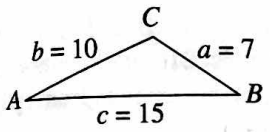
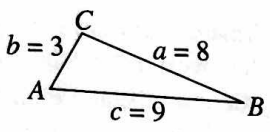
6.2 Exercises

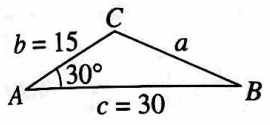
VOCABULARY CHECK: Fill in the blanks.

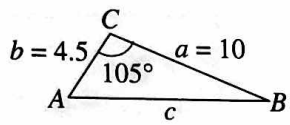
1. If you are given three sides of a triangle, you would use the Law of _____ to find the three angles of the triangle.
2. The standard form of the Law of Cosines for $\cos B = \dfrac{a^2 + c^2 - b^2}{2ac}$ is _____.
3. The Law of Cosines can be used to establish a formula for finding the area of a triangle called _____ _____ Formula.

In Exercises 1–16, use the Law of Cosines to solve the triangle. Round your answers to two decimal places.

1. 

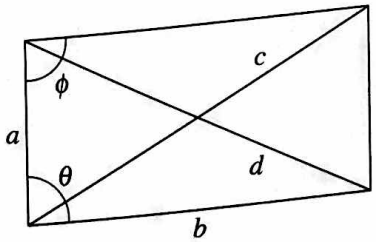
2. 

3. 

4. 

5. $a = 11, \quad b = 14, \quad c = 20$
6. $a = 55, \quad b = 25, \quad c = 72$
7. $a = 75.4, \quad b = 52, \quad c = 52$
8. $a = 1.42, \quad b = 0.75, \quad c = 1.25$
9. $A = 135°, \quad b = 4, \quad c = 9$
10. $A = 55°, \quad b = 3, \quad c = 10$
11. $B = 10° 35', \quad a = 40, \quad c = 30$
12. $B = 75° 20', \quad a = 6.2, \quad c = 9.5$
13. $B = 125° 40', \quad a = 32, \quad c = 32$
14. $C = 15° 15', \quad a = 6.25, \quad b = 2.15$
15. $C = 43°, \quad a = \frac{4}{9}, \quad b = \frac{7}{9}$
16. $C = 103°, \quad a = \frac{3}{8}, \quad b = \frac{3}{4}$

In Exercises 17–22, complete the table by solving the parallelogram shown in the figure. (The lengths of the diagonals are given by *c* and *d*.)



	a	b	c	d	θ	ϕ
17.	5	8			45°	
18.	25	35				120°
19.	10	14	20			
20.	40	60		80		
21.	15		25	20		
22.		25	50	35		

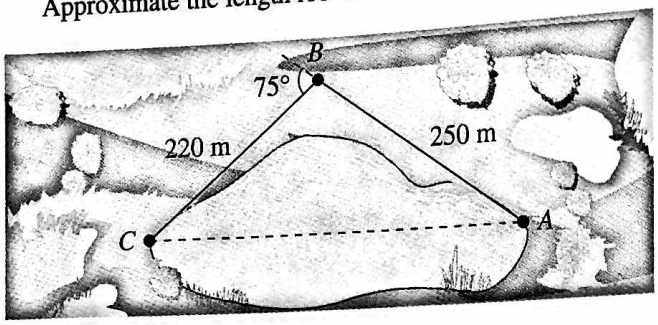
In Exercises 23–28, use Heron's Area Formula to find the area of the triangle.

23. $a = 5, \quad b = 7, \quad c = 10$
24. $a = 12, \quad b = 15, \quad c = 9$
25. $a = 2.5, \quad b = 10.2, \quad c = 9$
26. $a = 75.4, \quad b = 52, \quad c = 52$
27. $a = 12.32, \quad b = 8.46, \quad c = 15.05$
28. $a = 3.05, \quad b = 0.75, \quad c = 2.45$

29. ***Navigation*** A boat race runs along a triangular course marked by buoys A, B, and C. The race starts with the boats headed west for 3700 meters. The other two sides of the course lie to the north of the first side, and their lengths are 1700 meters and 3000 meters. Draw a figure that gives a visual representation of the problem, and find the bearings for the last two legs of the race.

30. ***Navigation*** A plane flies 810 miles from Franklin to Centerville with a bearing of 75°. Then it flies 648 miles from Centerville to Rosemount with a bearing of 32°. Draw a figure that visually represents the problem, and find the straight-line distance and bearing from Franklin to Rosemount.

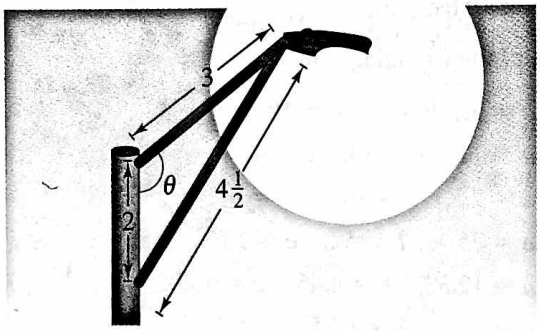
31. ***Surveying*** To approximate the length of a marsh, a surveyor walks 250 meters from point A to point B, then turns 75° and walks 220 meters to point C (see figure). Approximate the length AC of the marsh.



