REVIEW KEY VOCABULARY

For a list of postulates and theorems, see pp. 926–931.

- Pythagorean triple, p. 435
- trigonometric ratio, p. 466
- tangent, p. 466
- sine, p. 473
- cosine, p. 473
- angle of elevation, p. 475
- angle of depression, p. 475
- solve a right triangle, p. 483
- inverse tangent, p. 483
- inverse sine, p. 483
- inverse cosine, p. 483

VOCABULARY EXERCISES

1. Copy and complete: A Pythagorean triple is a set of three positive integers a, b, and c that satisfy the equation __?__. $a^2 + b^2 = c^2$

2. **WRITING** What does it mean to solve a right triangle? What do you need to know to solve a right triangle? **To find the measure of all three sides and all three angles; 2 side lengths, or 1 side length and 1 acute angle.**

3. **WRITING** *Describe* the difference between an angle of depression and an angle of elevation. *Sample answer:* **The difference is your perspective on the situation. The angle of depression is the measure from your line of sight down, and the angle of elevation is the measure from your line of sight up, but if you construct the parallel lines in any situation, the angles are alternate interior angles and are congruent by Theorem 3.1.**

REVIEW EXAMPLES AND EXERCISES

Use the review examples and exercises below to check your understanding of the concepts you have learned in each lesson of Chapter 7.

7.1 Apply the Pythagorean Theorem
pp. 433–439

EXAMPLE

Find the value of x.

Because x is the length of the hypotenuse of a right triangle, you can use the Pythagorean Theorem to find its value.

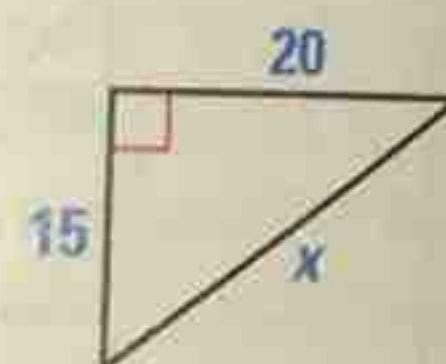$(\text{hypotenuse})^2 = (\text{leg})^2 + (\text{leg})^2$ **Pythagorean Theorem**

$x^2 = 15^2 + 20^2$ **Substitute.**

$x^2 = 625$ **Simplify.**

$x = 25$ **Find the positive square root.**

(triangle with legs 15 and 20, hypotenuse x)

EXERCISES

EXAMPLES 1 and 2 on pp. 433–434 for Exs. 4–6

Find the unknown side length x.

4. **20**
(triangle with sides x, 12, 16)
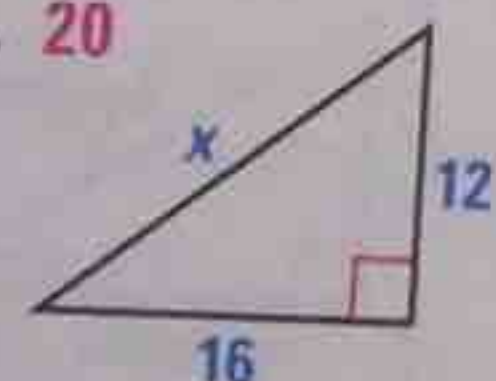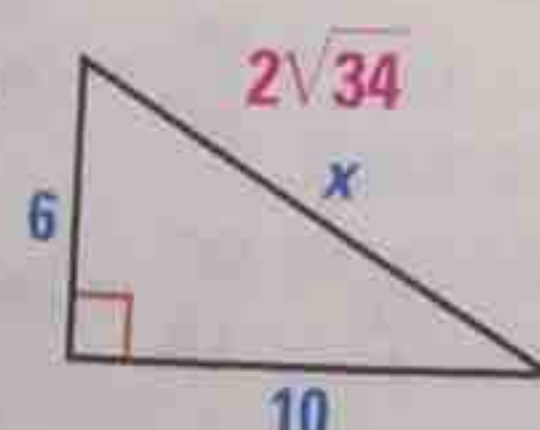
5. (triangle with $2\sqrt{34}$, x, 6, 10)

