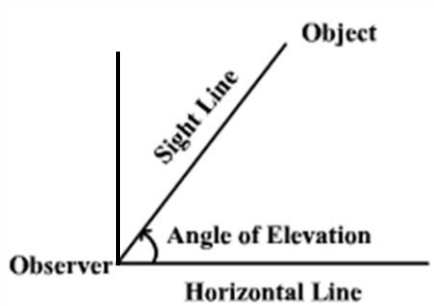# Section 6.1d – Applications of Trigonometric Concepts

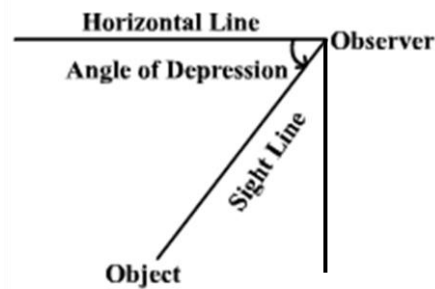**This booklet belongs to:**_____**Block:** _____

- As we move into more complex problems and word problems we need some terminology
- Trigonometry is used to calculate heights and distances that are difficult or impossible to measure by ordinary methods. These concepts will help:

Terminology

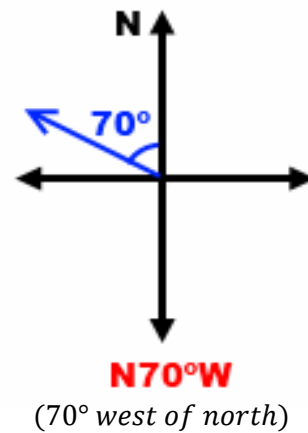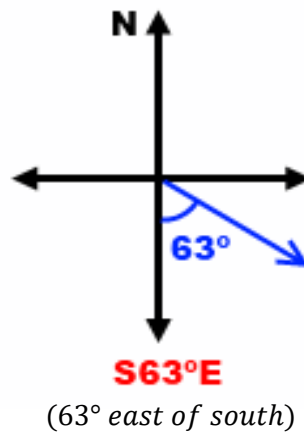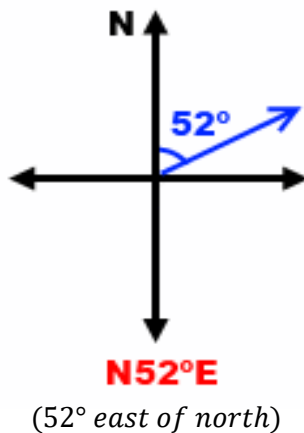*Angle of Elevation*   *Angle of Depression*

- Trigonometry was used primarily for **Navigation** in the past
- Bearings represent **direction of travel** and have to be read a certain way
- Bearings measure the **movement East and West** from a **fixed North-South line**

Bearings

N52°E	S63°E	N70°W
(52° *east of north*)	(63° *east of south*)	(70° *west of north*)

- With these **tools and the information** from the previous sections, we should now be able to **tackle any questions** involving **triangles formed** with a **RIGHT ANGLE**

Example 1:   A pilot has to approach Vancouver airport at an $8°$ angle of descent. IF the plane is travelling at an altitude of $10\ 000ft$, what is the horizontal distance that the airplane should be at to begin its descent?
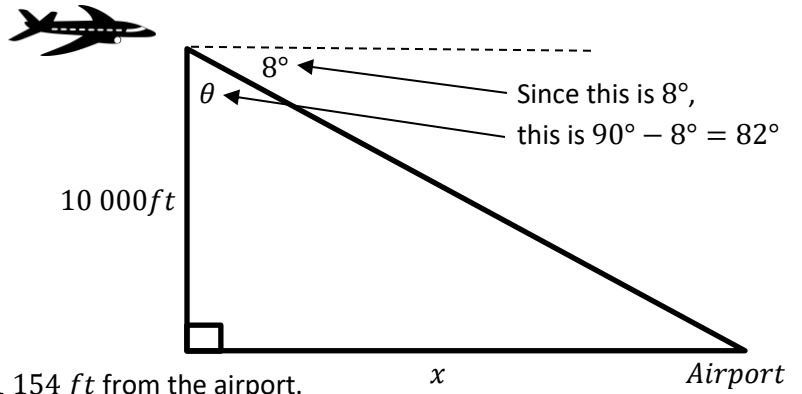
Solution 1:

