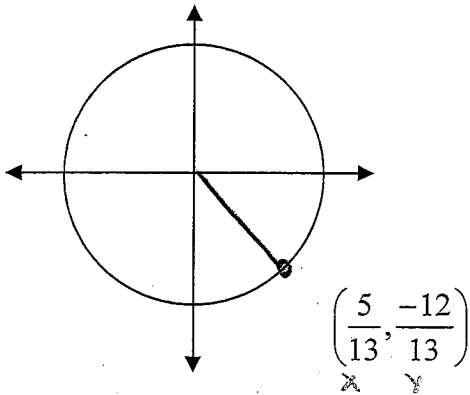


Answer each question carefully. You MUST show work for full credit.

1-6. Given the point on the unit circle below, find all six trigonometric functions.



$$\tan \theta = \frac{-12}{13} = \frac{-12}{13} \cdot \frac{13}{5} = \frac{-12}{5}$$

$\sin \theta = \frac{-12}{13}$
$\cos \theta = \frac{5}{13}$
$\tan \theta = \frac{-12}{5}$
$\csc \theta = \frac{-13}{12}$
$\sec \theta = \frac{13}{5}$
$\cot \theta = \frac{-5}{12}$

7-11. Given that $\sin \theta = \frac{2}{3}$, $90^\circ < \theta < 180^\circ$, Find the exact value of each of the remaining trig functions.

$$\left(\frac{2}{3}\right)^2 + \cos^2 \theta = 1$$

$$\frac{4}{9} + \cos^2 \theta = 1$$

$$-\frac{4}{9} \quad -\frac{4}{9}$$

$$\cos^2 \theta = 1 - \frac{4}{9}$$

QII cos is neg, sin is pos.

$$\cos^2 \theta = \frac{9}{9} - \frac{4}{9}$$

$$\sqrt{\cos^2 \theta} = \sqrt{\frac{5}{9}}$$

$$\cos \theta = \frac{\sqrt{5}}{3}$$

$$\sec \theta = \frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$$

$$\tan \theta = \frac{\frac{2}{3}}{\frac{\sqrt{5}}{3}} = \frac{2}{3} \cdot \frac{3}{\sqrt{5}} = \frac{2}{\sqrt{5}}$$

$$\frac{2}{\sqrt{5}} \left(\frac{\sqrt{5}}{\sqrt{5}}\right) = \frac{2\sqrt{5}}{5}$$

$\sin \theta = \frac{2}{3}$
$\cos \theta = \frac{\sqrt{5}}{3}$
$\tan \theta = \frac{2\sqrt{5}}{5}$
$\csc \theta = \frac{3}{2}$
$\sec \theta = \frac{3\sqrt{5}}{5}$
$\cot \theta = \frac{\sqrt{5}}{2}$

#8-12: Find the exact value of each expression below.

8. $\sin\left(-\frac{2\pi}{3}\right)$ $\frac{-\sqrt{3}}{2}$

9. $\sec 150^\circ$ $\frac{1}{\cos 150^\circ} = \frac{1}{-\frac{\sqrt{3}}{2}} = 1 \cdot \frac{2}{-\sqrt{3}} = \frac{2}{-\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$

10. $\cos^2 \frac{\pi}{9} + \sin^2 \frac{\pi}{9} = \underline{1}$ $\cos^2 + \sin^2 = 1$

11. $\tan^2 60^\circ - \sec^2 60^\circ$ $\frac{\cos^2 + \sin^2 = 1}{\cos^2 \quad \cos^2 \quad \cos^2}$
 $1 + \tan^2 = \sec^2$
 $-1 - \sec^2 = -\sec^2 - 1$
 $\tan^2 - \sec^2 = -1$

12. $6 \tan \frac{\pi}{4} + \sin \frac{\pi}{3} \sec \frac{\pi}{6}$ All from unit circle.
 $6\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{3}/2}\right) = \frac{6\sqrt{2}}{2} + 1 = \underline{3\sqrt{2} + 1}$

#13-14: Find the co-function with the same value as the given expression

13. $\tan 13^\circ$
 $\tan 3 = \cot(90 - 13)$
 $\cot(77^\circ)$

14. $\cos \frac{2\pi}{5} = \sin\left(\frac{\pi}{2} - \frac{2\pi}{5}\right)$
 $\sin\left(\frac{5\pi}{10} - \frac{4\pi}{10}\right) = \underline{\sin \frac{\pi}{10}}$

Answer each question carefully.

You **MUST** show work (neatly) for full credit.

Please circle your final answer(s).

15. Convert 125° to radians.

$$125^\circ * \frac{\pi}{180} = \frac{125\pi}{180} = \boxed{\frac{25\pi}{36}}$$

16. Convert $\frac{-5\pi}{18}$ to degrees.

$$\frac{-5\pi}{18} * \frac{180}{\pi} = \frac{-5 \cdot 180}{18} = \boxed{-50^\circ}$$

#17-18: Find one positive and one negative coterminal angle.

Your answer must be in the same form as the question.

17. -380°

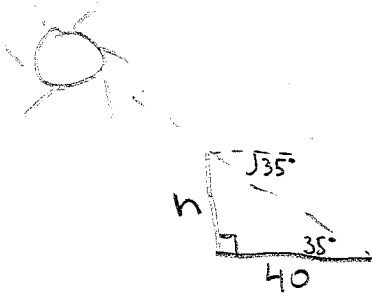
$$\begin{array}{r} +360 \\ \hline -20 \end{array}$$

$$\begin{array}{r} -20 \\ +360 \\ \hline 340 \end{array}$$

18. $\frac{7\pi}{10} + \frac{20\pi}{10} = \boxed{\frac{27\pi}{10}}$

$$\frac{7\pi}{10} - \frac{20\pi}{10} = \boxed{\frac{-13\pi}{10}}$$

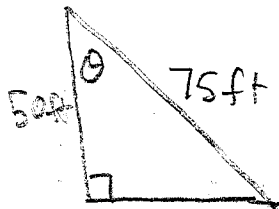
19. At a certain time of day, the angle of elevation of the sun is 35 degrees. To the nearest foot, find the height of a tree whose shadow is 40 feet long.



$$40 \cdot \tan 35^\circ = \frac{h}{40} \cdot 40$$

$$h \approx 28.01 \text{ ft}$$

$$\boxed{28 \text{ ft}}$$

20. A telephone pole is 50 feet tall. A guy wire 75 feet long is attached from the ground to the top of the pole. Find the angle between the wire and the pole to the nearest degree.

$$\cos \theta = \frac{50}{75}$$

$$\theta = \cos^{-1}\left(\frac{50}{75}\right) = 48.19$$

$$\boxed{48^\circ}$$