Test 1 Review

Thursday, February 7, 2019 8:07 AM

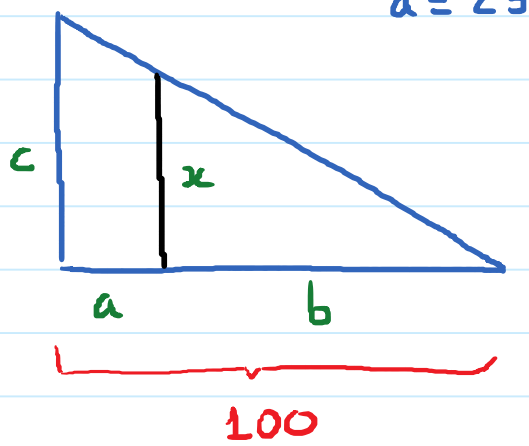
MC section

(1) $3x + 6x - 18 = 90^\circ \rightarrow 9x = 108^\circ \rightarrow x = 12$

$3x = \boxed{36^\circ}$; $6x - 18 = \boxed{54^\circ}$

(2) Third angle $= 180^\circ - (102.5^\circ + 42.4^\circ) = \boxed{35.1^\circ}$

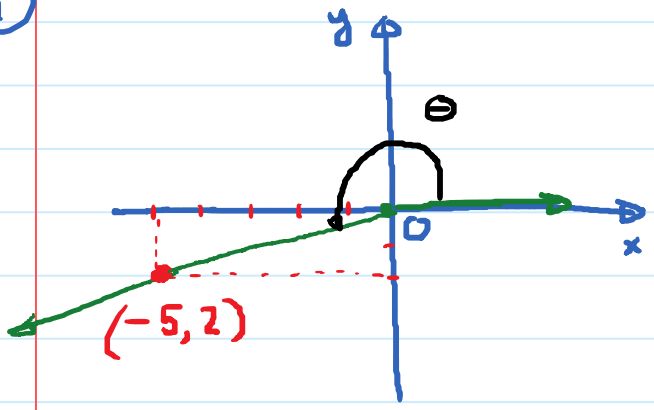
(3) $a = 25$; $b = 75$, $c = 52$. Find x.



$$\frac{x}{c} = \frac{b}{100} \rightarrow x = \frac{bc}{100}$$

$$\rightarrow x = \frac{75 \cdot 52}{100} = \boxed{39}$$

(4)



$-2x - 5y = 0 \rightarrow y = -\frac{2}{5}x$

$\sec\theta = \frac{R}{x}$

$x = -5$; $R = \sqrt{x^2 + y^2}$

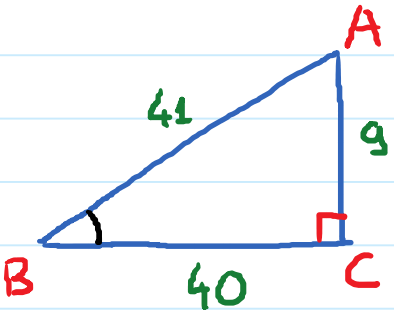
$= \sqrt{29}$

$\sec\theta = \frac{\sqrt{29}}{-5} = \boxed{-\frac{\sqrt{29}}{5}}$

(5) $\cot\theta = -\frac{10}{11}$; $\tan\theta = \boxed{-\frac{11}{10}}$ (Reciprocal Identities)

(6) QI

(7) SOHCAH TOA



$\cos B = \frac{adj}{hyp} = \boxed{\frac{40}{41}}$

(8) $\sec(\theta + 12^\circ) = \csc(2\theta + 15^\circ)$ → Cofunction identities

→ complementary

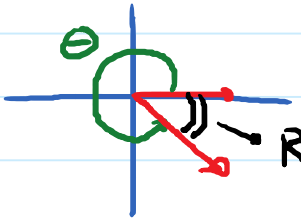
$\theta + 12^\circ + 2\theta + 15^\circ = 90^\circ$

$\rightarrow 3\theta = 63 \rightarrow \boxed{\theta = 21^\circ}$

(9) Reference angle for -403°

Step 1: coterminal $= \theta = -403^\circ + 2\cdot 360^\circ = 317^\circ$

Step 2:



Reference angle $= 360^\circ - 317^\circ$

$\boxed{\theta' = 43^\circ}$

10 $\frac{I_w}{I_a} = \frac{\sin A}{\sin W}$

Given: $I_w = 1.3$; $I_a = 1.0003$; $A = 31.5°$.

