1. $ABC$ is a right triangle with the right angle at $B$. Given that $A = 38^\circ$ and $a = 18.5 \text{ cm}$, find $b$ (two decimal places).

2. $ABC$ is a right triangle with the right angle at $A$. Given that $B = 60^\circ$ in and $b = 12 \text{ in}$, find the exact value of $c$. Also find the exact area. Simplify both answers.

3. Find the exact values of the first three trigonometric functions of an angle of $510^\circ$. Show details.

4. The length of a rectangle is 12 inches and the area is 28 square inches. Find any angle between the two diagonals (two decimal places).

5. Find all values of $\theta$ between $0^\circ$ and $360^\circ$ satisfying $\cot \theta = 1258$ (four decimal places). Show all work.
6. From the top of a lighthouse 120 ft tall, a small boat is observed on the ocean surface. The boat is 210 ft from the base of the lighthouse. Find the angle of depression to the boat from the top of the lighthouse (two decimal places).

7. Two vertical buildings are standing across each other on the ground, 50 feet apart. From the bottom of the shorter building, the angle of elevation to the top of the taller building is $35^\circ$. From the top of the shorter building, the angle of elevation to the top of the taller building is $20^\circ$. Find the angle of depression from the top of the shorter building to the bottom of the taller building. (two decimal places).

8. In the following diagram, $ABC$ is a right triangle with the right angle at $A$, and $AD$ is perpendicular to $BC$. Given that $BD = 8$ units, and $CD = 5$ units, find $AD$ (exact and simplified answer), and $C$ (two decimal places).
1. $ABC$ is a right triangle with the right angle at $B$. Given that $A = 38^\circ$ and $a = 18.5$ cm, find $b$ (two decimal places).

\[ \sin(38^\circ) = \frac{18.5}{b} \]

\[ b = \frac{18.5}{\sin(38^\circ)} \approx 30.05 \text{ cm}. \]

2. $ABC$ is a right triangle with the right angle at $A$. Given that $B = 60^\circ$ in and $b = 12$ in, find the exact value of $c$. Also find the exact area. Simplify both answers.

\[ \tan 60^\circ = \frac{12}{c} \]

\[ c = \frac{12}{\sqrt{3}} = \frac{12\sqrt{3}}{3} = 4\sqrt{3} \text{ in}. \]

\[ \text{Area of } \triangle = \frac{1}{2} \times \text{base} \times \text{height} \]

\[ = \frac{1}{2} \times 4 \sqrt{3} \times 12 \]

\[ \therefore \text{Area} = 24\sqrt{3} \text{ in}^2. \]

3. Find the exact values of the first three trigonometric functions of an angle of $510^\circ$. Show details.

\[ \sin(510^\circ) = \sin(30^\circ) = \frac{1}{2} \]

\[ \cos(510^\circ) = \cos(30^\circ) = -\frac{\sqrt{3}}{2} \]

\[ \tan(510^\circ) = \tan(30^\circ) = -\frac{1}{\sqrt{3}} \]

4. The length of a rectangle is 12 inches and the area is 28 square inches. Find any angle between the two diagonals (two decimal places).

\[ \text{Area} = 12 \times x = 28 \]

\[ \therefore x = \frac{28}{12} = \frac{7}{3} \text{ in.} \]

\[ \tan \theta = \frac{7}{3} \]

\[ \therefore \theta = \tan^{-1} \left( \frac{7}{3} \right) \approx 11.60^\circ \]

5. Find all values of $\theta$ between $0^\circ$ and $360^\circ$ satisfying $\cot \theta = 1258$ (four decimal places). Show all work.

\[ \therefore \tan \theta = \frac{1}{\cot \theta} = \frac{1}{1258} \]

2 soln b/wn $0^\circ$ and $360^\circ$

\[ \theta = \tan^{-1} \left( \frac{1}{1258} \right) \]

\[ \theta \approx 0.0455^\circ \]

\[ \alpha = 180^\circ + \theta = 180^\circ + 0.0455^\circ \]
6. From the top of a lighthouse 120 ft tall, a small boat is observed on the ocean surface. The boat is 210 ft from the base of the lighthouse. Find the angle of depression to the boat from the top of the lighthouse (two decimal places).

\[
\tan \theta = \frac{120}{210}
\]
\[
\therefore \theta = \tan^{-1}\left(\frac{120}{210}\right)
\]
\[
\therefore \theta \approx 29.74^\circ
\]

7. Two vertical buildings are standing across each other on the ground, 50 feet apart. From the bottom of the shorter building, the angle of elevation to the top of the taller building is 35°. From the top of the shorter building, the angle of elevation to the top of the taller building is 20°. Find the angle of depression from the top of the shorter building to the bottom of the taller building. (two decimal places).

8. In the following diagram, \(ABC\) is a right triangle with the right angle at \(A\), and \(AD\) is perpendicular to \(BC\). Given that \(BD = 8\) units, and \(CD = 5\) units, find \(AD\) (exact and simplified answer), and \(C\) (two decimal places).