

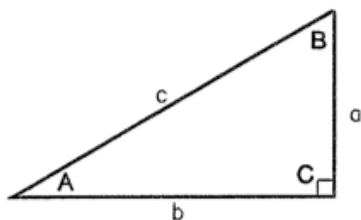
IM 3 Lesson 5.5 DAY 2: Problem Solving with Triangle Trig

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> Working with RTT Working with Sine and Cosine Law Sinusoidal Functions Unit Circle and Radians 		
CONTEXT of this LESSON:	Where we've been We have been working RTT, Sine, and Cosine Law.	Where we are We want to solidify our work with those laws by extending our learning into topics that are a bit more complex	Where we are heading After this we head to sinusoidal functions.

Lesson Objectives:

Level	# of Problems	Points per problem
Level 1	5 Problems	12 Points
Level 2	5 Problems	15 Points
Level 3	4 Problems	25 Points
Level 4	1 Problem	75 Points

RIGHT TRIANGLE FORMULAS

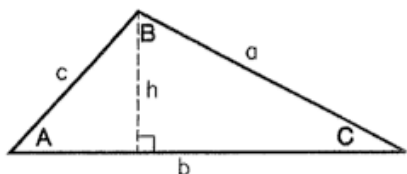


PYTHAGOREAN THEOREM: $a^2 + b^2 = c^2$

AREA: $\frac{1}{2}ab$

TRIGOMETRIC FUNCTIONS: $\sin A = \frac{a}{c}$ $\cos A = \frac{b}{c}$
 $\tan A = \frac{a}{b}$

OBLIQUE TRIANGLE FORMULAS



LAW OF SINES: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

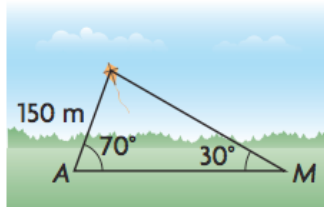
LAW OF COSINES: $a^2 = b^2 + c^2 - 2bc \cos A$

AREA: $\frac{1}{2}bh$

Level 1 problems

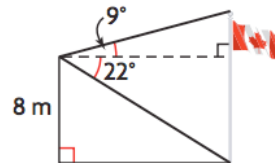
Problem 1.

6. Allison is flying a kite. She has released the entire 150 m ball of kite string. She notices that the string forms a 70° angle with the ground. Marc is on the other side of the kite and sights the kite at an angle of elevation of 30° . How far is Marc from Allison?



Problem 2

11. From the top of an 8 m house, the angle of elevation to the top of a flagpole across the street is 9° . The angle of depression is 22° to the base of the flagpole. How tall is the flagpole?

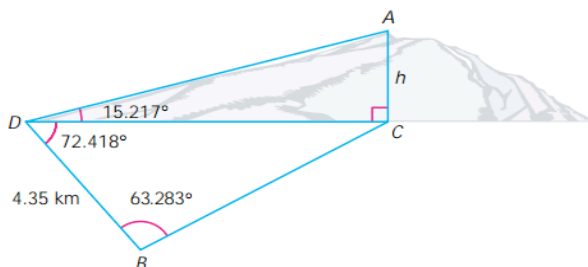


Problem 3.

10. The Leaning Tower of Pisa leans toward the south at an angle of about 5.5° . On one day, its shadow is 90 m long, and the angle of elevation from the tip of the shadow to the top of the tower is 32° .
- What is the slant height of the tower?
 - How high is the tip of the tower above the ground?

Problem 4.

16. A surveyor uses a diagram to help determine the height, h , of a mountain.



- Use $\triangle BDC$ to determine $\angle C$.
- Use $\triangle BDC$ and the sine law to determine DC .
- Use $\triangle ADC$ to calculate h .

PROBLEM #5:

12. A surveyor needs to estimate the length of a swampy area. She starts at one end of the swamp and walks in a straight line, 450 paces and turns 60° towards the swamp. She then walks in another straight line, 380 paces before arriving at the other end of the swamp. One pace is about 75 cm. Estimate the length of the swamp in metres.