6. **15** (triangle with 15, 12, x, $\sqrt{369}$)
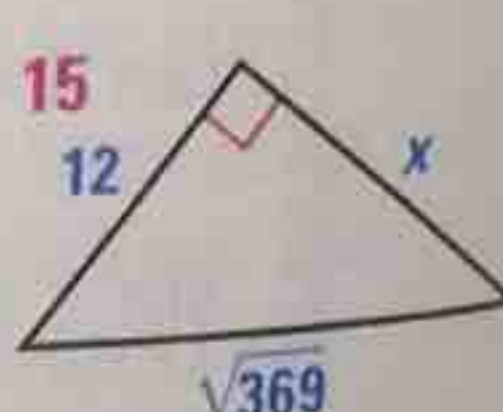
7.2 Use the Converse of the Pythagorean Theorem
pp. 441–447

EXAMPLE
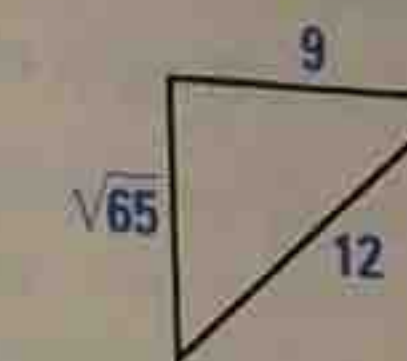
Tell whether the given triangle is a right triangle.

Check to see whether the side lengths satisfy the equation $c^2 = a^2 + b^2$.

$12^2 \stackrel{?}{=} (\sqrt{65})^2 + 9^2$

$144 \stackrel{?}{=} 65 + 81$

$144 < 146$

The triangle is not a right triangle. It is an acute triangle.

(triangle with sides 9, $\sqrt{65}$, 12)

EXERCISES

EXAMPLE 2 on p. 442 for Exs. 7–12

Classify the triangle formed by the side lengths as *acute*, *right*, or *obtuse*.

7. 6, 8, 9   **acute**

8. 4, 2, 5   **obtuse**

9. 10, $2\sqrt{2}$, $6\sqrt{3}$ **right**

10. 15, 20, 15   **acute**

11. 3, 3, $3\sqrt{2}$ **right**

12. 13, 18, $3\sqrt{55}$ **obtuse**

7.3 Use Similar Right Triangles
pp. 449–456

EXAMPLE

Find the value of x.

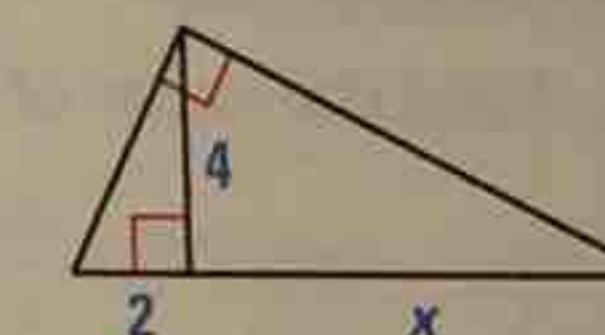By Theorem 7.6, you know that 4 is the geometric mean of x and 2.

