

## 5.1 The Law of Cosines

1. Answers:

- side  $a$
- $\angle T, \angle R$ , and  $\angle I$
- side  $l$
- $\angle R$  and  $\angle D$
- side  $b$
- $\angle C, \angle D, \angle M$

7. Answers:

- (a) First, find  $x$ :  $x^2 = 31^2 + 26^2 - 2 \cdot 31 \cdot 26 \cdot \cos 47^\circ$ ,  $x = 23.187$  miles. Dividing the miles by his speed will tell us how long he will have service.  $\frac{23.187}{45} = 0.52$  hr or 30.9 min.
- (b)  $\frac{23.187}{35} = 0.66$  hr or 39.7 min, so he will have service for 8.8 minutes longer.

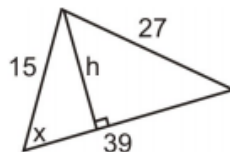
8. Answers:

- $194.1^2 = 183^2 + 306^2 - 2 \cdot 183 \cdot 306 \cdot \cos a$ . The angle formed,  $a$ , is  $37^\circ$ .
- $207^2 = 183^2 + 329^2 - 2 \cdot 183 \cdot 329 \cdot \cos b$ . The new angle,  $b$ , will need to be  $34.8^\circ$  rather than  $37^\circ$  or  $2.2^\circ$  less.

9.  $x^2 = 235^2 + 329^2 - 2 \cdot 235 \cdot 329 \cdot \cos 9^\circ$ , making the ball 103.6 yards away from the flag.

10. Students answers will vary. The goal is to have each student create their own word problem.

11. Draw a figure as shown below.



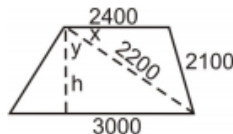
We need to find the height in order to get the area.

$$27^2 = 15^2 + 39^2 - 2 \cdot 15 \cdot 39 \cdot \cos x, x = 29.6^\circ$$

$$\sin 29.6^\circ = \frac{h}{15} \rightarrow h = 7.4$$

$$A = \frac{1}{2} \cdot 39 \cdot 7.4 = 144.3$$

12. Draw a figure as shown below.



Recall that the area of a trapezoid is  $A = \frac{1}{2}h(b_1 + b_2)$ . We need to find the angle  $x$ , in order to find  $y$  and then  $h$ .

$$2100^2 = 2400^2 + 2200^2 - 2 \cdot 2400 \cdot 2200 \cdot \cos x, x = 54.1^\circ$$

$$90^\circ - 54.1^\circ = 35.9^\circ = y \cdot \cos 35.9^\circ = \frac{h}{2200} \rightarrow h = 1782.1$$

$$A = \frac{1}{2} \cdot 1782.1(2400 + 3000) = 4,811,670 \text{ sq.ft. or } 110.5 \text{ acres.}$$