM

Verify

$$\frac{1}{1 - \sin x} + \frac{1}{1 + \sin x} = \frac{2}{\cos^2 x} \quad \checkmark$$

$$\frac{1(1 + \sin x)}{(1 - \sin x)(1 + \sin x)} + \frac{1(1 - \sin x)}{(1 + \sin x)(1 - \sin x)} =$$

$$\frac{1 + \cancel{\sin x} + 1 - \cancel{\sin x}}{(1 - \sin x)(1 + \sin x)} = \frac{2}{1 - \sin^2 x} = \frac{2}{A^2 - B^2} = \boxed{\frac{2}{\cos^2 x}}$$

Sep 24-10:39 AM

Verify

$$\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} = 2 \csc A$$

foil

$$\frac{\sin A \cdot \sin A}{(1 + \cos A) \cdot \sin A} + \frac{(1 + \cos A)(1 + \cos A)}{\sin A (1 + \cos A)}$$

$$= \frac{\sin^2 A + 1 + \cos A + \cos A + \cos^2 A}{(1 + \cos A) \cdot \sin A}$$

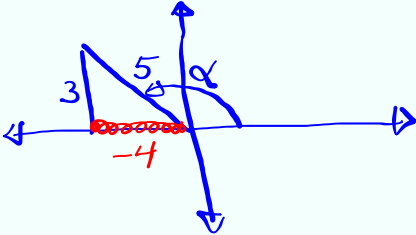
$$= \frac{2 + 2\cos A}{(1 + \cos A) \sin A} = \frac{2(1 + \cos A)}{(1 + \cos A) \sin A}$$

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

$$= 2 \cdot \frac{1}{\sin A} = \boxed{2 \csc A}$$

Sep 24-10:45 AM

$\sin \alpha = \frac{3}{5}$, α is in QII , find



$\sin(-\alpha) = -\sin \alpha = \boxed{-\frac{3}{5}}$

$\cos(-\alpha) = \cos \alpha = \boxed{-\frac{4}{5}}$

$\tan(-\alpha) = -\tan \alpha = -\frac{3}{-4} = \frac{-3}{-4} = \boxed{\frac{3}{4}}$

Sep 24-10:53 AM

$\tan \alpha = \frac{5}{12}$ $180^\circ < \alpha < 270^\circ$ Find
Q III

$\sin \alpha = -\frac{5}{13}$ $\csc \alpha = -\frac{13}{5}$

$\cos \alpha = -\frac{12}{13}$ $\sec \alpha = -\frac{13}{12}$

$\tan \alpha = \frac{5}{12}$ $\cot \alpha = \frac{12}{5}$

Sep 24-10:58 AM

$\sin \alpha = -\frac{2}{3}$, α is in Q IV Find

$\sin \alpha = -\frac{2}{3}$ $\csc \alpha = -\frac{3}{2}$

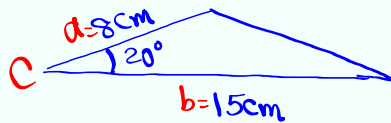
$\cos \alpha = \frac{\sqrt{5}}{3}$ $\sec \alpha = \frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{3\sqrt{5}}{5}}$

$\tan \alpha = \frac{-2}{\sqrt{5}} = \boxed{\frac{-2\sqrt{5}}{5}}$ $\cot \alpha = \boxed{\frac{-\sqrt{5}}{2}}$

Sep 24-11:03 AM

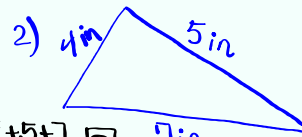
Find the area

1)