$\dfrac{x}{4} = \dfrac{4}{2}$ **Write a proportion.**
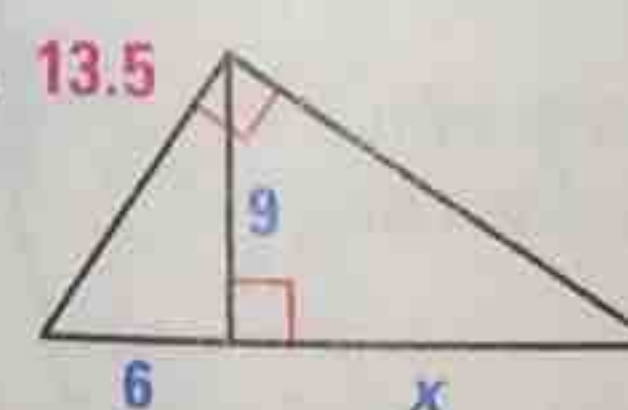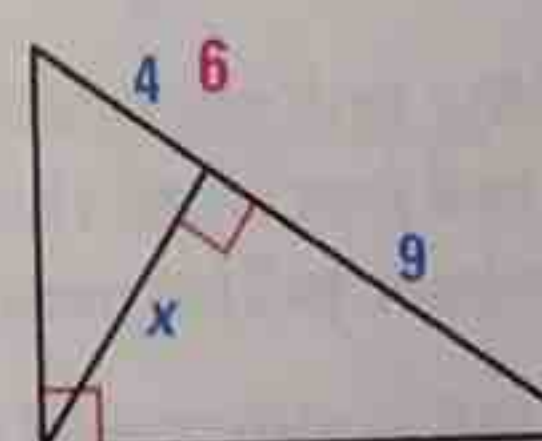
$2x = 16$ **Cross Products Property**

$x = 8$ **Divide.**

(right triangle with 4, 2, x)

EXERCISES

EXAMPLES 2 and 3 on pp. 450–451 for Exs. 13–18

Find the value of x.

13. **13.5** (triangle with 9, 6, x)

14. (triangle with 4, 6, 9, x)

15. (triangle with 6, 4, x, $2\sqrt{10}$)

16. (triangle with 2, $\sqrt{14}$, x, 5)

17. **9** (triangle with 12, 16, x)

18. **16** (triangle with 16, 20, x, 25)

Extra Example
Tell whether the g
right triangle.

(triangle with $5\sqrt{7}$, 11, 7)

No, the triangle i

Extra Examp
Find the value of
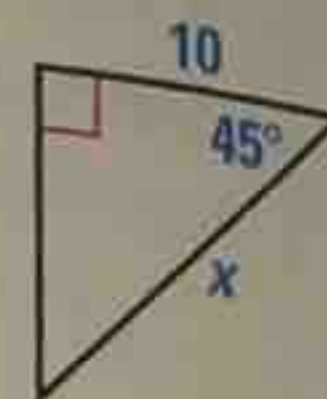
(triangle with x, 9, 3)

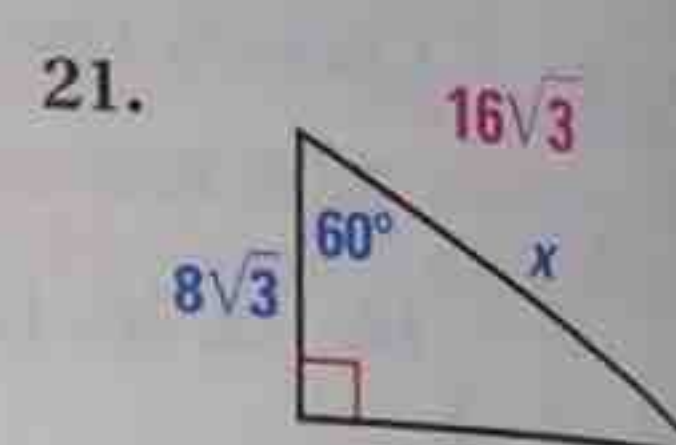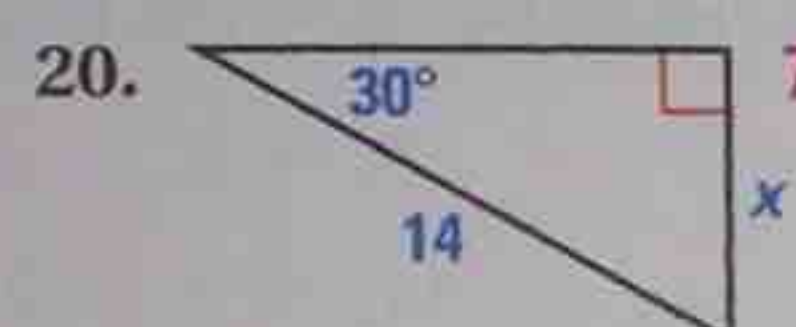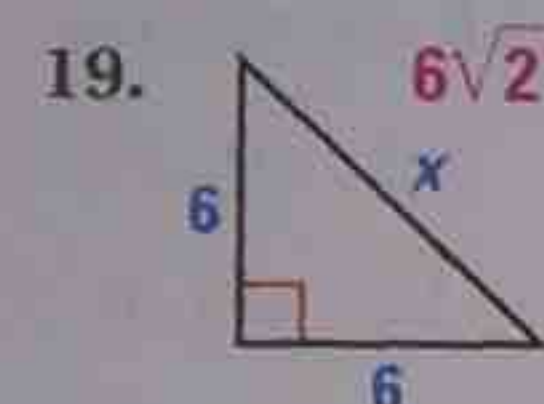## 7.4 Special Right Triangles

