Grade 10 Academic Math
Unit: Trigonometry

Lesson: $\quad \underline{7-4}$
Topic: Solving Right Triangle Problems

## \# homework check: Principles of Mathematics 10 p. 404 \#2, 3, 6, 8, 10, 14

## \# note: Solving Right Triangle Problems

In order to solve word problems, we need to know that angles of depressions are measured down from the horizontal. Angles of inclination (or elevation) are measured up from the horizontal. For example,

a) A tree is 12 m high. When the sun is at an angle of depression of 32 degrees, how long is the shadow?
Step 1: draw a picture


Step 2: identify sides and ratio
Step 3: find missing angle
Step 4: solve for unknown side

$$
\begin{aligned}
& \tan x=\frac{o p p}{a d j} \\
& \tan 58=\frac{12}{x} \\
& x \tan 58=12 \\
& x=\frac{12}{\tan 58} \\
& x=7.5 m
\end{aligned}
$$

b) A man on a cliff can see an airplane in the air at angle of inclination of 37 degrees. The same man can also see a boat in the water at an angle of depression of $\mathbf{6 2}$ degrees. If the cliff is $\mathbf{2 3} \mathbf{~ m}$ high, how high is the plane above the boat?

Step 1: draw a picture


Step 2: identify sides and ratios
Step 3: make a plan
Step 4: solve for unknowns
Because the distance between the boat and point $C$ is the same as the height of the cliff, we can use the tangent ratio to find the distance between the cliff and point $C$.

$$
\begin{aligned}
& \tan x=\frac{o p p}{a d j} \\
& \tan 62=\frac{23}{x} \\
& x \tan 62=23 \\
& x=\frac{23}{\tan 62} \\
& x=12.2 m
\end{aligned}
$$

Now that we know the distance between the cliff and point $C$, we can move into the airplane triangle. With the distance between the point C and the cliff's edge, we can use the tangent ratio again to find the distance between point $C$ and the airplane.

$$
\begin{aligned}
& \tan x=\frac{o p p}{a d j} \\
& \tan 37=\frac{x}{12.2} \\
& 12.2 \tan 37=x \\
& x=9.2 m
\end{aligned}
$$

Therefore the total distance between the boat and the plane is $9.2+\mathbf{2 3}=\mathbf{3 2 . 2} \mathbf{~ m}$.
\# homework assignment: Principles of Mathematics 10 p. 412 \#4-14

