

Your Name

Mrs. Theo

10/15/21

Notes

5.1 - Angles in Triangles

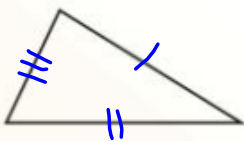
Lesson Objectives

- Find interior and exterior angles of triangles
- Classify triangles by side lengths and angle measures

Classifying Triangles by Side Length

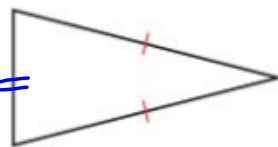
Naming Triangles  
 $\Delta$  3 letters  
 $\Delta ABC$      A     B     C

**Scalene Triangle**



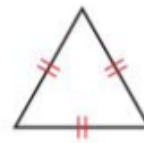
no congruent sides

**Isosceles Triangle**



at least 2 congruent sides

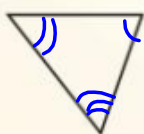
**Equilateral Triangle**  
 Equal Sides



3 congruent sides

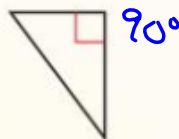
Classifying Triangles by Angle Measure

**Acute Triangle**



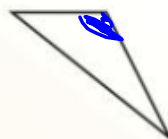
3 acute angles

**Right Triangle**



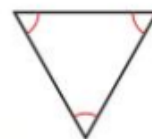
1 right angle

**Obtuse Triangle**



1 obtuse angle

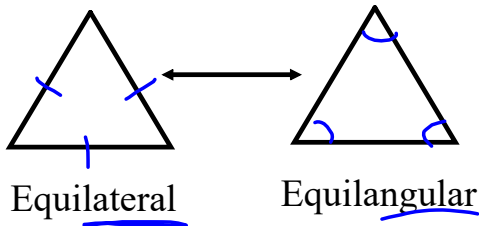
**Equiangular Triangle**  
 Equal angle



3 congruent angles

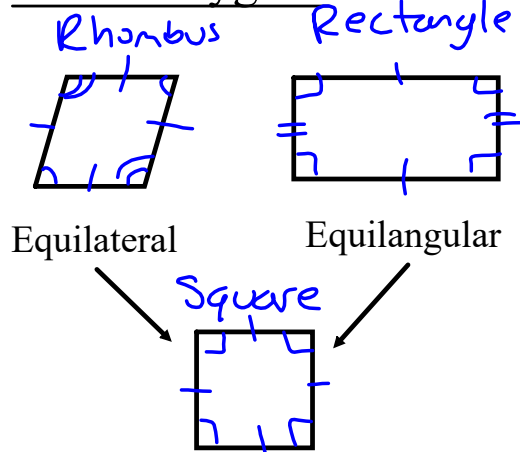
Equilateral vs. Equiangular

Triangles



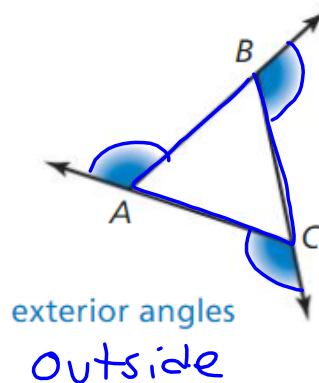
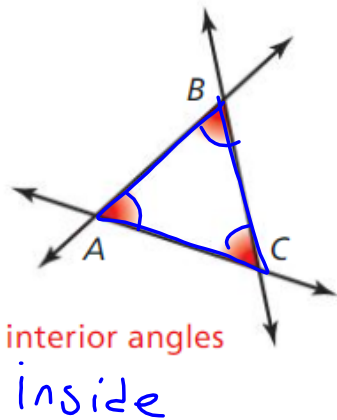
for a triangles  
if equal sides  
then equal angles