EXAMPLE

Find the length of the hypotenuse.

By the Triangle Sum Theorem, the measure of the third angle must be 45°. Then the triangle is a 45°-45°-90° triangle.

$$\text{hypotenuse} = \text{leg} \cdot \sqrt{2} \qquad \textbf{45°-45°-90° Triangle Theorem}$$

$$x = 10\sqrt{2} \qquad \textbf{Substitute.}$$

EXERCISES

Find the value of x. Write your answer in simplest radical form.

19.

20.

21.

7.5 Apply the Tangent Ratio

EXAMPLE

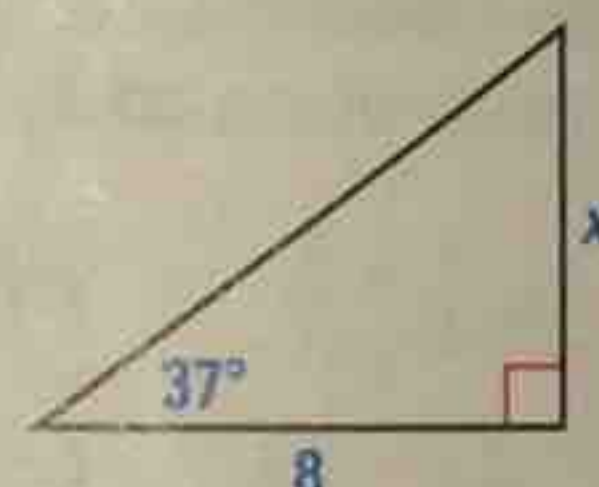**Find the value of x.**

$$\tan 37° = \frac{\text{opp.}}{\text{adj.}} \qquad \textbf{Write ratio for tangent of 37°.}$$