32. ***Surveying*** A triangular parcel of land has 115 meters of frontage, and the other boundaries have lengths of 76 meters and 92 meters. What angles does the frontage make with the two other boundaries?

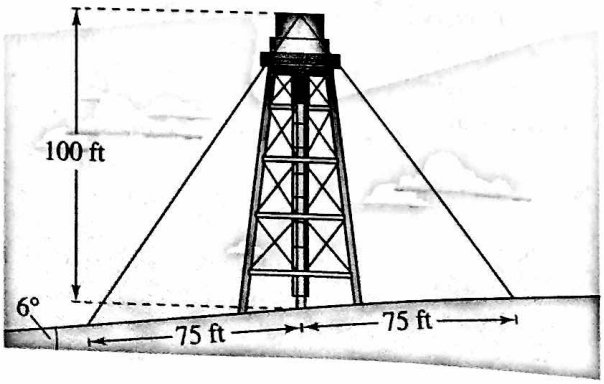
33. ***Surveying*** A triangular parcel of ground has sides of lengths 725 feet, 650 feet, and 575 feet. Find the measure of the largest angle.

34. ***Streetlight Design*** Determine the angle θ in the design of the streetlight shown in the figure.

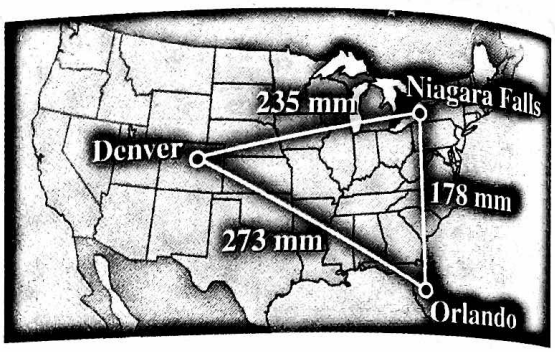


35. ***Distance*** Two ships leave a port at 9 A.M. One travels at a bearing of N 53° W at 12 miles per hour, and the other travels at a bearing of S 67° W at 16 miles per hour. Approximate how far apart they are at noon that day.

36. ***Length*** A 100-foot vertical tower is to be erected on the side of a hill that makes a 6° angle with the horizontal (see figure). Find the length of each of the two guy wires that will be anchored 75 feet uphill and downhill from the base of the tower.



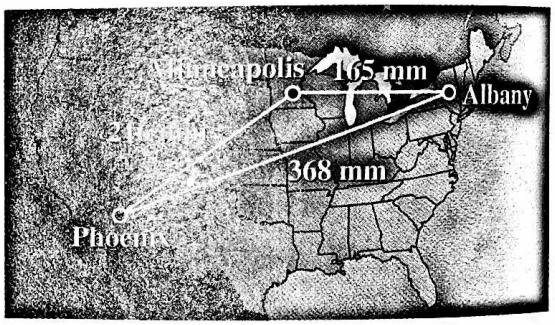
37. ***Navigation*** On a map, Orlando is 178 millimeters due south of Niagara Falls, Denver is 273 millimeters from Orlando, and Denver is 235 millimeters from Niagara Falls (see figure).



(a) Find the bearing of Denver from Orlando.

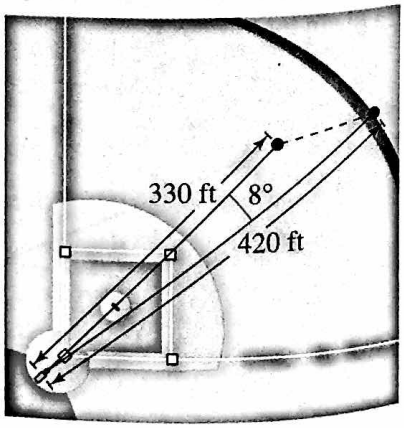
(b) Find the bearing of Denver from Niagara Falls.

38. ***Navigation*** On a map, Minneapolis is 165 millimeters due west of Albany, Phoenix is 216 millimeters from Minneapolis, and Phoenix is 368 millimeters from Albany (see figure).



(a) Find the bearing of Minneapolis from Phoenix.

(b) Find the bearing of Albany from Phoenix.

39. ***Baseball*** On a baseball diamond with 90-foot sides, the pitcher's mound is 60.5 feet from home plate. How far is it from the pitcher's mound to third base?

40. ***Baseball*** The baseball player in center field is playing approximately 330 feet from the television camera that is behind home plate. A batter hits a fly ball that goes to the wall 420 feet from the camera (see figure). The camera turns 8° to follow the play. Approximately how far does the center fielder have to run to make the catch?