- $\tan 82° = \dfrac{x}{10\ 000}$

- $10\ 000(\tan 82°) = x$

- $x = 71\ 154\ ft$

- The pilot should start descending $71\ 154\ ft$ from the airport.

$8°$

θ

Since this is $8°$,
this is $90° - 8° = 82°$

$10\ 000ft$

x

$Airport$

Example 2:   The **equal sides** of an **isosceles** triangle are $30cm$, and the third side is $36cm$. Determine the measure of the **interior angles** of the training.
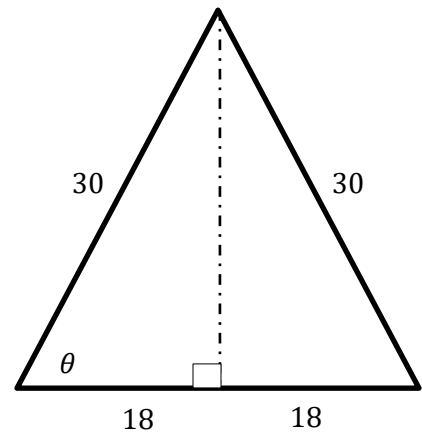
Solution 2:

- $\cos\theta = \dfrac{18}{30}$

- $\theta = \cos^{-1}\left(\dfrac{18}{30}\right)$

- $\theta = 53.1°$

- The three angles are: $53.1°, 53.1°, and\ 73.8°$

30 30

θ

18 18

The Questions that follow may be hard to discern. Drawing out the scenario is going to really help you out. If you can visualize what the question is describing, it is the first step to mapping out your thought process.

Section 6.1d – Practice Problems

PROFICIENT LEVEL QUESTIONS

1. Standing 300ft from the base of a water tower, there is a 36° angle from your feet to the top of the water tower. How high is the water tower?

2. An 8 meter ladder leans against a house so that the bottom end is 1.6m from the house. What angle does the ladder make with the ground?

3. A flagpole 20ft high casts a shadow of 4.3ft. What is the angle of elevation of the sun?

4. The angle of elevation of the top of a high-rise building is 78° for a person standing 62yds away from the base of the building. How high is the building?

5. If 200 meters of string is used to fly a kite, an angle of 37° is formed with the person flying the kite. If the person is two meters tall, and the string has no slack, how high in the air is the kite?

6. When an airplane leaves the runway, its angle of ascent is 16°, with a speed of 80 metres/second. Find the altitude of the plane after two minutes.

7. The top of a cedar tree broken by the wind hits the ground 12yds from the base of the tree. If the top of the tree makes an angle of 19° with the ground, what was the original height of the tree?

8. An isosceles triangle has a base of 18in. If the legs of the isosceles triangle meet at an angle of 24°, how long are the legs?

EXTENDING LEVEL QUESTIONS

9. A passenger in an airplane flying at an altitude of 11km spots two cities directly to the right. The angle of depression to the towns are $31°$ and $57°$. How far is it between the two cities?

10. A surveyor laying a road $due\ east$ from A encounters a small lake at B. She changes her direction to $N\ 33°\ E$ for 2400m to C, then she turns $S\ 42°\ E$. How far must she continue in this direction to reach point D on the $east-west$ line through A?

Section 6.1d – Answer Key

1. $x = 218ft$
2. $\theta = 78.5°$
3. $\theta = 77.9°$
4. $x = 291.7yds$
5. $122.4m$
6. $2646.1m$
7. $16.8yds$
8. $43.3in$
9. $11.2km$
10. $2708.5m$

Extra Work Space