$$\tan 37° = \frac{x}{8} \qquad \textbf{Substitute.}$$

$$8 \cdot \tan 37° = x \qquad \textbf{Multiply each side by 8.}$$

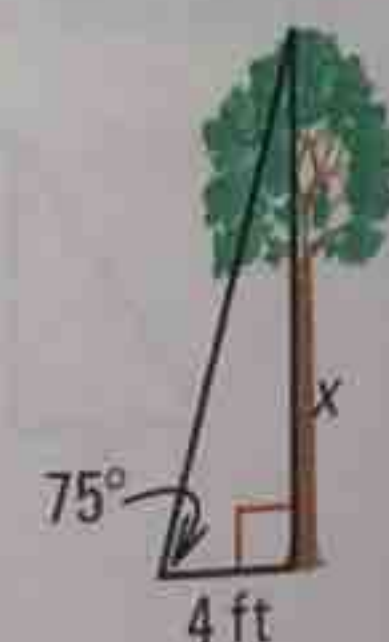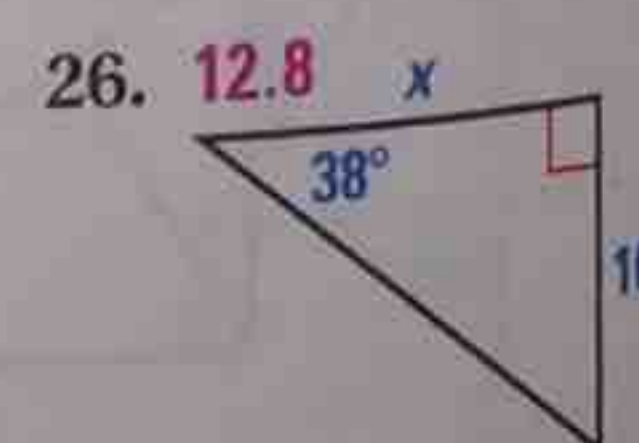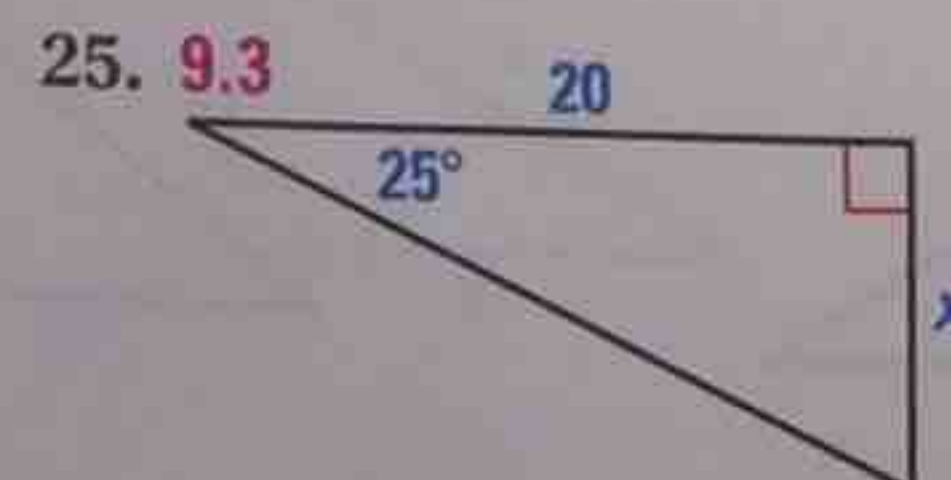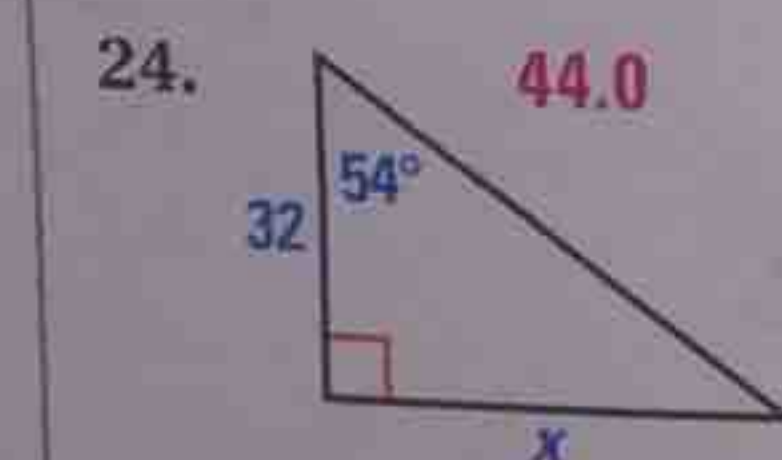$$6 \approx x \qquad \textbf{Use a calculator to simplify.}$$

EXERCISES

In Exercises 22 and 23, use the diagram.

22. The angle between the bottom of a fence and the top of a tree is 75°. The tree is 4 feet from the fence. How tall is the tree? Round your answer to the nearest foot. **15 ft**

23. In Exercise 22, how tall is the tree if the angle is 55°?
about 5.7 ft

Find the value of x to the nearest tenth.