Level 2 Problems

Problem 1

A new road requires building a bridge across a river. To determine the width of the river, a surveyor stakes out a base line of 300 m along the bank of a river. She places the line so that a tree on the opposite bank of the river lies between the ends of the line. From each end of the base line, she sights the position of the tree. The lines of sight to the tree make angles of 36° and 44° with the base line. Determine the width of the river.



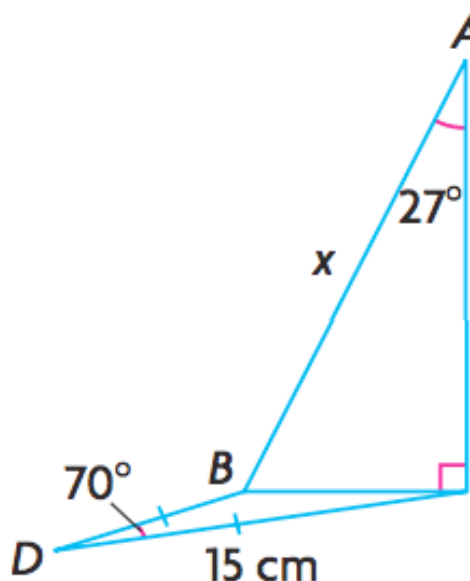
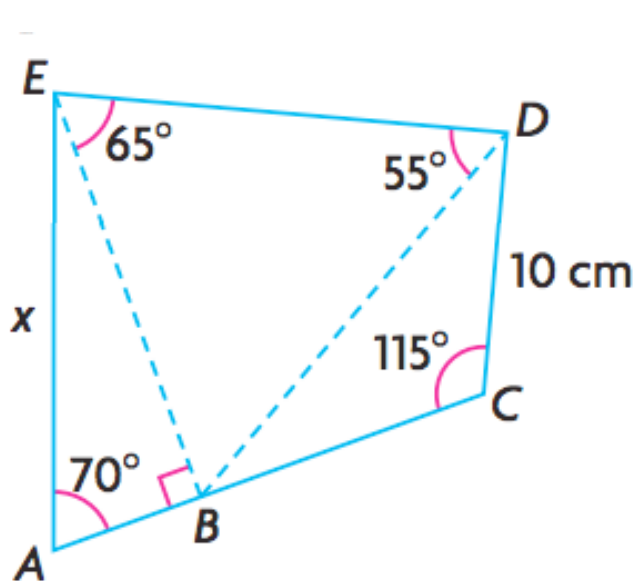
Problem 2.

Example 2

The Great Pyramid at Giza in Egypt has a square base with sides of 232.6 m long. The distance from the top of the pyramid to each corner of the base was originally 221.2 m.

- (a) Determine the angle each face makes with the base.
- (b) Determine the size of the apex angle of a face of the pyramid.

Problems 3 and 4 Solve for the indicated side and round final answer correct to the nearest tenths.



Problem #5

14. **Application:** Two forest fire towers, A and B , are 20.3 km apart. The bearing from A to B is $N70^\circ E$. The ranger in each tower observes a fire and radios the fire's bearing from the tower. The bearing from tower A is $N25^\circ E$. From tower B , the bearing is $N15^\circ W$. How far is the fire from each tower?

Level 3 Problems

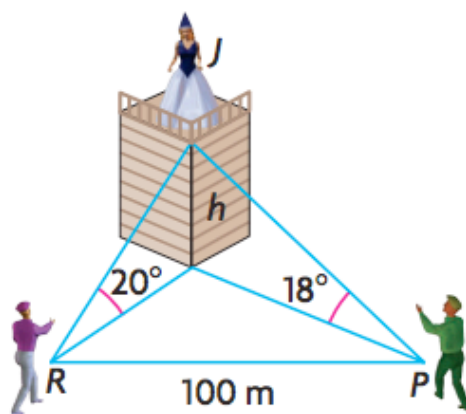
Problem 1.

18. Thinking, Inquiry, Problem Solving: A given pyramid has a regular hexagonal base. Each side of the base is 12.5 cm and the vertical height of the pyramid is 20.0 cm. Determine

- (a) the measure of the apex angle of each face
- (b) the surface area of the pyramid
- (c) the volume of the pyramid

Problem 2.

