Name:

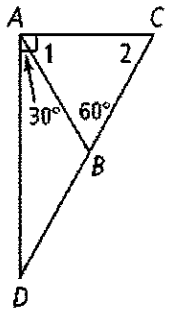
3-5

Triangle Angle-Sum Theorem:

The measures of the angles in a triangle add up to 180.

Problem

In the diagram at the right, ΔACD is a right triangle. What are $m\angle 1$ and $m\angle 2$?



Step 1

$m\angle 1 + m\angle DAB = 90$ Use Complementary Angles

$m\angle 1 + 30 = 90$ Substitute in the given value

$m\angle 1 =$ _____

Step 2

$m\angle 1 + m\angle 2 + m\angle ABC = 180$ Use triangle Angle-Sum Theorem

$60 + m\angle 2 + 60 = 180$ Substitute in given value

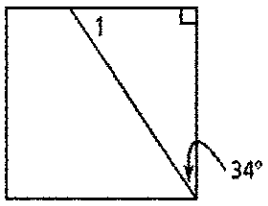
$m\angle 2 + 120 = 180$

$m\angle 2 =$ _____

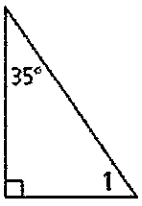
Exercises

Find $m\angle 1$.

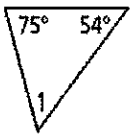
1.

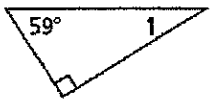


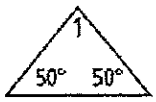
2.



3.

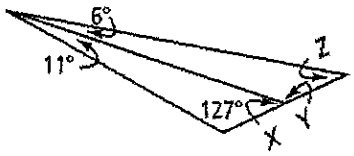


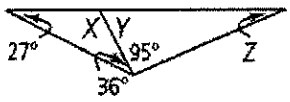
4. 

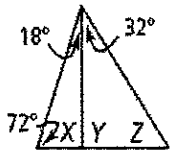
5. 

6. 

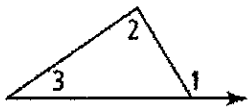
Algebra Find the value of *each* variable.

7. 

8. 

9. 

3-5 (continued)



In the diagram at the right, $\angle 1$ is an exterior angle of the triangle. An exterior angle is an angle formed by one side of a polygon and an extension of an adjacent side.

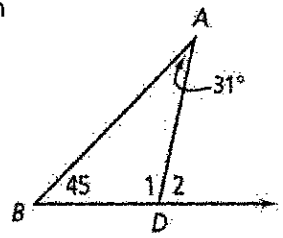
For each exterior angle of a triangle, the two interior angles that are not next to it are its remote interior angles. In the diagram, $\angle 2$ and $\angle 3$ are remote interior angles to $\angle 1$.

The *Exterior Angle Theorem* states that the measure of an exterior angle is equal to the sum of its remote interior angles. So, $m\angle 1 = m\angle 2 + m\angle 3$.

Problem

What are the measures of the unknown angles?

$m\angle ABD + m\angle BDA + m\angle BAD = 180$	Use triangle Angle-Sum Theorem
$45 + m\angle 1 + 31 = 180$	Substitute in given values
$m\angle 1 =$ _____	
$m\angle ABD + m\angle BAD = m\angle 2$	Use Exterior Angle Theorem
$45 + 31 = m\angle 2$	Substitute in given values
_____ $= m\angle 2$	



Your Turn:

Draw triangle ABC with angle Z exterior to angle A.

Which angles are the remote interior angles to <A?

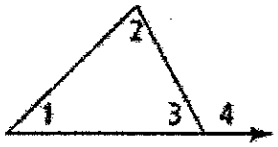
If the sum of the remote interior angles is 67°, what are the measures of <Z and < A?

Bonus: what is the relationship between angles A and Z?

Exercises

What are the exterior angle and the remote interior angles for each triangle?

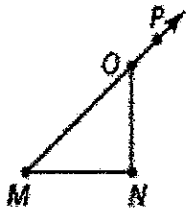
10.



exterior:

interior:

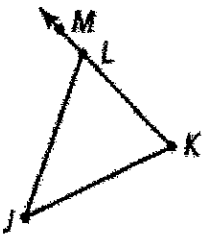
11.



exterior:

interior:

12.

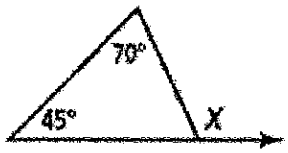


exterior:

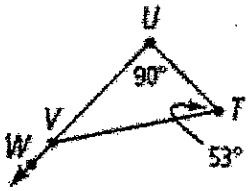
interior:

Find the measure of the exterior angle.

13.



14.



15.