12.1 Exercises

Dynamic Solutions available at *BigIdeasMath.com*

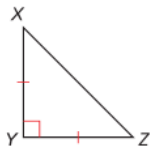
Vocabulary and Core Concept Check

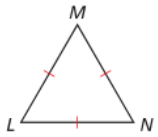
1. **WRITING** Can a right triangle also be obtuse? Explain your reasoning.

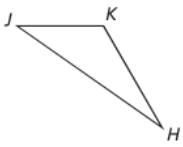
2. **COMPLETE THE SENTENCE** The measure of an exterior angle of a triangle is equal to the sum of the measures of the two _____ interior angles.

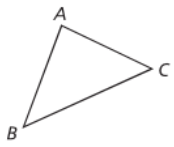
Monitoring Progress and Modeling with Mathematics

In Exercises 3–6, classify the triangle by its sides and by measuring its angles. *(See Example 1.)*

3. 

4. 

5. 

6. 

In Exercises 7–10, classify $\triangle ABC$ by its sides. Then determine whether it is a right triangle. *(See Example 2.)*

7. $A(2, 3), B(6, 3), C(2, 7)$

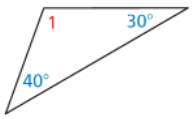
8. $A(3, 3), B(6, 9), C(6, -3)$

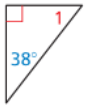
9. $A(1, 9), B(4, 8), C(2, 5)$

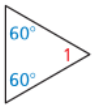
10. $A(-2, 3), B(0, -3), C(3, -2)$

In Exercises 11–14, find $m\angle 1$. Then classify the triangle by its angles.

11.

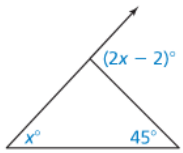
12. 

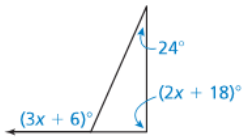
13. 

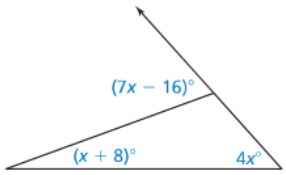
14. 

In Exercises 15–18, find the measure of the exterior angle. *(See Example 3.)*

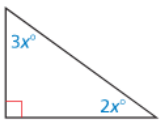
15.

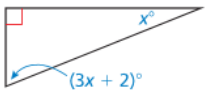
16. 

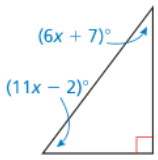
17. 

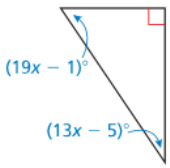
18. 

In Exercises 19–22, find the measure of each acute angle. *(See Example 4.)*

19. 

20. 

21. 

22. 

In Exercises 23–26, find the measure of each acute angle in the right triangle. *(See Example 4.)*

23. The measure of one acute angle is 5 times the measure of the other acute angle.

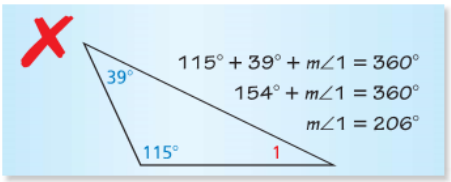
24. The measure of one acute angle is 8 times the measure of the other acute angle.

25. The measure of one acute angle is 3 times the sum of the measure of the other acute angle and 8.

26. The measure of one acute angle is twice the difference of the measure of the other acute angle and 12.

ERROR ANALYSIS **In Exercises 27 and 28, describe and correct the error in finding $m\angle 1$.**

27.



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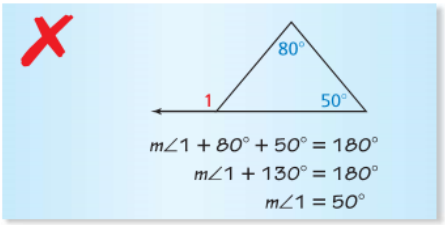
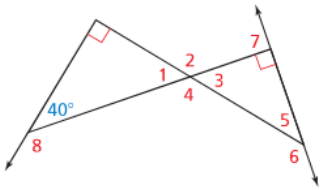


In Exercises 29–36, find the measure of the numbered angle.



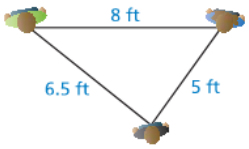
29. $\angle 1$ **30.** $\angle 2$

31. $\angle 3$ **32.** $\angle 4$

33. $\angle 5$ **34.** $\angle 6$

35. $\angle 7$ **36.** $\angle 8$

37. **USING TOOLS** Three people are standing on a stage. The distances between the three people are shown in the diagram. Classify the triangle by its sides and by measuring its angles.



38. **USING STRUCTURE** Which of the following sets of angle measures could form a triangle? Select all that apply.

Ⓐ 100°, 50°, 40° Ⓑ 96°, 74°, 10°

Ⓒ 165°, 113°, 82° Ⓓ 101°, 41°, 38°

Ⓔ 90°, 45°, 45° Ⓕ 84°, 62°, 34°

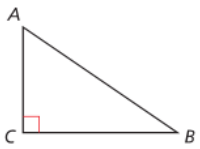
39. **MODELING WITH MATHEMATICS** You are bending a strip of metal into an isosceles triangle for a sculpture. The strip of metal is 20 inches long. The first bend is made 6 inches from one end. Describe two ways you could complete the triangle.

40. **THOUGHT PROVOKING** Find and draw an object (or part of an object) that can be modeled by a triangle and an exterior angle. Describe the relationship between the interior angles of the triangle and the exterior angle in terms of the object.

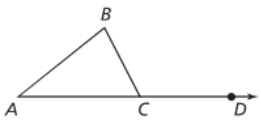
41. **PROVING A COROLLARY** Prove the Corollary to the Triangle Sum Theorem.

Given $\triangle ABC$ is a right triangle.

Prove $\angle A$ and $\angle B$ are complementary.



42. **PROVING A THEOREM** Prove the Exterior Angle Theorem.

Given $\triangle ABC$, exterior $\angle BCD$

Prove $m\angle A + m\angle B = m\angle BCD$