1. ABC is a right triangle with the right angle at A. Given that \( B = 30^\circ \) and \( b = 18 \text{ cm} \), solve the triangle completely. Provide exact answers in a simplified form.

\[
\begin{align*}
C &= 90^\circ - 30^\circ = 60^\circ \\
\text{Find } a : \\
\sin 30^\circ &= \frac{18}{a} \\
a &= \frac{18}{\sin 30^\circ} = 18 \sqrt{3} \\
c &= 18 \sqrt{3} \text{ cm} \\
\text{Find } c : \\
\tan 30^\circ &= \frac{18}{c} \\
c &= \frac{18}{\tan 30^\circ} = 18 \sqrt{3} \\
\end{align*}
\]

2. Find the exact values of the sine trigonometric functions of an angle of \(-570^\circ\). Show all the details.

\[
\begin{align*}
\sin (-570^\circ) &= \sin (30^\circ) = \frac{1}{2} \\
\cos (-570^\circ) &= -\cos (30^\circ) = -\frac{\sqrt{3}}{2} \\
\tan (-570^\circ) &= -\tan (30^\circ) = -\frac{1}{\sqrt{3}} \\
\csc (-570^\circ) &= -\sqrt{3} \\
\sec (-570^\circ) &= -\frac{2}{\sqrt{3}} \\
\cot (-570^\circ) &= 2 \\
\Ref 4 &= 30^\circ \\
\end{align*}
\]

3. In the \( \Delta ABC \), \( a = 6 \text{ cm}, b = 8 \text{ cm}, \) and \( C = 32^\circ \). Find \( c \) and \( A \). Round off your answers to two decimal places.

\[
\begin{align*}
\text{Use Law of Cosines} \\
C &= a^2 + b^2 - 2ab \cos C \\
C &= 6^2 + 8^2 - 2(6)(8) \cos 32^\circ \\
C &\approx 4.31 \text{ cm} \\
A &= \cos^{-1} \left( \frac{b^2 + c^2 - a^2}{2bc} \right) \\
A &\approx 47.51^\circ \\
\end{align*}
\]

4. In the \( \Delta ABC \), \( A = 75^\circ, B = 34^\circ, \) and \( c = 8 \text{ inches} \). Find \( a \) and the area of the \( \Delta \). Round off to two decimal places.

\[
\begin{align*}
\text{Use Law of Sines} \\
\frac{a}{\sin 75^\circ} &= \frac{8}{\sin 34^\circ} \\
a &= \frac{8 \sin 75^\circ}{\sin 71^\circ} \\
Area of the \Delta &= \frac{1}{2} \cdot 8 \cdot \sin 34^\circ \\
&\approx 18.28 \text{ in}^2 \\
\end{align*}
\]
4) In the Δ ABC, \( A = 75^\circ \), \( B = 34^\circ \), and \( c = 8 \) inches. Find \( a \) and the area of the Δ. Round off to two decimal places.

Use Law of Sines

\[
\frac{a}{\sin 75^\circ} = \frac{8}{\sin 71^\circ}
\]

\[
a = \frac{8 \sin 75^\circ}{\sin 71^\circ}
\]

\[a \approx 8.17 \text{ inches}\]

\[C = 180^\circ - (75^\circ + 34^\circ) = 180^\circ - 109^\circ = 71^\circ\]

Area of the Δ = \( \frac{1}{2} a c \sin B \)

\[= \frac{1}{2} (8.17...) (8) \sin 34^\circ\]

\[\approx 18.28 \text{ in}^2\]

5) ABC is a right triangle with the right angle at B. Given that \( b = 8 \) cm and \( a = 6 \) cm, find the exact values of \( \cos A \), \( \tan C \), and \( \cos B \).

Use Pyth. Thm

\[
b^2 = a^2 + c^2\]

\[
8^2 = 6^2 + c^2\]

\[
c^2 = 8^2 - 6^2 = 64 - 36\]

\[
c = ± \sqrt{28} = 2\sqrt{7}\]

\[c^2 = 28\]

\[\cos A = \frac{2\sqrt{7}}{8} = \frac{\sqrt{7}}{4}\]

\[\tan C = \frac{2\sqrt{7}}{6} = \frac{\sqrt{7}}{3}\]

\[\cos B = \cos 90^\circ = 0\]
6. A guy wire 80 meters long is attached to the top of an antenna mast that is 71 meters high. Find the angle that the wire makes with the vertical. Round off to 2 decimal places.

\[
\cos \theta = \frac{71}{80} \\
\theta = \cos^{-1}\left(\frac{71}{80}\right) \\
\theta \approx 27.44^\circ
\]

7. The angle of depression from the top of a building to a point on the ground is 43°. How far is the point on the ground from the base of the building, if the building is 223 meters high? (2 decimals)

\[
\tan 43^\circ = \frac{223}{x} \\
x \cdot \tan 43^\circ = 223 \\
x = \frac{223}{\tan 43^\circ} \\
x \approx 239.14 \text{ meters}
\]

8. The angle of elevation from the top of a smaller building to the top of a nearby taller building is 38°. If the smaller building is 71 ft high and the taller building is 342 ft high, find the angle of depression from the top of the taller building to the bottom of the smaller building. (2 decimals).

Find BD.

Use \(\triangle BDE\):

\[
\tan 38^\circ = \frac{271}{BD} \\
BD = \frac{271}{\tan 38^\circ} \\
BD \approx 346.864
\]

Now find \(\theta\) using \(\triangle ACE\):

\[
\tan \theta = \frac{342}{346.864} \\
\theta = \tan^{-1}\left(\frac{342}{346.864}\right) \\
\theta \approx 49.60^\circ
\]
8. The angle of elevation from the top of a smaller building to the top of a nearby taller building is 38°. If the smaller building is 71 ft high and the taller building is 342 ft high, find the angle of depression from the top of the taller building to the bottom of the smaller building. (2 decimals).

Find $BD$.

Use $\triangle BDE$:

\[
\tan 38° = \frac{271}{BD}
\]

\[
BD = \frac{271}{\tan 38°}
\]

\[
BD \approx 346.864...
\]

$\therefore AC \approx 346.864$

Now, find $\theta$ using $\triangle ACE$:

\[
\tan \theta = \frac{342}{346.864}.
\]

\[
\theta = \tan^{-1} \left( \frac{342}{346.864} \right)
\]

$\theta \approx 44.60°$

9. A 35-ft tall vertical tower is standing on the top of a hill. From a point 160 ft downhill from the base of the tower, the angle of elevation to the top of the tower is 25°. Find the angle that the hill makes with the horizontal (2 decimals).

First, find $\theta$ using $\triangle ABC$ (Law of Sines).

\[
\frac{35}{\sin \theta} = \frac{160}{\sin 65°}
\]

\[
\sin \theta = \frac{35 \sin 65°}{160}
\]

\[
\sin \theta \approx 0.1982...
\]

(\theta \text{ acute}) $\theta \approx \sin^{-1}(0.1982...)$

$\theta \approx 11.4349°$

Now, required angle

$= 25° - \theta$

$\approx 25° - 11.4349°$

$\approx 13.57°