Find $\angle W$

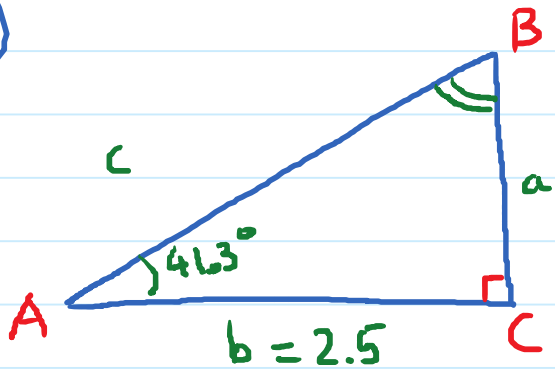
$$\frac{1.3}{1.0003} = \frac{\sin(31.5°)}{\sin W}$$

$$\sin W = \frac{(1.0003)\cdot \sin(31.5°)}{1.3}$$

$$W = \sin^{-1}\left(\frac{(1.0003)\cdot \sin(31.5°)}{1.3}\right)$$

$$\boxed{W \approx 23.7°}$$

11



$\angle B$; a, c

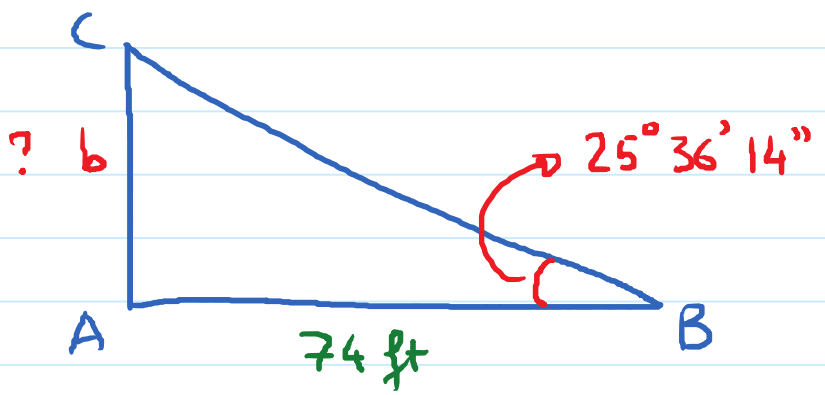
$\angle B = 90° - 41.3° = \boxed{48.7°}$

$\tan A = \frac{a}{b}$

$\rightarrow a = b \tan A = (2.5)\cdot \tan(41.3°) = 2.19 = \boxed{2.2}$

$\sin A = \frac{b}{c} \rightarrow c = \frac{b}{\sin A} = \frac{2.5}{\sin(41.3°)} \approx \boxed{3.3}$

(12)



$$\tan B = \frac{b}{74} \rightarrow b = 74 \tan\left(25° + \frac{36°}{60} + \frac{14°}{3600}\right)$$

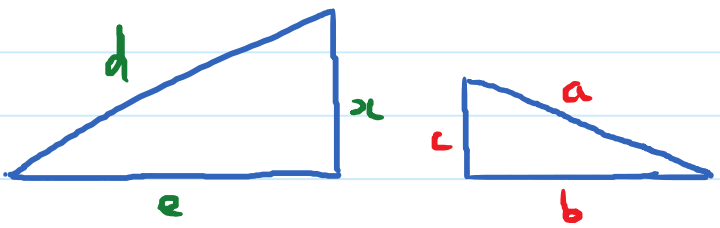
$$\boxed{b \simeq 35 \text{ ft}}$$

SA.