24. **44.0**

25. **9.3**
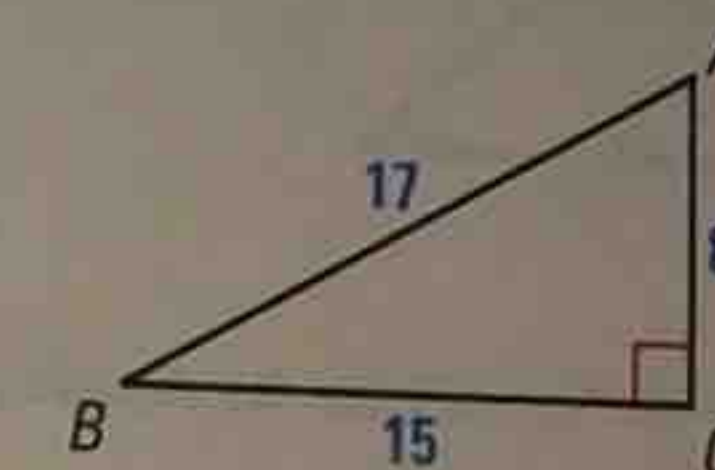
26. **12.8**

7.6 Apply the Sine and Cosine Ratios
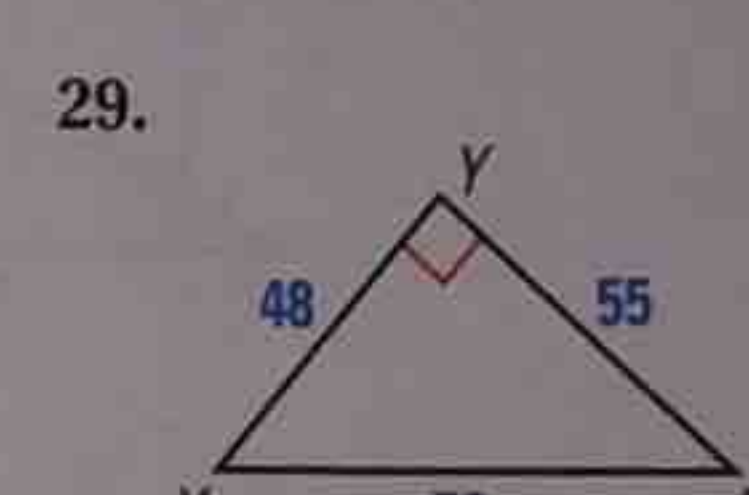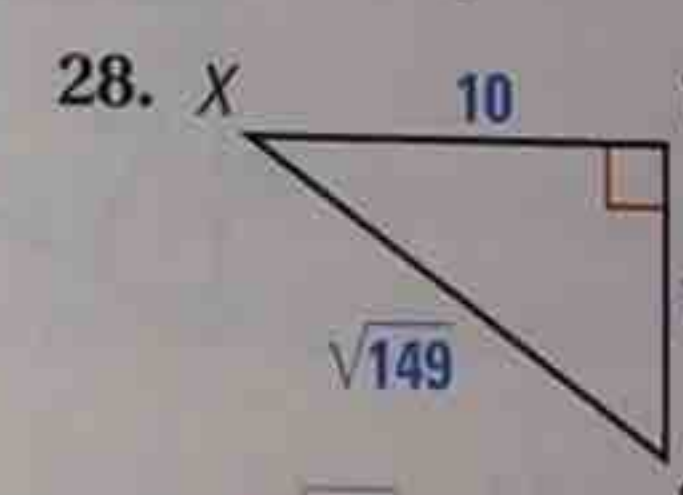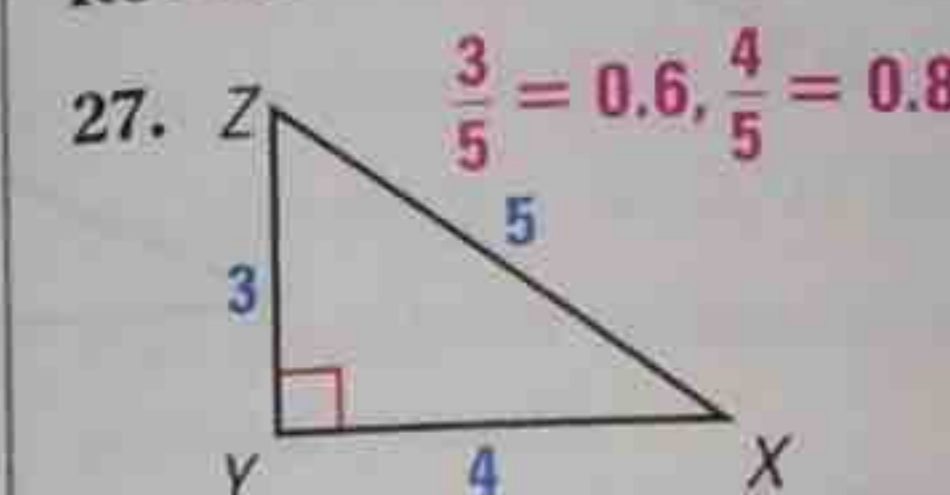
EXAMPLE

