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Quiz 12

This quiz is graded out of 18 marks. No books, watches, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

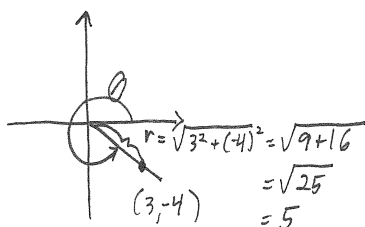**Question 1.** *(3 marks)* What angle θ ($0° \leq \theta 360°$) is co-terminal to $1215°$

$$1215° = \theta + K \cdot 360° \quad where \quad K = \left\lfloor \frac{1215}{360} \right\rfloor$$
$$1215° = \theta + 3 \cdot 360°$$
$$\theta = 1215° - 3 \cdot 360° \qquad = \lfloor 3.375 \rfloor$$
$$= 135° \qquad\qquad = 3$$

Question 2. *(3 marks)* Consider the angle θ in standard position with the given $(3, -4)$ point on its terminal side. Then find the values of the 6 trigonometric functions of θ.

$$r = \sqrt{3^2 + (-4)^2} = \sqrt{9+16}$$
$$= \sqrt{25}$$
$$= 5$$

$(3, -4)$

$$f(\theta) = \sin\theta = \frac{y}{r} = \frac{-4}{5}$$
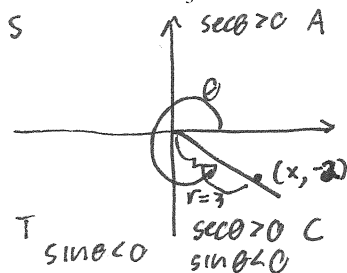$$f(\theta) = \csc\theta = \frac{5}{-4}$$
$$f(\theta) = \cos\theta = \frac{x}{r} = \frac{3}{5}$$
$$f(\theta) = \sec\theta = \frac{5}{3}$$
$$f(\theta) = \tan\theta = \frac{y}{x} = \frac{-4}{3}$$
$$f(\theta) = \cot\theta = \frac{3}{-4}$$

Question 3. *(4 marks)* Find the values of the other trigonometric functions, if $\sin\theta = -\frac{2}{3}$ and $\sec\theta > 0$.

S $\sec\theta > 0$ A

$\sin\theta < 0$
T $\sec\theta > 0$ C
         $\sin\theta < 0$

$$r = \sqrt{x^2 + y^2}$$
$$3 = \sqrt{x^2 + (-2)^2}$$
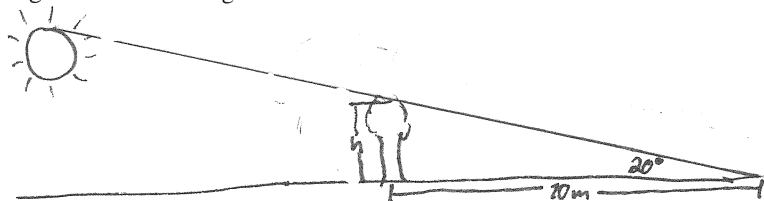$$9 = x^2 + 4$$
$$x = \sqrt{5}$$

$$\csc\theta = \frac{-3}{2}$$
$$\cos\theta = \frac{x}{r} = \frac{\sqrt{5}}{3}$$
$$\sec\theta = \frac{3}{\sqrt{5}}$$
$$\tan\theta = \frac{y}{x} = \frac{-2}{\sqrt{5}}$$
$$\cot\theta = \frac{\sqrt{5}}{-2}$$

Question 4. *(4 marks)* You are on level ground in the late afternoon. The Sun is at angle of elevation of 20 degrees. A tree casts a 70 meters long shadow. Find height of the tree.

$$\tan 20° = \frac{h}{70}$$
$$h = 70 \tan 20° = 25.5\,m$$

Question 5. *(4 marks)* You approach a hill on top of which there is a tall radio antenna. You know from your map that your horizontal distance from the bottom of the radio antenna is 600 feet. The angle of elevation to the bottom of the antenna is $10°$, and the angle of elevation to the top of the antenna is $25°$. Find the height of the hill and the height of the antenna.

600 ft
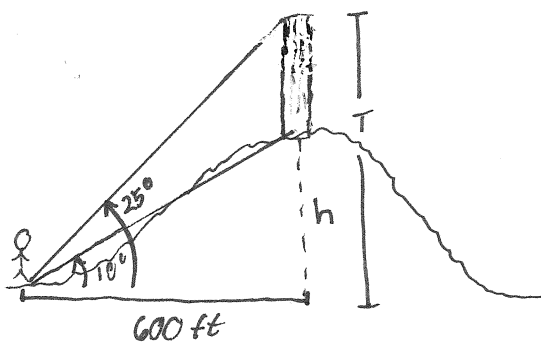
$$\tan 10° = \frac{h}{600}$$
$$h = 600 \tan 10° = 105.8\,m$$

$$\tan 25° = \frac{T}{600}$$
$$T = 600 \tan 25° = 279.8\,m$$

$\therefore$ height of the hill is $105.8\,m$
and height of antenna is $174.\,m$