(13) $1280° / 360° \simeq 3\ldots$ rotations

coterminal angle $= 1280° - 3 \cdot 360° = \boxed{200°}$

(14)



$a = 13$; $b = 12$; $c = 5$; $d = 26$, $e = 24$.

Find x. $\frac{x}{e} = \frac{c}{b} \rightarrow \frac{x}{24} = \frac{5}{12}$

$\rightarrow \boxed{x = 10}$

(15) $\csc\theta = -\frac{3}{2}$; θ is in QIII

Find $\cot\theta$.

Pythagorean Identities:

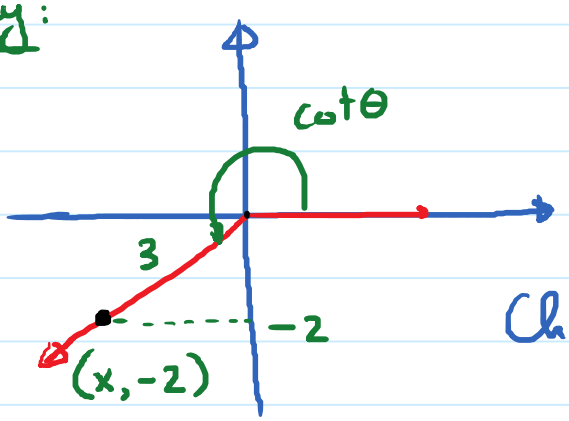
$$\cot^2\theta + 1 = \csc^2\theta$$

$$\rightarrow \cot^2\theta = \csc^2\theta - 1 = \left(-\frac{3}{2}\right)^2 - 1 = \frac{9}{4} - 1$$

$$\rightarrow \cot^2\theta = \frac{5}{4} \rightarrow \cot\theta = \pm\sqrt{\frac{5}{4}}$$

θ is in QIII $\rightarrow$ $\cot\theta = \sqrt{\frac{5}{4}} = \boxed{\frac{\sqrt{5}}{2}}$

2nd way:



$\csc\theta = \frac{R}{y}$

Choose $R = 3$; $y = -2$

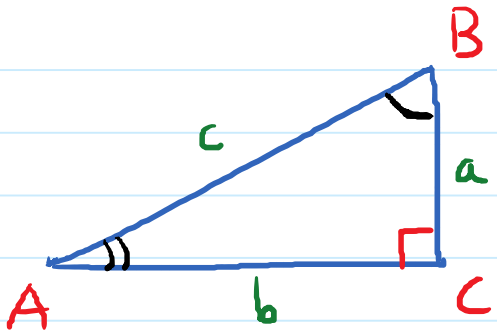
$x^2 + y^2 = R^2$

$$\rightarrow x^2 + (-2)^2 = (3)^2$$

$$x^2 = 5 \rightarrow x = \pm\sqrt{5} \rightarrow x = -\sqrt{5}$$

$$\cot\theta = \frac{x}{y} = \frac{-\sqrt{5}}{-2} = \boxed{\frac{\sqrt{5}}{2}}$$

(16)



Given $b = 8$; $c = 9$

Find $\tan B$

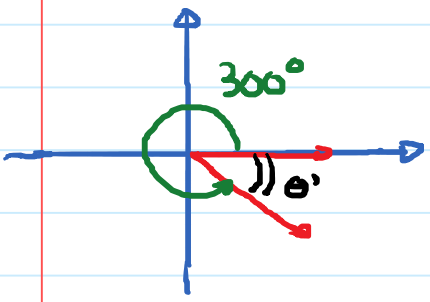
$\tan B = \frac{b}{a}$

$a^2 + b^2 = c^2 \rightarrow a^2 + 64 = 81 \rightarrow a^2 = 17$

$\rightarrow a = \sqrt{17} \rightarrow \tan B = \frac{8}{\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}} = \boxed{\frac{8\sqrt{17}}{17}}$

(17) $5\sin^2 300° + \csc^2 150° - \sec^2 30°$.

