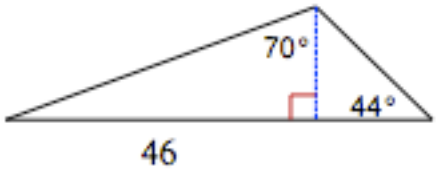
(A) Lesson Context

BIG PICTURE of this UNIT:	• How do I determine the measure of angles in geometric shapes, without direct measurement? • How do I solve for sides or angles in right triangles? • How do I model real world scenarios using right triangles?		
CONTEXT of this LESSON:	Where we've been You know how to use triangle trig to find the measure of sides and angles	Where we are If we can use triangles to model solutions to problems, then we can use trig in our math analysis	Where we are heading How can I solve problems that involving geometric models with right triangles?

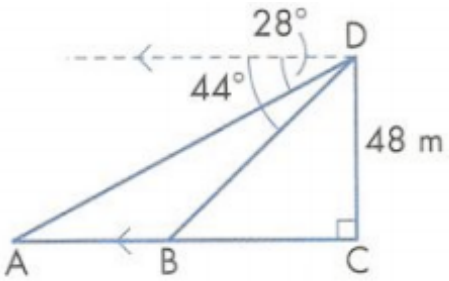
(B) Lesson Objectives:

a. Use the trig ratios to solve for sides or angles involving multiple triangles
b. Use trig ratios to solve for sides and angles in word problems involving triangles

(C) Working in Multiple Triangles



10. Find AB, to the nearest metre.



(D) **Applications of Triangle Trig – Example #1**

Example 1

To evacuate some refugees, a bridge needs to be built across a river. The first step is to find out how wide the river is. A surveyor is on one side of the river, with a transit mounted on a tripod 1.2 m above the ground. An assistant stands on the other side of the river, holding a 3 m pole vertically. The angle of elevation from the transit to the top of the pole is 8.5°. How wide is the river?

Step 1:Diagram: to visualize the problem and organize the given info

Step 2: What needs to be done & Why??

Step 3: Do what needs to be done!

STEP 4: Final Answer(s):

(E) **Applications of Triangle Trig – Example #2**

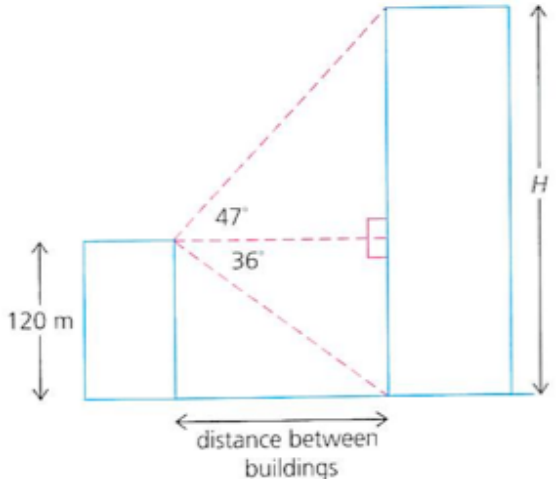
Example 2

A video camera is mounted on the top of a 120 m tall building. When the camera tilts down 36° with the horizontal, it views the bottom of another building. If it tilts up 47° with the horizontal, it can view the top of the same building.

(a) How far apart are the two buildings?

(b) How tall is the building viewed by the camera?

Step 1:Diagram: to visualize the problem and organize the given info



Step 2: What needs to be done & Why??

Step 3: Do what needs to be done!

STEP 4: Final Answer(s):

(F) **Applications of Triangle Trig – Example #3**

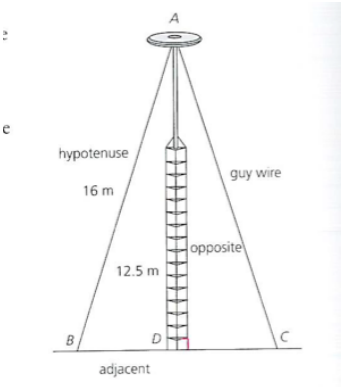
Example 3

A communications antenna is attached to the roof of a school and held in place with two 16 m guy wires. The antenna is 12.5 m tall.

(a) What angle do the wires make with the roof?

(b) At what distance from the base of the tower should the wires be secured to the roof?

Step 1:Diagram: to visualize the problem and organize the given info



Step 2: What needs to be done & Why??

Step 3: Do what needs to be done!

STEP 4: Final Answer(s):

(G) **Applications of Triangle Trig – Example #4**

Believe it or not, Mr. S. is a superhero in his spare time (when he is not busy writing lessons for his beloved "other favorite" class of course). So one night (it was a Thursday I recall), I was standing on top of a building (as is my superhero duty - watching over the city of course), when I happen to notice the evil Dr. MathNoLikius on top of a building, close to the one I was on. So I quickly used my InfraRed Supervision and I quickly determined that the angle of elevation of my line of sight to Dr. MathNoLikius was 12°. I also quickly determined that the angle of depression to the base of the building upon which Dr. MathNoLikius was standing happened to be 34°. Amazingly enough, I also knew that the two buildings where 150 meters apart (Wow, imagine that!!)

(A) So being a superhero, I was able to use my trig knowledge to determine the height of the building that the evil Dr. MathNoLikius was standing upon to be 356.6 m. Was I correct? Correct me if I was wrong (HAHAHAHAHAHA)

(B) But I also needed to know exactly the direct distance between me and the evil Dr. M. (as of course I would FLY there – or at least jump in a single bound – well, maybe attempt to anyway). Anyway, once again, I used my super trig powers to calculate that distance to be 600 meters. Was I right???

Diagram: to visualize the problem and organize the given info

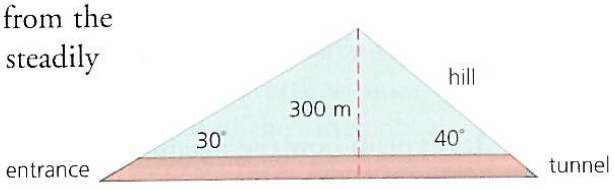
Step 1: What needs to be done??

Step 2: What needs to be done???

Final Answer(s):

(H) Applications of Triangle Trig – Example #5

19. **Thinking, Inquiry, Problem Solving:** A tunnel is being dug through a hill. Ventilation shafts must be placed every 70 m from the entrance to the tunnel. On one side, the hill climbs steadily upward at an angle of 30°. The hill is steeper on the other side, which has a slope of 40°. The top of the hill is 300 m high.



(a) How many shafts must be drilled?

(b) Special corrugated metal pipes are used to line the shaft. These pipes come in 5 m sections. How many sections should the builder order?

Diagram: to visualize the problem and organize the given info

Step 1: What needs to be done??

Step 2: What needs to be done???

Final Answer(s):

(I) Applications of Triangle Trig – Example #6

Application: A geologist has determined that an oil deposit lies under a lake. The lake is 150 m deep and the oil deposit is 1500 m below the bottom of the lake. Owing to environmental concerns, oil wells are not allowed in the lake itself and must be built on shore. The well is to be 1000 m from the point directly above the edge of the oil deposit.

(a) To minimize the cost of drilling, the drill has to be angled so that it pierces the deposit at the closest point. What angle should be used?

(b) The drill bit is extended using 10 m sections that are added on as the drill cuts through the earth. How many sections will be needed to reach the deposit?

(J) Homework

From Nelson 10, Chapter 5.8, page 509-512, Q1,2,5,7,8,11,12,15