1. \(ABC\) is a right triangle with the right angle at \(A\). Given that \(B = 24^\circ\) and \(c = 16\text{ cm}\), find \(a\) (two decimal places).

2. \(ABC\) is a right triangle with the right angle at \(B\). Given that \(b = 10\) and \(c = 6\), find \(A\) (two decimal places).

3. \(ABC\) is a right triangle with the right angle at \(B\). Given that \(a = 5\text{ in}\) and \(b = 12\text{ in}\), find the exact values of \(\cot A\) and \(\cot B\).

4. Find the exact values of the first three trigonometric functions of an angle of 870°.

5. Find all values of \(\theta\) between 0° and 360° satisfying \(\cot \theta = 78.1457\) (four decimal places). Show all work.

6. Find any solution to each one of the following equations:

(a) \(\sec(\theta + 10^\circ) \cos(4\theta + 30^\circ) = 1\)

(b) \(\csc(3\theta + 20^\circ) \cos(\theta - 10^\circ) = 1\)

7. From the top of a lighthouse 150 ft tall, the angle of depression of a small boat on the ocean surface is 35°. Find how far is the boat from the top of the lighthouse (two decimal places).

8. The angle of elevation from the top of a small building to the top of a nearby taller building is 46°. Also the angle of depression from the top of the smaller building to the bottom of the taller building is 14°. If the smaller building is 28 meters tall, find the height of the taller building (two decimal places).

Drop Date is this Friday. You may provide you contact number here:
1. \( ABC \) is a right triangle with the right angle at \( A \). Given that \( B = 24^\circ \) and \( c = 16 \text{ cm} \), find \( a \). (two decimal places).

2. \( ABC \) is a right triangle with the right angle at \( B \). Given that \( b = 10 \) and \( c = 5 \), find \( A \) (two decimal places).

3. \( ABC \) is a right triangle with the right angle at \( B \). Given that \( a = 5 \text{ in} \) and \( b = 12 \text{ in} \), find the exact values of \( \cot A \) and \( \cot B \).

4. Find the exact values of the **first three** trigonometric functions of an angle of \( 870^\circ \).

5. Find all values of \( \theta \) between \( 0^\circ \) and \( 360^\circ \) satisfying \( \cot \theta = 78.1457 \) (four decimal places). Show all work.

6. Find any solution to each one of the following equations:
   
   (a) \( \sec(\theta + 10^\circ) \cos(4\theta + 30^\circ) = 1 \)
   
   (b) \( \csc(3\theta + 20^\circ) \cos(\theta - 10^\circ) = 1 \)

7. From the top of a lighthouse 150 ft tall, the angle of depression of a small boat on the ocean surface is \( 35^\circ \). Find how far is the boat from the top of the lighthouse (two decimal places).

8. The angle of elevation from the top of a small building to the top of a nearby taller building is \( 46^\circ \). Also the angle of depression from the top of the smaller building to the bottom of the taller building is \( 14^\circ \). If the smaller building is 28 meters tall, find the height of the taller building (two decimal places).

9. Each side of an equilateral triangle is 10 cm long. Find its area. Provide the exact answer.

**Drop Date is this Friday. Provide you contact number here:**
1. \[ \cos 24^\circ = \frac{16}{a} \]
   \[ \therefore a = \frac{16}{\cos 24^\circ} \]
   \[ \therefore a \approx 17.51 \text{ cm} \]

2. \[ \cos A = \frac{6}{10} \]
   \[ \therefore A = \cos^{-1} \left( \frac{6}{10} \right) \]
   \[ \therefore A \approx 53.13^\circ \]
   
   Note: For version 2 for the test, \( c \) is given as 5.

