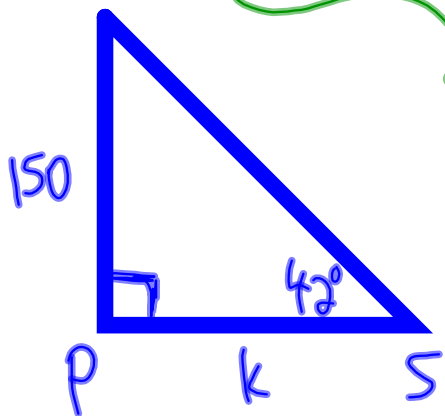
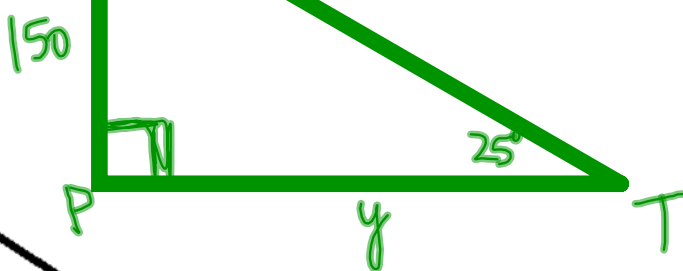
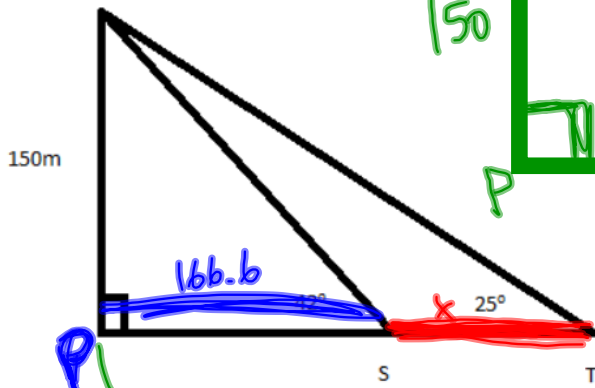


3.4 Solving Problems with Acute Triangles

Example #1

A smokestack is 150m high. Two observers, located at positions S and T, look to the top of the smokestack at angles of elevation of 42° and 25° respectively. How far apart are the two people?



$y = 321.7$

$$\frac{\tan 25^\circ}{1} = \frac{150}{y}$$

$$y = \frac{150}{\tan 25}$$

$$y = 321.7$$

$$\tan 42^\circ = \frac{150}{k}$$

$$k = \frac{150}{\tan 42^\circ}$$

$$k = 166.6$$

$$x = 321.7 - 166.6$$

$$x = 155.1 \text{ m}$$

Example #2

A crane stands on top of a building as shown.

- a. How far is the point on the ground from the base of the building, to the nearest tenth of a metre?
- b. How tall is the crane?

(#5,p.161)

Example #3

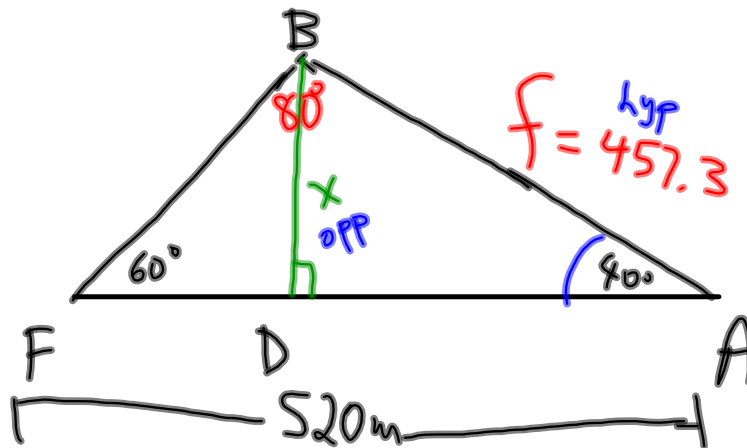
A tree is growing on a hillside as shown. The hillside is inclined at an angle of 15° to the horizontal. The tree casts a shadow uphill. How tall is the tree, to the nearest metre? (#6, p.162)

Example #4

A radio operator on a ship discovers a large sunken vessel lying parallel to the ocean surface, 200m directly below the ship. The length of the vessel is a clue to which wreck has been found. The radar operator measures the angles of depression to the front and back of the sunken vessel to be 56° and 62° . How long, to the nearest tenth of a metre, is the sunken vessel?

Example #5

Fred and Agnes are 520, apart. As Brendan flies overhead in an airplane, they estimate the angle of elevation of the airplane. Fred, looking south, estimates the angle of elevation to be 60° . Agnes, looking north, estimates it to be 40° . What is the altitude of the airplane, to the nearest tenth of a metre?



using Sine law : $\frac{f}{\sin 60^\circ} = \frac{520}{\sin 80^\circ}$

$$f = \frac{520 \sin 60^\circ}{\sin 80^\circ}$$

$$f = 457.3$$

$$\frac{\sin 40^\circ}{1} = \frac{x}{457.3}$$

$$x = 457.3 (\sin 40^\circ)$$

$$x = 293.9 \text{ m}$$

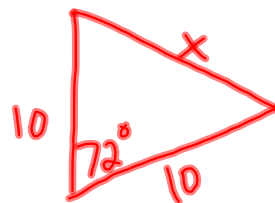
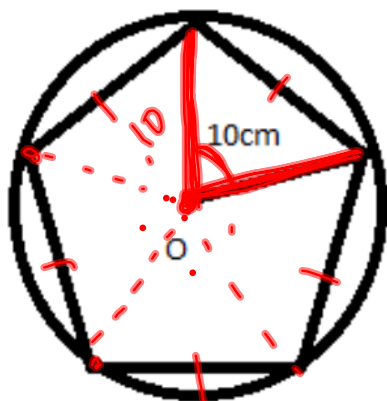
Example #0

Two support wires are fastened to the top of a communications tower from points A and B on the ground. The points are on opposite sides of the tower and in line. One wire is 18m long, and the other wire is 12m long. The angle of elevation of the longer wire to the top of the tower is 38° . How far apart are points A and B?

example #1

A regular pentagon is inscribed in a circle with centre O as shown in the diagram.
Determine the perimeter of the pentagon to the nearest tenth of a centimeter.

$$\frac{360}{5}$$



Using cosine Law:

$$x^2 = 10^2 + 10^2 - 2(10)(10)\cos 72^\circ$$

p. 161 # 3-7, 9, 13

Example #8

The radar screen in the air-traffic control tower at the Edmonton International Airport shows that two planes are at the same altitude. According to the range finder, one airplane is 100km away, in the direction $N60^{\circ}E$. The other airplane is 160km away, in the direction $S50^{\circ}E$. How far apart are the planes to the nearest tenth of a kilometer?

Example #9

In a parallelogram, two adjacent sides measure 10cm and 12cm. The shorter diagonal is 15 cm. Determine, to the nearest degree, the measures of all four angles in the parallelogram.

Example #10

From a window in an apartment building, 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, to the nearest tenth of a metre? (#10 p. 168)