- 7.** Suppose Romeo is serenading Juliet while she is on her balcony. Romeo is facing north and sees the balcony at an angle of elevation of 20° . Paris, Juliet's other suitor, is observing the situation and is facing west. Paris sees the balcony at an angle of elevation of 18° . Romeo and Paris are 100 m apart as shown. Determine the height of Juliet's balcony above the ground, to the nearest metre.

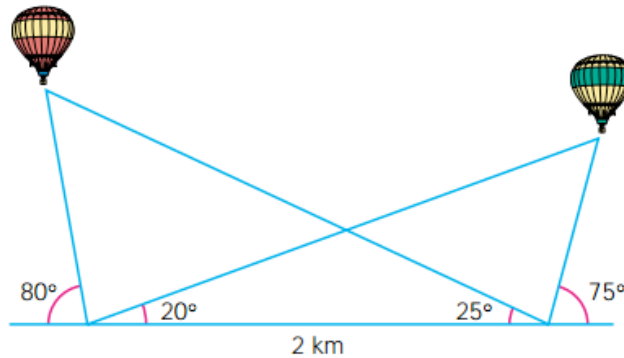


Problem 3.

20. Two hot air balloons are moored directly over a level road. The diagram shows the angle of elevation of the balloons from two observers 2 km apart.

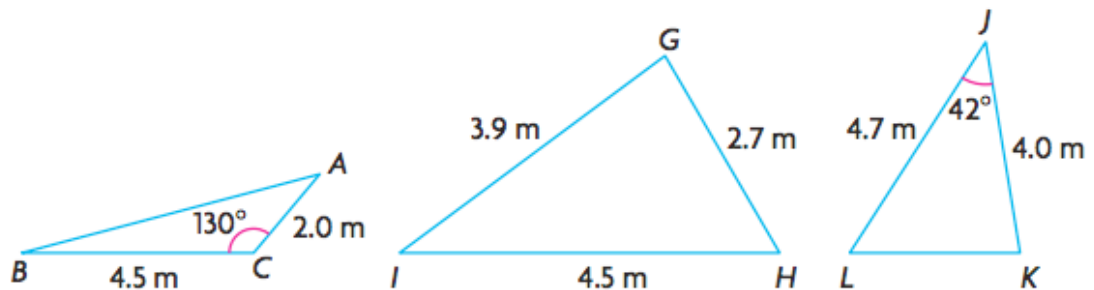
(a) To the nearest tenth of a kilometre, how far apart are the balloons?

(b) Which balloon is higher, and by how many metres?

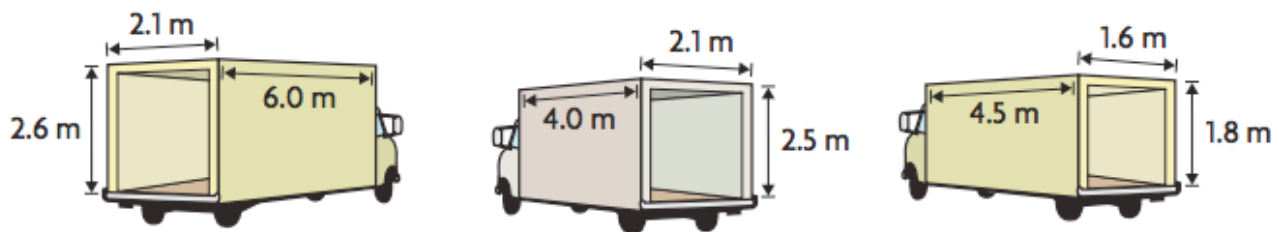


Problem 4.

10. In setting up for an outdoor concert, a stage platform has been dismantled **T** into three triangular pieces as shown.

