Review 2

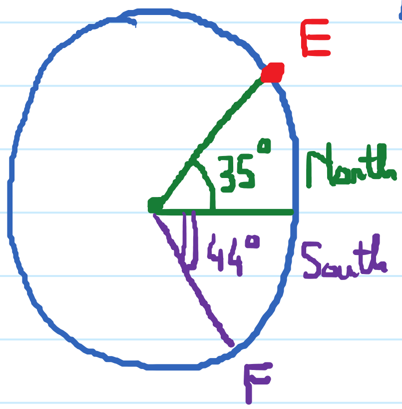
Monday, March 2, 2020 9:39 AM

MC

1. $288^\circ \longrightarrow 288 \cdot \dfrac{\pi}{180} = \dfrac{288\pi}{180} = \boxed{\dfrac{8\pi}{5}}$ Reduce

2. $-\dfrac{9\pi}{6} \longrightarrow -\dfrac{9 \cdot 180}{6} = \boxed{-270^\circ}$

Replace π by 180

3. 

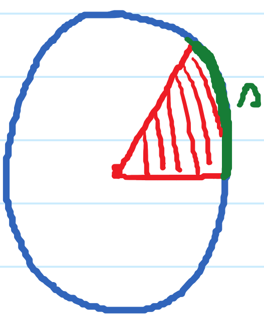
Angle between 2 cities:

$\theta = 35^\circ + 44^\circ = 79^\circ$

To radians : $\theta = \dfrac{79 \cdot \pi}{180}$ radians.

Distance from E to F = arc length $= R \cdot \theta$

$= 6400 \cdot \dfrac{79\pi}{180} \approx \boxed{8824 \text{ km}}$

4. 

$A = 486 \text{ ft}^2$; $R = 9 \text{ ft}$; $s = ?$

$A = \dfrac{1}{2} R^2 \cdot \theta \longrightarrow 486 = \dfrac{1}{2} \cdot (9)^2 \cdot \theta$

$\rightarrow 486 = \dfrac{81}{2} \cdot \theta \rightarrow \theta = 12$ (radians)

So, arc length $s = R \cdot \theta = 9 \cdot 12 = \boxed{108 \text{ ft}}$

(5) This is the unit circle, so $\sin\theta$ = y-coord $= -\frac{24}{25}$

So, $\csc\theta = \frac{1}{\sin\theta} = \boxed{-\frac{25}{24}}$

(do $\frac{y}{x} = \frac{\sin s}{\cos s}$)

(6) $\tan s = -\frac{\sqrt{3}}{3}$. Base on the unit circle, $s = \frac{5\pi}{6}$ or $s = \frac{11\pi}{6}$. Since we are told s in $\left[\frac{3\pi}{2}, 2\pi\right]$ (Q IV), s must be $\boxed{\frac{11\pi}{6}}$

(7) $4\sin^2 s = 3 \rightarrow \sin^2 s = \frac{3}{4} \rightarrow \sin s = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{2}$.

Base on unit circle (angle with y-coord $= \pm\frac{\sqrt{3}}{2}$) are

$s = \underbrace{\frac{\pi}{3}, \frac{2\pi}{3}}_{\sin = \frac{\sqrt{3}}{2}} ; \underbrace{\frac{4\pi}{3}; \frac{5\pi}{3}}_{\sin = -\frac{\sqrt{3}}{2}}$

(8) 1. $y = \sin(3x)$. Period $= \frac{2\pi}{3}$, Amplitude $= 1 \rightarrow$ graph B.

2. $y = 3\cos(x)$. Period $= 2\pi$, Amplitude $= 3 \rightarrow$ graph C

3. $y = 3\sin(x)$. Period $= 2\pi$, Amplitude $= 3 \rightarrow$ graph D.

4. $y = \cos(3x)$. Period $= \frac{2\pi}{3}$, Amplitude $= 1 \rightarrow$ graph A.