$\sin 300°$

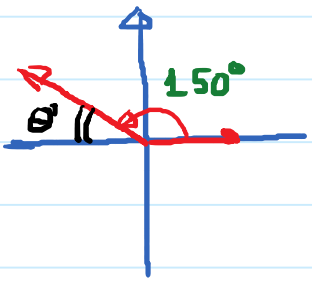


$\theta' = 60°$

$\sin 60° = \frac{\sqrt{3}}{2}$

$\sin 300° = -\frac{\sqrt{3}}{2}$

$\csc 150°$



$\theta' = 30°$

$\csc 30° = 2$

$\csc 150° = 2$

$\sec 30°$

$= \frac{1}{\cos 30°} = \frac{2}{\sqrt{3}}$

$\sec 30° = \frac{2}{\sqrt{3}}$

$5 \cdot \left(-\frac{\sqrt{3}}{2}\right)^2 + (2)^2 - \left(\frac{2}{\sqrt{3}}\right)^2 = \frac{15}{4} + 4 - \frac{4}{3}$

$= \boxed{\frac{77}{12}}$

(18) $\frac{c_1}{c_2} = \frac{\sin\theta_1}{\sin\theta_2}$ Given: $c_1 = 6 \cdot 10^8$

$c_2 = 4.66 \cdot 10^8$; $\theta_1 = 43^\circ$

Find θ_2

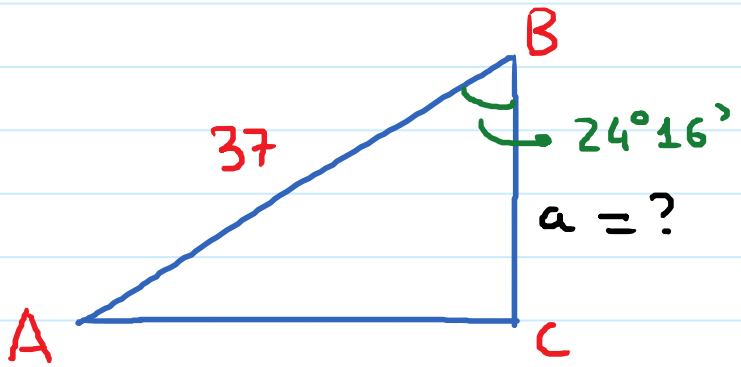
$$\frac{6 \cdot 10^8}{4.66 \cdot 10^8} = \frac{\sin(43^\circ)}{\sin\theta_2} \rightarrow \frac{6}{4.66} = \frac{\sin 43^\circ}{\sin\theta_2}$$

$$\rightarrow \sin\theta_2 = \frac{4.66 \cdot \sin 43^\circ}{6}$$

$$\rightarrow \theta_2 = \sin^{-1}\left(\frac{4.66 \cdot \sin 43^\circ}{6}\right) \simeq \boxed{32^\circ}$$

Essay

(19)



$$\cos B = \frac{a}{37} \rightarrow a = 37\cos\left(24^\circ + \frac{16^\circ}{60}\right)$$

$a = 33.73$ ft.

(20) $\cot\theta = -\frac{7}{2}$; $\cos\theta < 0$ $\longrightarrow$ θ is in QII

$\csc\theta = ?$

Pythagorean identities:

$$\cot^2\theta + 1 = \csc^2\theta$$

$$\left(-\frac{7}{2}\right)^2 + 1 = \csc^2\theta$$

$$\csc^2\theta = \frac{53}{4} \longrightarrow \csc\theta = \pm\sqrt{\frac{53}{4}}$$

$$\longrightarrow \csc\theta = \boxed{\frac{\sqrt{53}}{2}} \quad (\theta \text{ is in QII})$$