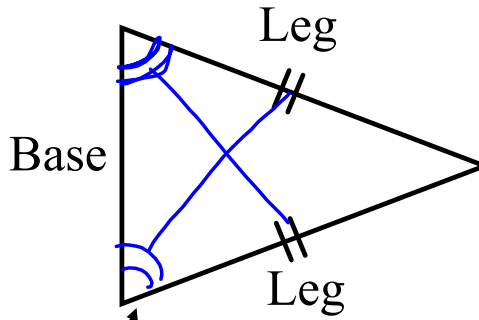
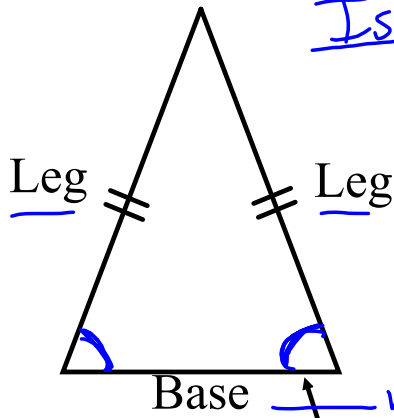
Other Polygons



Both = **Regular** Polygon  
equilateral  
and equiangular

Angle Measures in Triangles



Isosceles Triangles

Legs are  
the congruent  
sides

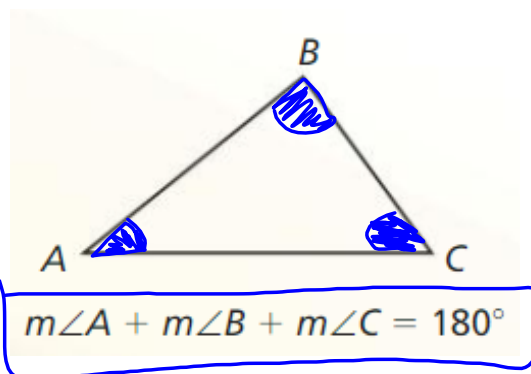
non  
congruent side

Base Angles are  $\cong$  congruent  
(in isos triangles)

opposite legs

Triangle Sum Theorem

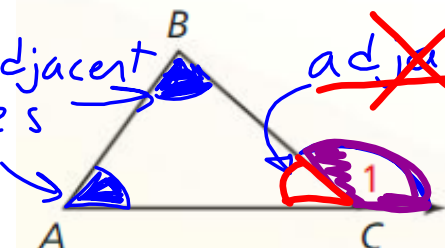
The sum of the measures of the interior angles of a triangle is 180°.



Exterior Angle Theorem

The measure of an exterior angle in a triangle is equal to the sum of the non-adjacent interior angles.

*not next to*

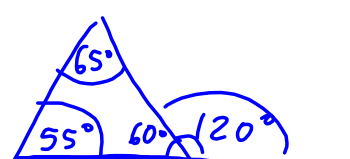


*non-adjacent Angles*

~~adjacent~~

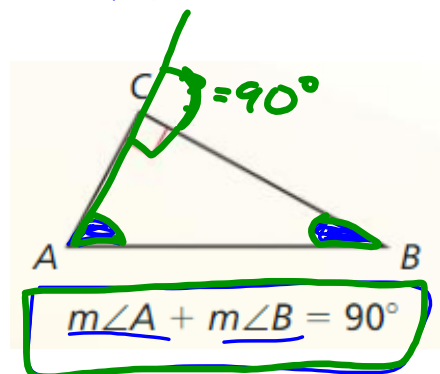
$m\angle 1 = m\angle A + m\angle B$

$\star 55 + 65 + 60 = 180$   
 $\star 60 + 120 = 180$   
 $55 + 65 + 60 = 60 + 120$   
 $\quad -60 \quad -60$   
 $\underline{55 + 65 = 120} \checkmark$


Corollary to the Exterior Angle Theorem

The acute angles of a right triangle are complementary.

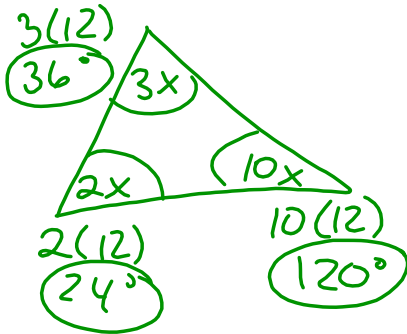
*adds to 90*



**Example #1**

multiply each part by x  $2x:3x:10x$

The angles in a triangle are in a ratio of 2:3:10.  
Find the measure of all 3 angles.