Find sin A and sin B.

$$\sin A = \frac{\text{opp.}}{\text{hyp.}} = \frac{BC}{BA} = \frac{15}{17} \approx 0.8824$$

$$\sin B = \frac{\text{opp.}}{\text{hyp.}} = \frac{AC}{AB} = \frac{8}{17} \approx 0.4706$$

EXERCISES

Find sin X and cos X. Write each answer as a fraction, and as a decimal. Round to four decimals places, if necessary.

27. $\frac{3}{5} = 0.6, \frac{4}{5} = 0.8$

28. $\frac{7\sqrt{149}}{149} \approx 0.5735, \frac{10\sqrt{149}}{149} \approx 0.8192$

29. $\frac{55}{73} \approx 0.7534, \frac{48}{73} \approx 0.6575$
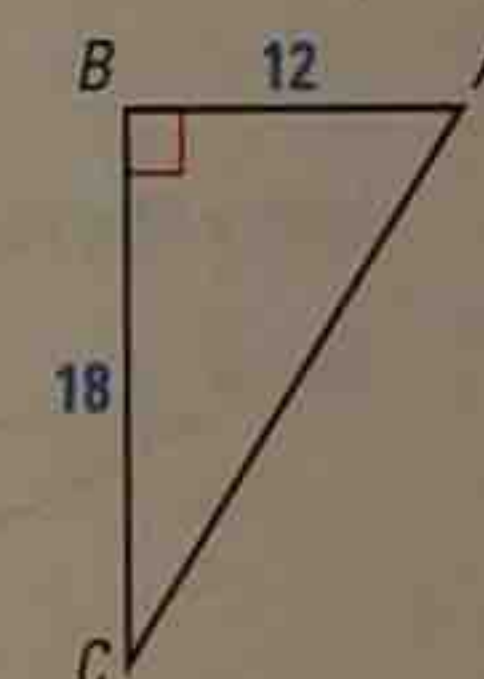

7.7 Solve Right Triangles

EXAMPLE

Use a calculator to approximate the measure of ∠A to the nearest tenth of a degree.

Because $\tan A = \frac{18}{12} = \frac{3}{2} = 1.5$, $\tan^{-1} 1.5 = m\angle A$.
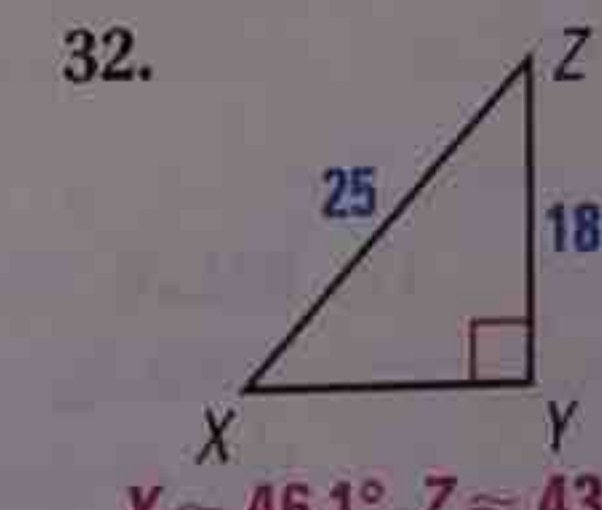
Use a calculator to evaluate this expression.

