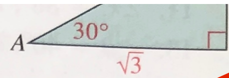
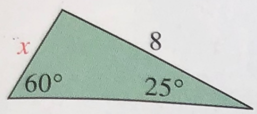
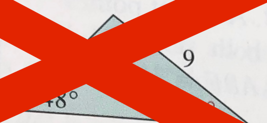


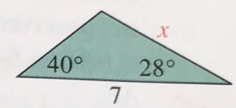
In Exercises 3–5, consider $\triangle ABC$.

3. If $\angle A \geq 90°$, what can you conclude about the measure of $\angle B$? ...
4. ... B has a greater measure than $\angle C$, what must be true of ... n.
5. If a ... hat must be true of $\angle A$ and $\angle B$? Why? ... Why?

In Exercises 6–8, s... equation that you ca... to solve for x.

6. 



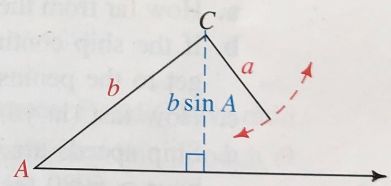
8. 

9. If $a = 8$ and $b =$ ... w a diagram to show that ... is uniquely determined for ea... the given measures of $\angle A$: **a.** 45 ... 90° **c.** 120°
10. Use th... of sines to show that $\triangle ABC$ in part (a) of Exercise ... ique.
11. ... e law of sines to show that there is no $\triangle XYZ$ with $\angle X = 30°$, $x =$ ... $y = 8$.

WRITTEN EXERCISES

A

1. The purpose of this exercise is to determine whether $\triangle ABC$ can be constructed when two lengths a and b and the measure of an acute angle A are given. As shown at the right, first $\angle A$ and then the side of length b are constructed; finally a circular arc is drawn with center C and radius a. Given that the distance from C to the side opposite C is $b \sin A$, determine for each of the following conditions whether 0, 1, or 2 triangles can be formed.



a. $a < b \sin A$ **b.** $a = b \sin A$
c. $b \sin A < a < b$ **d.** $a \geq b$

2. Use Exercise 1 or the law of sines to determine whether there are 0, 1, or 2 triangles possible for each of the following sets of measurements.
a. $a = 2,\ b = 4,\ \angle A = 22°$ **b.** $b = 3,\ c = 6,\ \angle B = 30°$
c. $a = 7,\ c = 5,\ \angle A = 68°$ **d.** $b = 4,\ c = 3,\ \angle C = 76°$

In Exercises 3–14, solve each $\triangle ABC$. Give angle measures to the nearest tenth of a degree and lengths in simplest radical form or to three significant digits. Be alert to problems with no solution or two solutions.

3. $\angle A = 45°,\ \angle B = 60°,\ a = 14$
4. $\angle B = 30°,\ \angle C = 45°,\ b = 9$
5. $\angle B = 30°,\ \angle A = 135°,\ b = 4$
6. $\angle A = 60°,\ \angle B = 75°,\ c = 10$

7. $\angle C = 25°$, $b = 3$, $c = 2$

8. $\angle B = 36°$, $a = 10$, $b = 8$

9. $\angle A = 76°$, $a = 12$, $b = 4$

10. $\angle B = 130°$, $b = 15$, $c = 11$

11. $\angle C = 88°$, $b = 7$, $c = 7$

12. $\angle A = 95°$, $a = 13$, $c = 10$

13. $\angle B = 40°$, $a = 12$, $b = 6$

14. $\angle C = 112°$, $c = 5$, $a = 7$

15. In $\triangle RST$, $\angle R = 140°$ and $s = \frac{3}{4}r$. Find the measures of $\angle S$ and $\angle T$.

16. In $\triangle DEF$, $\angle F = 120°$ and $f = \frac{4}{3}e$. Find the measures of $\angle D$ and $\angle E$.

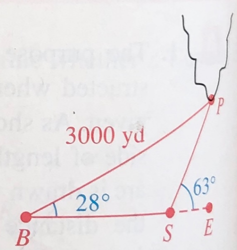
17. A fire tower at point A is 30 km north of a fire tower at point B. A fire at point F is observed from both towers. If $\angle FAB = 54°$ and $\angle ABF = 31°$, find AF.

18. From lighthouses P and Q, 16 km apart, a disabled ship S is sighted. If $\angle SPQ = 44°$ and $\angle SQP = 66°$, find the distance from S to the nearer lighthouse.

19. In $\triangle ABC$, $\tan A = \frac{3}{4}$, $\tan B = 1$, and $a = 10$. Find b in simplest radical form.

20. In $\triangle ABC$, $\cos A = \frac{1}{2}$, $\cos B = -\frac{1}{4}$, and $a = 6$. Find b in simplest radical form.

B 21. **Navigation** A ship passes by buoy B which is known to be 3000 yd from peninsula P. The ship is steaming east along line BE and $\angle PBE$ is measured as 28°. After 10 min, the ship is at S and $\angle PSE$ is measured as 63°.



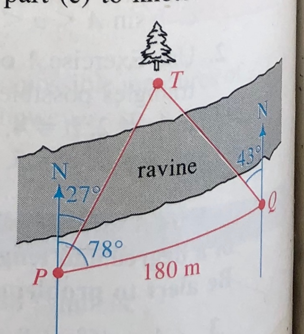
a. How far from the peninsula is the ship when it is at S?

b. If the ship continues east, what is the closest it will get to the peninsula?

c. How fast (in yd/min) is the ship traveling?

d. Ship speeds are often given in knots, where 1 knot = 1 nautical mile per hour ≈ 6080 feet per hour. Convert your answer in part (c) to knots.

22. **Surveying** From points P and Q, 180 m apart, a tree at T is sighted on the opposite side of a deep ravine. From point P, a compass indicates that the angle between the north-south line and line of sight $\overline{PT}$ is 27° and that the angle between the north-south line and $\overline{PQ}$ is 78°. From point Q, the angle between the north-south line and $\overline{QT}$ is 43°.



a. How far from P is the tree?

b. How far from P is the point on $\overline{PQ}$ that is closest to the tree?