Triangle Sum Theorem

angle + angle + angle = 180

$2x + 3x + 10x = 180$

$15x = 180$

$\frac{15x}{15} = \frac{180}{15}$

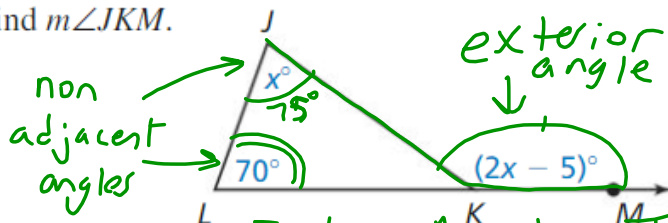
$x = 12$

$\div$  by 12  $24^\circ:36^\circ:120^\circ$   
 $2:3:10$  ✓

**Example #2**

**Finding an Angle Measure**

Find  $m\angle JKM$ .



Ext. Angle Th. m.  
non adjacent angles = exterior angle

$(x) + (70) = 2x - 5$   
 $-x$   $-x$

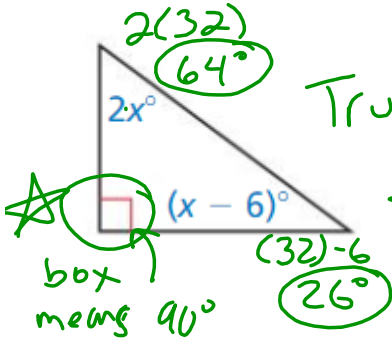
$70 = x - 5$   
 $+5$   $+5$

$75 = x$

$m\angle JKM = 2(75) - 5$   
 $= 145^\circ$

**Example #3**

Find the measure of each acute angle.



True  $A + A + A = 180$   
 $(2x) + (x-6) + 90 = 180$   
 $\quad\quad\quad -90 \quad -90$

$2x + x - 6 = 90$  Corr. Ext. Angle Thm.

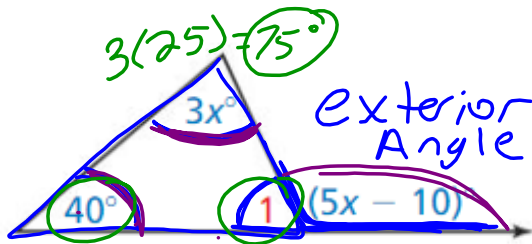
$3x - 6 = 90$   
 $\quad\quad +6 \quad +6$

$3x = 96$   
 $\quad\quad \underline{\quad} \quad \underline{\quad}$   
 $\quad\quad 3 \quad\quad 3$

$x = 32$

**Example #4**

Find the measure of  $\angle 1$ .



non adjacent angles add up to exterior angle

$3x + 40 = 5x - 10$   
 $\quad -3x \quad\quad -3x$

$40 = 2x - 10$   
 $\quad +10 \quad\quad +10$

$50 = 2x$   
 $\quad \underline{\quad} \quad \underline{\quad}$   
 $\quad 2 \quad\quad 2$

$25 = x$

Triangle Sum Th:

$75^\circ + 40^\circ + m\angle 1 = 180$

$115^\circ + m\angle 1 = 180$

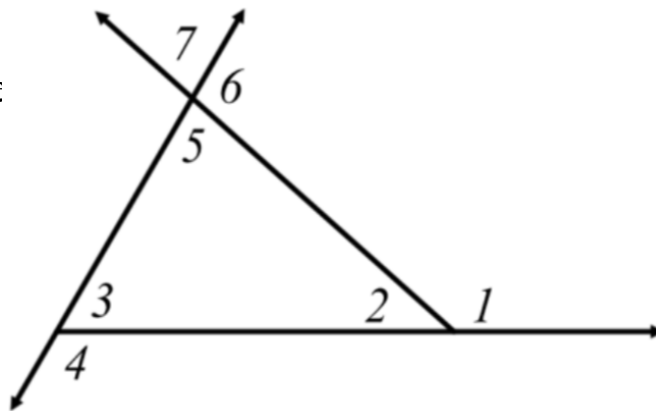
$\quad -115 \quad\quad -115$

$m\angle 1 = 65^\circ$

**Example #5** Finding an Angle Measure

$$\angle 1 = 130^\circ \quad \angle 7 = 70^\circ$$

Given:  
Find the measure



Homework: pg. 236  
#3-6, 15-17, 19, 21,

Fun Challenge! #7, 29-36

Find Answer Key to these textbook questions via the link on my website for Textbook Answers