SAS Area = $\frac{1}{2} ab \sin C$

$$\begin{aligned} \text{Area} &= \frac{1}{2} \cdot (8)(15) \cdot \sin 20^\circ \\ &= 60 \sin 20^\circ \approx \boxed{21 \text{ cm}^2} \end{aligned}$$



$$s = \frac{4+5+7}{2} = 8 \text{ in.}$$

SSS

Heron's
Formula

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{a+b+c}{2}$$

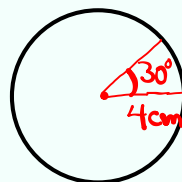
$$\text{Area} = \sqrt{8(8-4)(8-5)(8-7)}$$

$$= \sqrt{8 \cdot 4 \cdot 3}$$

$$= \sqrt{96} \approx \boxed{10 \text{ in}^2}$$

Sep 24-11:08 AM

1) Draw a sector with $r = 4 \text{ cm}$ & $\theta = 30^\circ$



$$\theta = \frac{\pi}{6}$$

Rad.

2) find its area

$$\begin{aligned} A &= \frac{1}{2} r^2 \theta = \frac{1}{2} \cdot 4^2 \cdot \frac{\pi}{6} \\ &= \frac{8\pi}{6} = \boxed{\frac{4\pi}{3} \text{ cm}^2} \end{aligned}$$

3) find its
arc length.

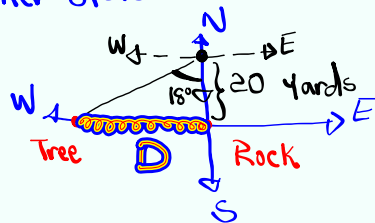
$$s = r\theta$$

$$= 4 \cdot \frac{\pi}{6}$$

$$= \boxed{\frac{2\pi}{3} \text{ cm}}$$

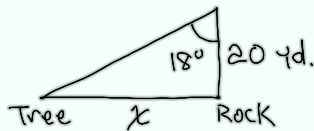
Sep 24-11:16 AM

A tree is on one side of a river, and is due west of a rock on the other side of the river.



20 yards North of rock,
the bearing of the tree is $S 18^\circ W$.

How far is the rock from the tree?



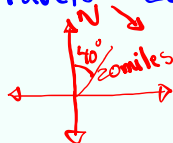
$$\tan 18^\circ = \frac{x}{20}$$

$$x = 20 \tan 18^\circ$$

$$\approx 6 \text{ Yards} \approx 6.5 \text{ Yards}$$

Sep 24-11:22 AM

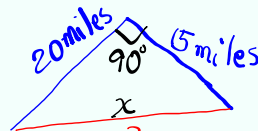
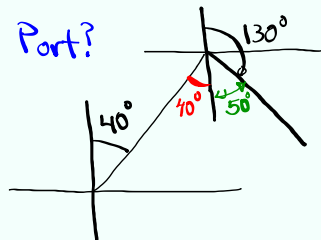
A boat travels 20 miles with a bearing of 40° .



It changes bearing, it travels 15 miles with a bearing of 130° .



How far is the boat from the original Port?

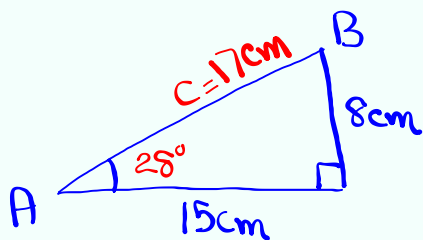


$$\begin{aligned} x^2 &= 20^2 + 15^2 \\ &= 400 + 225 \\ &= 625 \end{aligned}$$

$$\begin{aligned} x &= \sqrt{625} \\ x &= 25 \text{ miles} \end{aligned}$$

Sep 24-11:29 AM

Solve the triangle below



$$c^2 = a^2 + b^2$$

$$= 8^2 + 15^2 = 289$$

$$\tan A = \frac{8}{15}$$

$$A = \tan^{-1}\left(\frac{8}{15}\right) \approx 28^\circ$$

$$A + B = 90^\circ$$

$$B = 90 - 28$$

$$\boxed{B = 62^\circ}$$

$$\boxed{C = 17}$$

Sep 24-11:38 AM