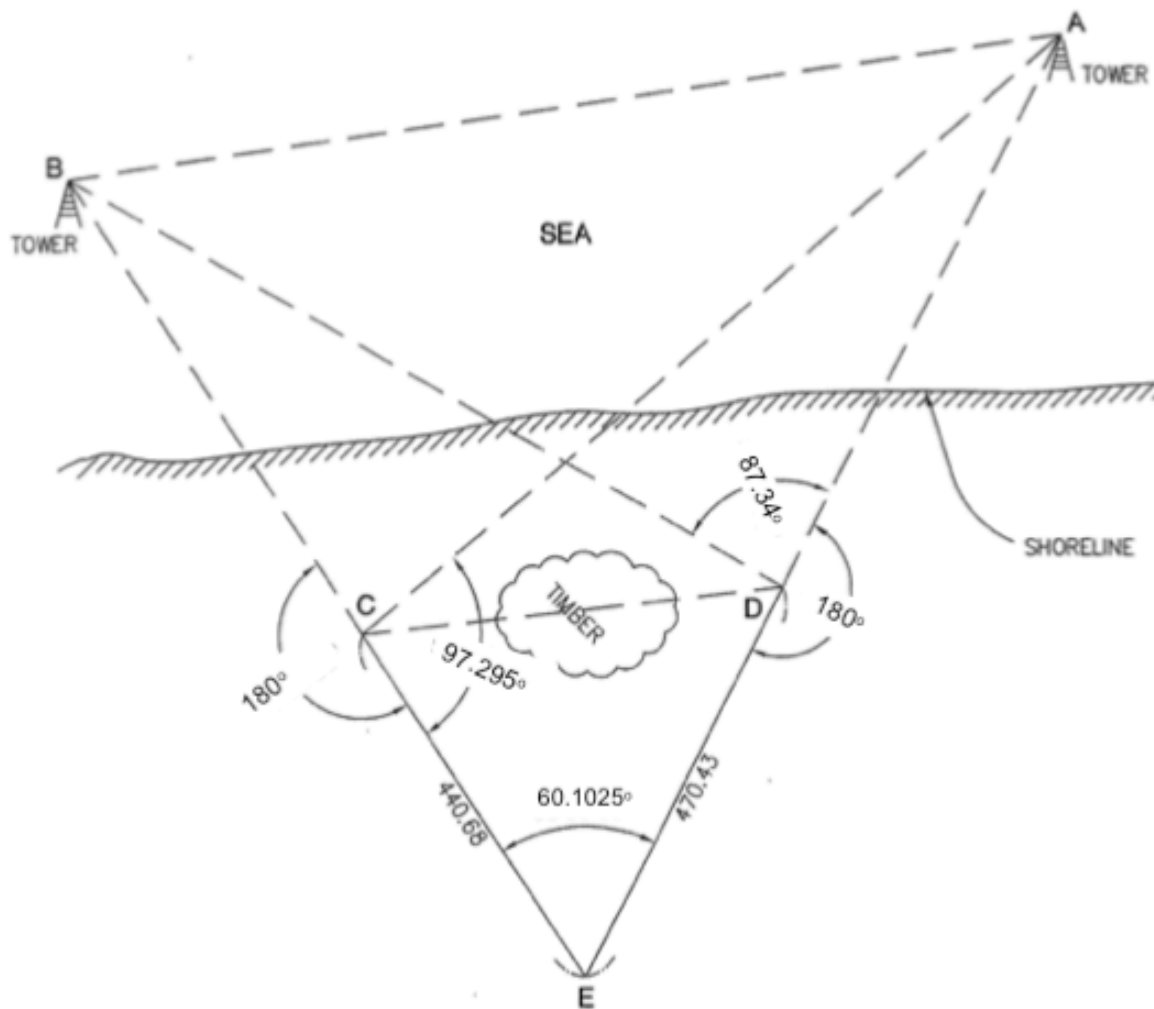


There are three vehicles available to transport the pieces. In order to prevent damaging the platform, each piece must fit exactly inside the vehicle. Explain how you would match each piece of the platform to the best-suited vehicle. Justify your reasoning with calculations.



Level 4 Problem

Problem 4: The government has constructed offshore communication towers to help monitor the costal waters. A Fiber Optic Cable need to be connect from the points on land to the Towers for increased security. This cable will enable the towers to transmit information quicker, for surveillance and environmental purposes. We need you to find the following distances for our Engineers. Please write your answers to the nearest Thousandths Place



Find the following:

- Distance AC
- Distance AD
- Distance BD
- Distance BC
- Distance CD
- Distance AB