   So for that version:
   \[ \cos A = \frac{5}{10} \]
   \[ \therefore A = \cos^{-1} \left( \frac{5}{10} \right) = 60.00^\circ \]

3. \[ b = 12 \]
   \[ c = 5 \]
   \[ \text{Find } c \text{ first} \]
   \[ \text{Hyp}^2 = \text{leg}^2 + \text{leg}^2 \]
   \[ 12^2 = 5^2 + c^2 \]
   \[ 144 = 25 + c^2 \]
   \[ c^2 = 119 \]
   \[ \therefore c = \sqrt{119} \]
   \[ \therefore \cot A = \frac{\sqrt{119}}{5} \]
   and
   \[ \cot B = \cot 90^\circ = 0 \]
   (Recall 90° is a quadrantal angle)

4. \[ \sin 870^\circ = \sin 30^\circ = \frac{1}{2} \]
   \[ \cos 870^\circ = \cos 30^\circ = \frac{-\sqrt{3}}{2} \]
   \[ \tan 870^\circ = \tan 30^\circ = -\frac{1}{\sqrt{3}} \]

5. \[ \cot \theta = 78.1457 \]
   \[ \therefore \tan \theta = \frac{1}{78.1457} \]
   \[ \therefore \theta = \tan^{-1} \left( \frac{1}{78.1457} \right) \]
   \[ \therefore \theta \approx 0.7332^\circ \]
   \[ \text{But this only the acute answer} \]
   \[ \therefore \theta \approx 0.7332^\circ \text{ or } 180.7332^\circ \]

   The other answer between 0° and 360° is 180.7332°.
(a) \( \sec(\theta + 10^\circ) \cdot \cos(4\theta + 30^\circ) = 1 \)
\[
\therefore \cos(4\theta + 30^\circ) = \cos(\theta + 10^\circ)
\]
\[
\text{SET: } 4\theta + 30^\circ = \theta + 10^\circ \\
3\theta = -20^\circ
\]
\[
\therefore \text{one solution is } \theta = -\frac{20^\circ}{3}
\]

(b) \( \csc(3\theta + 20^\circ) \cdot \cos(\theta - 10^\circ) = 1 \)
\[
\therefore \cos(\theta - 10^\circ) = \sin(3\theta + 20^\circ)
\]
Here set: \((\theta - 10^\circ) + (3\theta + 20^\circ) = 90^\circ \) (know why?)
\[
\therefore 4\theta + 10^\circ = 90^\circ \\
4\theta = 80^\circ
\]
\[
\therefore \theta = 20^\circ
\]

7. \( \sin 35^\circ = \frac{150}{x} \)
\[
\therefore x = \frac{150}{\sin 35^\circ} \approx 261.52 \text{ ft}
\]
\[
\therefore \text{The boat is approximately 261.52 ft from the top of the light house.}
\]

8. Find \( CD \)

\[
\text{STEP 1: Find BE:} \\
\tan 14^\circ = \frac{28}{BE} \\
\therefore BE = \frac{28}{\tan 14^\circ} \approx 112.3018 \ldots
\]
\[
\therefore \text{BE} \approx 112.3018 \ldots
\]

\[
\text{STEP 2: Find DE:} \\
\tan 46^\circ = \frac{DE}{112.3018 \ldots} \\
\therefore DE = (112.3018 \ldots) \tan 46^\circ \\
\therefore DE \approx 116.2913 \ldots
\]

\[
\text{STEP 3: Find } CD = CE + DE = 28 + 116.29 \ldots \approx 144.29 \text{ ft}
\]
\[
\therefore \text{The taller building is about 144.29 ft tall.}
\]
only for version 2 of the test:

Find the height \( h \) first:

\[
\sin 60^\circ = \frac{h}{10}
\]

\[
\therefore h = 10 \left( \sin 60^\circ \right) = 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3}
\]

Now area of \( \triangle ABC = \frac{1}{2} \times \text{base} \times \text{height} \)

\[
= \frac{1}{2} \times 10 \times 5\sqrt{3}
\]

\[
\therefore \text{Area} = 25\sqrt{3} \text{ cm}^2
\]