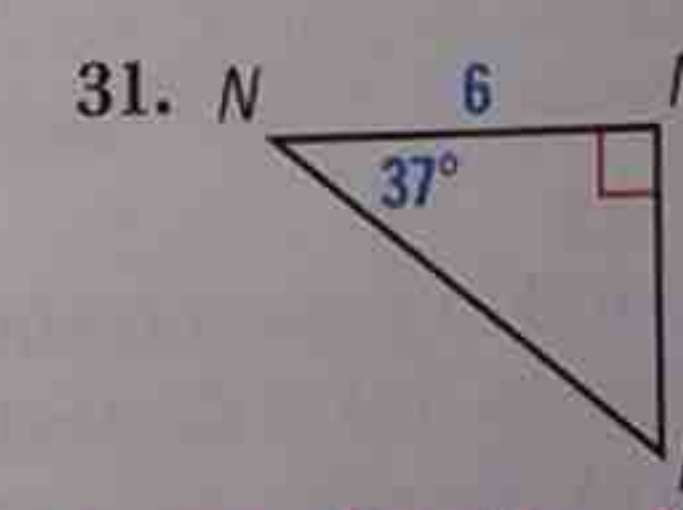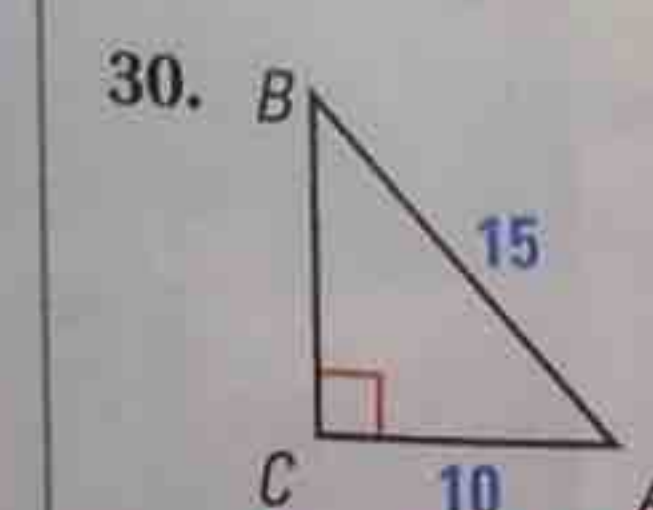$$\tan^{-1} 1.5 \approx 56.3099324 \ldots$$

So, the measure of ∠A is approximately 56.3°.

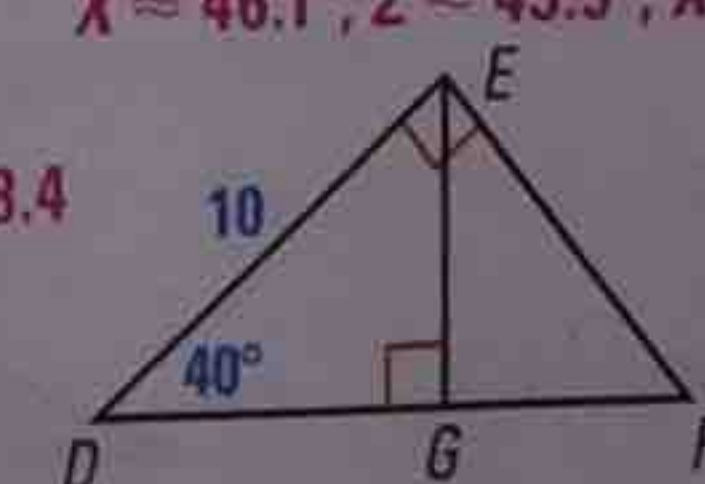**EXERCISES**

Solve the right triangle. Round decimal answers to the nearest tenth.

30. $A \approx 48.2°, B \approx 41.8°, BC \approx 11.2$

31. $L = 53°, ML \approx 4.5, NL \approx 7.5$

32. $X \approx 46.1°, Z \approx 43.9°, XY \approx 17.3$

33. Find the measures of ∠GED, ∠GEF, and ∠EFG. Find the lengths of $\overline{EG}, \overline{DF}, \overline{EF}$. **50°, 40°, 50°; about 6.4, about 13.1, about 8.4**