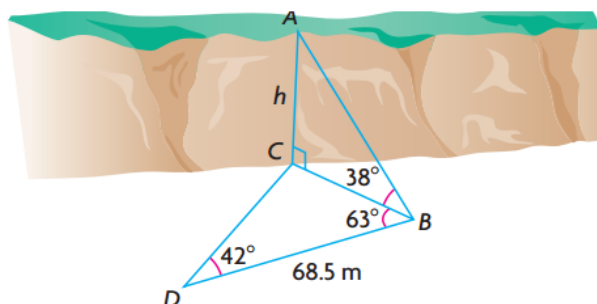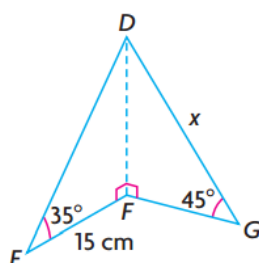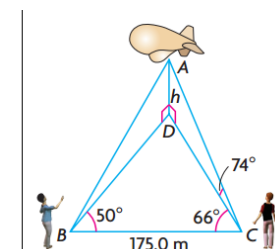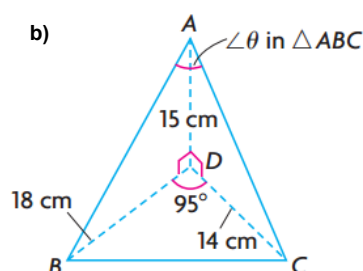# TRIG in 3-D !!!

1. From point B, Manny uses a clinometer to determine the angle of elevation to the top of a cliff as $38°$. From point D, 68.5 m away from Manny, Joe estimates the angle between the base of the cliff, himself, and Manny to be $42°$, while Manny estimates the angle between the base of the cliff, himself, and his friend Joe to be $63°$.

A
h
C
38°
63° B
42°
68.5 m
D

2. a)
D
x
35° F 45°
15 cm G
E

b) A — $\angle\theta$ in $\triangle ABC$
15 cm
D
18 cm 95°
14 cm
B C

3. As a project, a group of students was asked to determine the altitude, h, of a promotional blimp. The students' measurements are shown in the sketch at the left.

a) Determine h to the nearest tenth of a metre. Explain each of your steps.
b) Is there another way to solve this problem? Explain.

A
h
D
74°
50° 66°
B 175.0 m C

4. 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.

J
h
20° 18°
R 100 m P
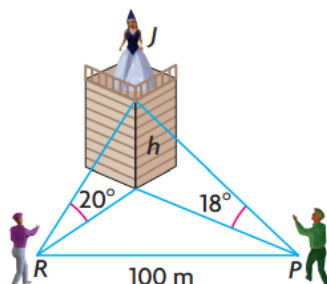
5.
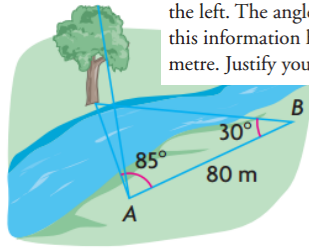
Bert wants to calculate the height of a tree on the opposite bank of a river. To do this, he lays out a baseline 80 m long and measures the angles as shown at the left. The angle of elevation from A to the top of the tree is 28°. Explain if this information helps Bert to calculate the height of the tree to the nearest metre. Justify your reasoning with calculations.

B

30°

85°

80 m

A

6.

To determine the height of a pole across a road, Justin takes two measurements. He stands at point A directly across from the base of the pole and determines that the angle of elevation to the top of the pole is 15.3°. He then walks 30 m parallel to the freeway to point C, where he sees that the base of the pole and point A are 57.5° apart. From point A, the base of the pole and point C are 90.0° apart. Calculate the height of the pole to the nearest metre.

h

B

15.3°

57.5°

A 30 m C