3-5 Parallel Lines and Triangles

Vocabulary

Review

Identify the part of speech for the word *alternate* in each sentence below.

1. You vote for one winner and one *alternate*. _____
2. Your two friends *alternate* serves during tennis. _____
3. You and your sister babysit on *alternate* nights. _____
4. Write the *converse* of the statement.

   Statement: If it is raining, then I need an umbrella.

   Converse: _____

Vocabulary Builder

tri- (prefix) **try**

Related Word: triple

Main Idea: **Tri-** is a prefix meaning three that is used to form compound words.

Examples: triangle, tricycle, tripod

Use Your Vocabulary

Write T for *true* or F for *false*.

_____ **5.** A *tri*pod is a stand that has three legs.

_____ **6.** A *tri*angle is a polygon with three or more sides.

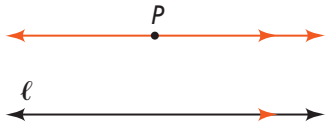
_____ **7.** A *tri*atholon is a race with two events — swimming and bicycling.

_____ **8.** In order to *tri*ple an amount, multiply it by three.

take note

Postulate 3-3 Parallel Postulate

Through a point not on a line, there is one and only one line parallel to the given line.



9. You can draw ____ line(s) through P parallel to line ℓ.

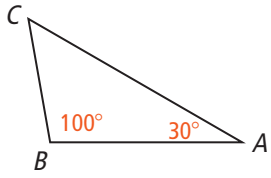
take note

Theorem 3-10 Triangle Angle-Sum Theorem

The sum of the measures of the angles of a triangle is 180.

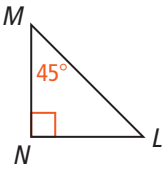
Find each angle measure.

10.



$m\angle C =$ ____

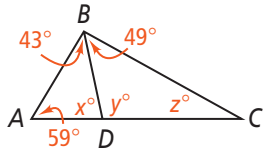
11.



$m\angle L =$ ____

Problem 1 Using the Triangle Angle-Sum Theorem

Got It? **Use the diagram at the right. What is the value of z?**



Complete each statement.

12. $m\angle A =$ ____

13. $m\angle ABC =$ ____ $+$ ____ $=$ ____

14. $m\angle A + m\angle ABC + m\angle C =$ ____

____ $+$ ____ $+ z =$ ____

$z =$ ____ $-$ ____ $-$ ____ $=$ ____

Check your result by solving for z another way.

15. Find $m\angle BDA$.

16. Then find $m\angle BDC$.

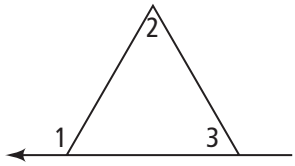
17. Use your answers to Exercises 15 and 16 to find the value of z.

take note

Theorem 3-11 Triangle Exterior Angle Theorem

An **exterior angle of a polygon** is an angle formed by a side and an extension of an adjacent side. For each exterior angle of a triangle, the two nonadjacent interior angles are its **remote interior angles.**

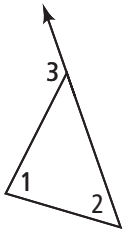
The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles.



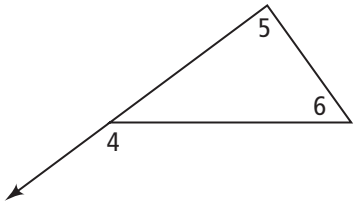
18. ____ $= m\angle 2 + m\angle 3$

Circle the number of each exterior angle and draw a box around the number of each remote interior angle.

19.

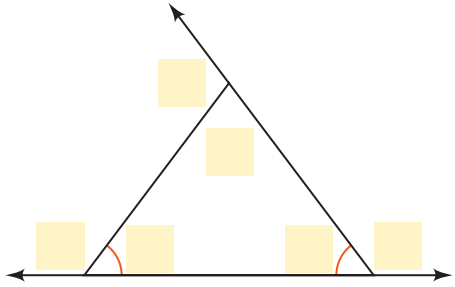


20.



Problem 2 Using the Triangle Exterior Angle Theorem

Got It? **Two angles of a triangle measure 53. What is the measure of an exterior angle at each vertex of the triangle?**



21. Use the diagram at the right.

Label the interior angles 53°, 53°, and a.

Label the exterior angles adjacent to the 53° angles as x and y. Label the third exterior angle z.

22. Complete the flow chart.

Triangle Angle-Sum

$53 + 53 + a =$ ____

$a =$ ____ $-$ ____

$=$ ____

Exterior Angle

$x = a +$ ____

$=$ ____ $+$ ____

$=$ ____

Exterior Angle

$y = a +$ ____

$=$ ____ $+$ ____

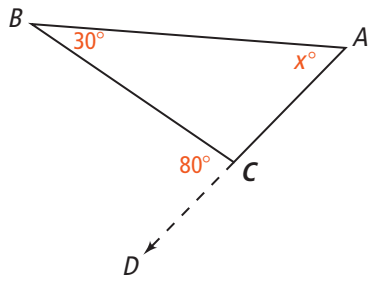
$=$ ____

Exterior Angle

$z =$ ____ $+$ ____

$=$ ____

Problem 3 Applying the Triangle Theorems



Got It? Reasoning **Can you find $m\angle A$ without using the Triangle Exterior Angle Theorem? Explain.**

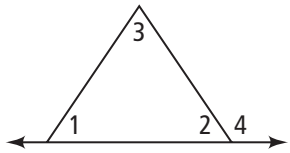
23. $\angle ACB$ and $\angle DCB$ are complementary / supplementary angles.

24. Find $m\angle ACB$.

25. Can you find $m\angle A$ if you know two of the angle measures? Explain.

Lesson Check • Do you UNDERSTAND?

Explain how the Triangle Exterior Angle Theorem makes sense based on the Triangle Angle-Sum Theorem.



26. Use the triangle at the right to complete the diagram below.

Triangle Angle-Sum Theorem → ____ + $m\angle 2 = 180$

$m\angle 1 + m\angle 3 = m\angle 4$

Linear Pair Postulate → ____ + $m\angle 2 = 180$

27. Explain how the Triangle Exterior Angle Theorem makes sense based on the Triangle Angle-Sum Theorem.

Math Success

Check off the vocabulary words that you understand.

☐ exterior angle ☐ remote interior angles

Rate how well you can *use the triangle theorems.*

Need to review 0 2 4 6 8 10 Now I get it!