(9) $y = 5\sin\left(\boxed{\frac{1}{4}}x - \frac{\pi}{2}\right)$

Period $= \frac{2\pi}{\boxed{\frac{1}{4}}} = 2\pi \cdot \frac{4}{1} = \boxed{8\pi}$

(10) $y = \boxed{-2}\cos\left(3x + \frac{\pi}{4}\right)$

Amplitude $= \left|\boxed{-2}\right| = \boxed{2}$

(11) $y = -5\cos\left(x + \frac{\pi}{4}\right)$

Phase shift $= \boxed{\frac{\pi}{4}}$ to the $\boxed{\text{left}}$

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(12) 1. $y = \boxed{-}\tan\left(x - \frac{\pi}{2}\right)$ → Graph D.

shift $\frac{\pi}{2}$ to right

Reflect over x-axis

2. $y = \tan\left(x + \frac{\pi}{2}\right)$

shift $\frac{\pi}{2}$ to left → graph A

3. $y = \boxed{-}\cot\left(x - \frac{\pi}{2}\right)$ → graph C

shift $\frac{\pi}{2}$ to right

Reflect over x-axis

4. $y = \cot\left(x + \frac{\pi}{2}\right)$ → graph B.

shift $\frac{\pi}{2}$ to left

Note: Need to know basic graphs of $\boxed{y = \tan x}$ and $\boxed{y = \cot x}$.

SA.

(13) Convert θ to radians: $314 \cdot \frac{\pi}{180} = \frac{314\pi}{180} = \frac{157\pi}{90}$

$\text{Area} = \frac{1}{2}R^2 \cdot \theta = \frac{1}{2} \cdot (7.4)^2 \cdot \frac{157\pi}{90} \approx \boxed{150.1\ mi^2}$

14 This is the unit circle.

So, $\cos\theta = x\text{-coord} = -\frac{5}{13}$

$\sin\theta = y\text{-coord} = \frac{12}{13}$

$$\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{-\frac{5}{13}}{\frac{12}{13}} = -\frac{5}{\cancel{13}} \cdot \frac{\cancel{13}}{12} = \boxed{-\frac{5}{12}}$$

15 $\tan s = 1$.

Base on unit circle (Do $\tan s = \frac{y}{x} = \frac{\sin s}{\cos s}$)

$s = \frac{\pi}{4}$ and $s = \frac{5\pi}{4}$.

Since we are told s in $\left[\pi, \frac{3\pi}{2}\right]$ (Quadrant 3)

$$\boxed{s = \frac{5\pi}{4}}$$

16 $\csc s = 1.1691$.

$\longrightarrow \sin s = \frac{1}{1.1691} \to$ use calculator.

$$s = \sin^{-1}\left(\frac{1}{1.1691}\right) = \boxed{1.026 \text{ (radians)}}$$

(17) $\tan^2 x = \frac{1}{3} \rightarrow \tan x = \pm\sqrt{\frac{1}{3}} = \pm\frac{1}{\sqrt{3}} = \pm\frac{\overset{\frac{1}{2} \rightarrow \text{sine}}{}}{\underset{\frac{\sqrt{3}}{2} \rightarrow \text{cosine}}{}}$

$$\pm \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} \qquad \frac{1}{2} \rightarrow \text{sine}, \quad \frac{\sqrt{3}}{2} \rightarrow \text{cosine}$$

Base on unit circle:

$$x = \underbrace{\frac{\pi}{6}, \frac{5\pi}{6}}_{\tan = \frac{1}{\sqrt{3}}}, \underbrace{\frac{7\pi}{6}, \frac{11\pi}{6}}_{\tan = -\frac{1}{\sqrt{3}}}$$

(18) $y = -2 + \sin\left(x + \frac{\pi}{2}\right)$. Period $= 2\pi$

Basic cycle: $x + \frac{\pi}{2} = 0 \rightarrow x = -\frac{\pi}{2}$

$x + \frac{\pi}{2} = 2\pi \rightarrow x = 2\pi - \frac{\pi}{2} = \frac{3\pi}{2}$