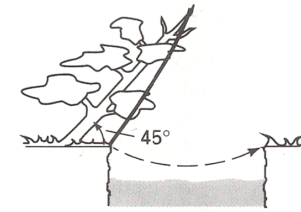


EXERCISES 4-3

Solve $\triangle ABC$. If no solution exists, so state. If there are two solutions, find both.

- A**
- $a = 21; c = 30; \angle B = 42^\circ$
 - $a = 16; \angle B = 32^\circ; \angle C = 50^\circ$
 - $b = 14; \angle B = 25^\circ; \angle C = 110^\circ$
 - $a = 5; b = 8; c = 10$
 - $a = 2.3; b = 3.7; c = 5.0$
 - $b = 120; c = 145; \angle A = 100^\circ$
 - $b = 20; c = 15; \angle B = 115^\circ$
 - $a = 30; b = 20; \angle A = 130^\circ$
 - $a = 12; b = 15; \angle A = 55^\circ$
 - $a = 12; b = 7; \angle B = 35^\circ$
 - $a = 5.2; b = 3.9; c = 6.5$
 - $b = 13.4; c = 6.7; \angle C = 30^\circ$
 - $b = 15; c = 13; \angle C = 50^\circ$
 - $b = 1.1; c = 1.8; \angle B = 40^\circ$
- If $\angle B$ is acute, what condition must $b, c,$ and $\angle B$ satisfy in order that there be at least one triangle having these parts?
 - Draw diagrams similar to those in Figure 4-5 to illustrate the two SSA cases where $\angle A$ is obtuse.
 - A monument consists of a 20 m flagpole standing on a mound in the shape of a cone with vertex angle 140° . How long a shadow does the pole cast on the cone when the angle of elevation of the sun is 58° ?
 - Ann is flying a plane on a triangular course at 400 km/h. She flies due east for two hours and then turns left through a 15° angle measured clockwise from north. How long after turning will she be exactly northeast of where she started?
 - John is flying a plane from Upton to Vista, a distance of 500 km. Because of a storm between the two cities he has flown 17.5° off course for 300 km. How far is he now from Vista and through what angle should he turn to fly directly there?
- 23.** A kite 2.5 m long is a quadrilateral having two sides each 1 m long and two sides each 2 m long. How wide is the kite? (That is, what is the length of the shorter diagonal?)

- 25.** To cross a river, an explorer swings on a 100-foot vine attached to a tree leaning over the river at a 45° angle, as shown at the right. The vine is attached to the tree 120 feet from its base. How wide is the river?



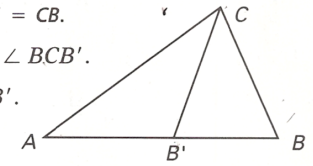
- 26.** Show that in any triangle $ABC, c = a \cos B + b \cos A$. (Hint: Consider separately the cases where both $\angle A$ and $\angle B$ are acute and where one of them is obtuse. Draw figures.)

Exercises 27–30 refer to the figure at the right where $CB' = CB$.

- 27.** Given that $a = 8, b = 13,$ and $\angle A = 30^\circ,$ find $\angle BCB'$.

- 28.** Given the measures in Exercise 27, find $\angle ACB'$.

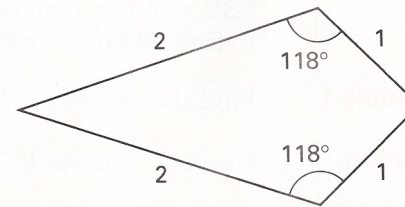
- C 29.** Show that $\frac{\text{area } \triangle ABC}{\text{area } \triangle AB'C} = \frac{\sin \angle ACB}{\sin \angle ACB'}$.



Exercises 27-30

- 30.** Show that the ratio in Exercise 29 equals $\frac{\sin(B + A)}{\sin(B - A)}$.

- 34.** Find the lengths of the diagonals of the quadrilateral shown below.



EXERCISES 4-4

A 1–14. Find the areas of the triangles described in Exercises 1–14 on pages 139–140. If no triangle exists, so state. If there are two triangles, find the area of each.

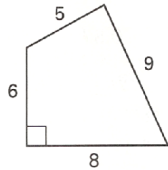
15. Find the area of a parallelogram that has a 62° angle and sides of lengths 16 and 30.
16. Find the area of a rhombus having perimeter 72 cm and a 56° angle.
17. Find the area of a parallelogram that has sides of lengths 20 m and 30 m and a diagonal 40 m long.
18. Find the area of a parallelogram whose diagonals have lengths 24 and 36 and cross at a 48° angle.

Find the area of a regular polygon of n sides inscribed in a circle of radius r .

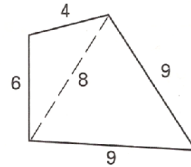
19. $n = 12; r = 4$ 20. $n = 9; r = 9$ 21. $n = 8; r = 10$ 22. $n = 15; r = 8$

B 23. A triangle has area 24 m^2 , and two of its angles measure 62° and 78° . How long is its longest side?

24. How long is the shortest side of the triangle in Exercise 23?
25. Find the area of the quadrilateral shown at the left below.



Exercise 25



Exercise 26

26. Find the area of the quadrilateral shown at the right above.