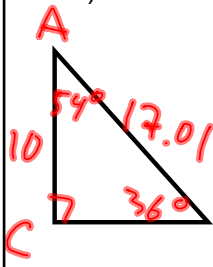


4-8 Applications and Models

Ex 1) Solve the right triangle given  $A = 54^\circ$  and  $b = 10$ .



$$\angle B = 180 - (54 + 90)$$

$$\angle B = 36^\circ$$

$$10 \tan 54^\circ = \frac{a}{10} \cdot 10$$

$$10 \tan 54^\circ = a$$

$$13.76 = a$$

$$\sin 36^\circ = \frac{10}{c} \cdot c$$

$$\frac{c \sin 36^\circ}{\sin 36^\circ} = \frac{10}{\sin 36^\circ}$$

$$c = 17.01$$

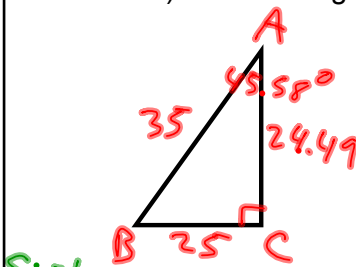
Round to 2 decimal places on all sides and angles.

$$\angle B = 36^\circ$$

$$c = 17.01$$

$$a = 13.76$$

Ex 2) Solve the right triangle given  $a = 25$  and  $c = 35$ .



$$25^2 + b^2 = 35^2$$

$$625 + b^2 = 1225$$

$$\sqrt{b^2} = \sqrt{600}$$

$$b = 24.49$$

$$\sin^{-1} \sin A = \frac{25}{35}$$

$$A = 45.58^\circ$$

$$\angle B = 180 - (90 + 45.58)$$

$$\angle B = 44.42$$

$$b = 24.49$$

$$\angle A = 45.58^\circ$$

$$\angle B = 44.42^\circ$$

Ex 3) From a point 50 feet in front of a church, the angles of elevation to the base of the steeple and the top of the steeple are  $35^\circ$  and  $47^\circ 40'$ , respectively. Draw a picture of the situation. Use a trig function to write an equation involving the unknown quantity. Find the height of the steeple.

Sol  $\tan 35^\circ = \frac{a}{50} \cdot 50$

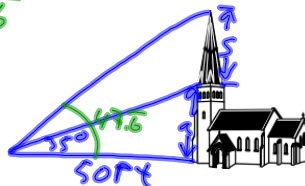
$a = 35.010376$

(So)  $\tan 47.6^\circ = \frac{s + 35.010376}{50} \cdot 50$

$50 \tan 47.6^\circ = s + 35.010376$

$50 \tan 47.6^\circ - 35.010376 = s$

$17.8784 = s$



Ex 4) A global positioning system satellite orbits 12,500 miles above the Earth's surface. Find the angle of depression from the satellite to the horizon. Assume the radius of the earth is 4,000 miles.

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Ex 5) An airplane flying at 600 miles per hour has a bearing of  $52^\circ$ . (see page 322)  
 After flying 1.5 hours, how far north and how far east has the plane traveled from its point of departure?



Ex 6) A passenger in an airplane flying at an altitude of 10 kilometers sees two towns directly to the east of the plane. The angles of depression to the towns are  $28^\circ$  and  $55^\circ$ . How far apart are the towns?

