IMPORTANT: Do not attempt to write or workout any answer on this piece of paper, as it will not be graded.

1. (a) Convert $24° 28' 37''$ into degrees and decimal degrees (two decimal places)  
   
   (b) Convert $132.513°$ into degrees, minutes, and seconds.

2. Given that the point $P(-6, 8)$ is on the terminal side of some angle $\theta$ in the standard position, find the exact values of the last three trigonometric functions of $\theta$. Simplify your answers.

3. Given $Tan\beta = \frac{3}{2}$ with $\beta$ in quadrant III, find the exact values of the first three trigonometric functions of $\beta$. Use any method to solve this problem. Show complete work.

4. Given $Cos\theta = \frac{\sqrt{3}}{5}$ with $\theta$ in quadrant IV find the exact value of $Cot\theta$. Use only the trigonometric identities to solve this problem (No $x$-$y$-$r$ calculations). Simplify the answer.

5. Given $Sec\alpha = -\frac{5}{3}$ with $\alpha$ in quadrant II find the exact values of $Cosec\alpha$ and $Cot\alpha$. Use only the trigonometric identities to solve this problem (No $x$-$y$-$r$ calculations).

6. Draw an angle of $-810°$ in the standard position. Then use a suitable $x$-$y$-$r$ calculation to find the first three trig functions of $-810°$. Must show the $x$, $y$, $r$ values, and the steps of your calculation, not just the final answer.

7. Evaluate $2Sin^3(-270°) - 3Sec^5(540°) + 3Cos^2(-450°)$. Show each line of your calculation carefully and methodically.

8. The equation of the terminal side of some angle $\theta$ in the standard position is given by $\frac{3x}{2} - \frac{y}{3} = 0$, $x \leq 0$. Find the exact values of the first three trigonometric functions of $\theta$. Simplify your answers.

9. $ABC$ is a right triangle with the right angle at $A$. Given that $BC = \sqrt{10}$ $cm$ and the area of the triangle is equal to $2$ sq. cm, find the exact values of $AB$ and $AC$. Provide the exact and simplified answers.
(a) \[ 24^\circ 28' 37'' = \frac{24\circ + 28' + 37''}{60} \approx 24.48^\circ \]

\[(b)\ 132.513^\circ = 132^\circ + (0.513\times60)' = 132^\circ + 30' + (0.78\times60)'' \approx 132^\circ 30' 47'' \]

2. \( P(-6, 8) \)
\[ x = -6; \ y = 8; \ r = ? \]
\[ r = \sqrt{x^2 + y^2} \]
\[ r = \sqrt{(-6)^2 + (8)^2} \]
\[ r = \sqrt{36 + 64} = \sqrt{100} = 10 \]

\[ \cot \theta = \frac{x}{y} = \frac{-6}{8} = -\frac{3}{4} \]
\[ \sec \theta = \frac{r}{x} = \frac{10}{-6} = -\frac{5}{3} \]
\[ \csc \theta = \frac{r}{y} = \frac{10}{8} = \frac{5}{4} \]

3. \[ \tan \beta = \frac{3}{2} \text{ with } \beta \text{ in III} \]
\[ \tan \beta = \frac{3}{2} = \frac{y}{x} = \frac{-3}{-2} \]
Thus, pick \( y = -3; \ x = -2; \ r = ? \)
\[ r = \sqrt{x^2 + y^2} = \sqrt{(-2)^2 + (-3)^2} = \sqrt{4 + 9} = \sqrt{13} \]
\[ \therefore \ \sin \beta = \frac{y}{r} = \frac{-3}{\sqrt{13}} \]
\[ \cos \beta = \frac{x}{r} = \frac{-2}{\sqrt{13}} \]
\[ \tan \beta = \frac{y}{x} = \frac{3}{2} \]

4. \[ \cos \theta = \frac{3}{5} \text{ with } \theta \text{ in IV} \]
Find: \( \cot \theta \)

**STEP 1:** \( \sec \theta = \frac{1}{\cos \theta} = \frac{1}{\left(\frac{3}{5}\right)} = \frac{5}{\sqrt{3}} \)

**STEP 2:** Use: \( \sec^2 \theta = 1 + \tan^2 \theta \)
\[ \left(\frac{5}{\sqrt{3}}\right)^2 = 1 + \tan^2 \theta \]
\[ \frac{25}{3} = 1 + \tan^2 \theta \]
\[ \frac{25}{3} - 1 = \tan^2 \theta \]
\[ \frac{22}{3} = \tan^2 \theta \]
\[ \therefore \ \tan \theta = \pm \sqrt{\frac{22}{3}} \]
\[ \therefore \ \tan \theta = -\frac{\sqrt{22}}{\sqrt{3}} \]

**STEP 3:** \( \cot \theta = \frac{1}{\tan \theta} \)
\[ \therefore \ \cot \theta = -\frac{\sqrt{3}}{\sqrt{22}} \]
5. Given: \( \sec \alpha = -\frac{5}{3} \) with \( \alpha \) in II
Find: \( \csc \alpha \) and \( \cot \alpha \)

**STEP 1:** Use \( \sec^2 \alpha = 1 + \tan^2 \alpha \)
\[
\left( -\frac{5}{3} \right)^2 = 1 + \tan^2 \alpha \\
\frac{25}{9} = 1 + \tan^2 \alpha \\
\tan^2 \alpha = \frac{25 - 9}{9} \\
\tan \alpha = \pm \sqrt{\frac{16}{9}} \\
\therefore \tan \alpha = -\frac{4}{3}
\]

**STEP 2:** \( \cot \alpha = \frac{1}{\tan \alpha} = \frac{1}{-\frac{4}{3}} = -\frac{3}{4} \)

**STEP 3:** \( \sin \alpha = \frac{\csc \alpha}{\tan \alpha} \)
\[
\sin \alpha = \csc \alpha \cdot \tan \alpha = \left( -\frac{5}{3} \right) \cdot \left( -\frac{4}{3} \right) = \frac{4}{5}
\]

**STEP 4:** \( \csc \alpha = \frac{1}{\sin \alpha} = \frac{1}{\frac{4}{5}} = \frac{5}{4} \)

6. Draw: \( -810^\circ \)
\[
\sin(-810^\circ) = \frac{y}{r} = \frac{-1}{1} = -1 \\
\cos(-810^\circ) = \frac{x}{r} = \frac{0}{1} = 0 \\
\tan(-810^\circ) = \frac{y}{x} = \frac{-1}{0} = \text{undefined}
\]

7. \( 2 \sin^3(-270^\circ) - 3 \sec^5(540^\circ) + 3 \cot^2(-450^\circ) \)
\[
= 2 \left[ \sin(-270^\circ) \right]^3 - 3 \left[ \sec 540^\circ \right]^5 + 3 \left[ \cot(-450^\circ) \right]^2 \\
= 2 (1)^3 - 3 (-1)^5 + 3 (0)^2 = 2 (1) - 3 (-1) + 3 (0) = 2 + 3 + 0 = 5
\]

8. \( \frac{3x}{2} - \frac{y}{3} = 0 \) with \( x \leq 0 \)
\[
\frac{y}{3} = \frac{3x}{2} \\
y = \frac{3}{2} x
\]

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-2</td>
<td>-3</td>
</tr>
</tbody>
</table>

\[
x = -2; \ y = 3; \ r = ? \\
r = \sqrt{x^2 + y^2} = \sqrt{(-2)^2 + (-3)^2} \\
\therefore \ r = \sqrt{4 + 81} = \sqrt{85}
\]

\[
\sin \theta = \frac{y}{r} = \frac{-3}{\sqrt{85}} \\
\cos \theta = \frac{x}{r} = \frac{-2}{\sqrt{85}} \\
\tan \theta = \frac{y}{x} = \frac{-3}{-2} = \frac{3}{2}
\]
First: \( b^2 + c^2 = a^2 \)
\[ b^2 + c^2 = (\sqrt{10})^2 \]
\[ \therefore b^2 + c^2 = 10 \quad (1) \]

Area of \( \triangle ABC = 2 \)
\[ \therefore \frac{1}{2} bc = 2 \]
\[ \therefore bc = 4 \quad (2) \]

2 \Rightarrow c = \frac{4}{b} \quad \text{Plug back in (1)}

\[ b^2 + \left(\frac{4}{b}\right)^2 = 10 \]
\[ b^2 \left( b^2 + \frac{16}{b^2} \right) = 10 \cdot b^2 \]
\[ b^4 + 16 = 10 b^2 \]
\[ b^4 - 10b^2 + 16 = 0 \]
\[ (b^2 - 8)(b^2 - 2) = 0 \]
\[ \therefore b^2 - 8 = 0 \quad \text{or} \quad b^2 - 2 = 0 \]
\[ b^2 = 8 \quad \text{or} \quad b^2 = 2 \]
\[ \therefore b = \pm \sqrt{8} \quad \text{or} \quad b = \pm \sqrt{2} \]

\[ c = \frac{4}{b} = \frac{4}{\sqrt{8}} \quad \therefore c = \frac{4}{b} = \frac{4}{\sqrt{2}} \]
\[ c = \frac{4}{2\sqrt{2}} = \sqrt{2} \quad \therefore c = \frac{4}{2} \cdot \sqrt{2} = 2\sqrt{2} \]

\[ b = 2\sqrt{2} \text{ and } c = \sqrt{2} \text{ cm} \quad \text{OR} \quad b = \sqrt{2} \text{ cm and } c = 2\sqrt{2} \text{ cm.} \]

In other words, the legs of the \( \triangle ABC \) are \( 2\sqrt{2} \text{ cm and } \sqrt{2} \text{ cm.} \)

---

END OF TEST