Corr. Ext. Angle Th  
 $90 - 40$

29.  $m\angle 1 = 50^\circ$

30.  $m\angle 2 = 130^\circ$

31.  $m\angle 3 = 50^\circ$  (Vertical)

32.  $m\angle 4 = 130^\circ$  (Vertical)

33.  $m\angle 5 = 40^\circ$  ( $90 - 50$ )

34.  $m\angle 6 = 140^\circ$  ( $180 - m\angle 5$ )

35.  $m\angle 7 = 90^\circ$

36.  $m\angle 8 = 140^\circ$

Geometry

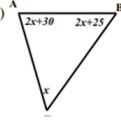
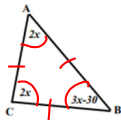
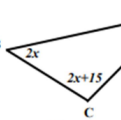
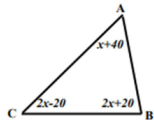
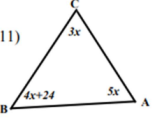
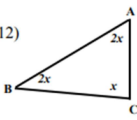
name: Key

Triangle Sum Theorem Practice

Directions: Solve for  $x$  in each of the triangles below. The Triangle Sum Theorem states that the interior angles of a triangle always add up to 180. Your first step should be to set up an equation where the sum of the angles adds up to 180. Solve the equation for  $x$ , then plug that value back in to the expressions to find the measure of the missing angles.

<p>1) </p> <p><math>A + A + A = 180</math>  <math>3x + x + x = 180</math>  <math>5x = 180</math>  <math>x = 36</math>  <math>\angle A = 36^\circ</math>  <math>\angle B = 36^\circ</math>  <math>\angle C = 108^\circ = 3(36)</math></p>	<p>2) </p> <p><math>m\angle A + m\angle B + m\angle C = 180</math>  <math>(x+52) + (x+8) + (x) = 180</math>  <math>3x + 60 = 180</math>  <math>3x = 120</math>  <math>x = 40</math>  <math>\angle A = 92^\circ = 40 + 52</math>  <math>\angle B = 48^\circ = 40 + 8</math>  <math>\angle C = 40^\circ</math></p>	<p>3) </p> <p><math>5x + 4x + 3x = 180</math>  <math>12x = 180</math>  <math>x = 15</math>  <math>\angle A = 75^\circ</math>  <math>\angle B = 60^\circ</math>  <math>\angle C = 45^\circ</math></p>
<p>4) </p> <p><math>x + 60 + x + 4x = 180</math>  <math>6x + 60 = 180</math>  <math>x = 20</math>  <math>\angle A = 80^\circ</math>  <math>\angle B = 80^\circ</math>  <math>\angle C = 20^\circ</math></p>	<p>5) </p> <p><math>2x + 3x + 4x = 180</math>  <math>9x = 180</math>  <math>x = 20</math>  <math>\angle A = 40^\circ</math>  <math>\angle B = 60^\circ</math>  <math>\angle C = 80^\circ</math></p>	<p>6) </p> <p><math>3x + x + 6x + 10 = 180</math>  <math>10x + 10 = 180</math>  <math>x = 17</math>  <math>\angle A = 17^\circ</math>  <math>\angle B = 51^\circ</math>  <math>\angle C = 112^\circ</math></p>

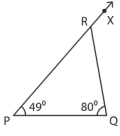


<p>7) </p>	<p>8) </p>	<p>9) </p>
<p><math>2x+30+2x+25+x=180</math>  <math>5x+55=180</math>  <math>x=25</math></p>	<p><math>2x+2x+3x-30=180</math>  <math>7x-30=180</math>  <math>7x=210</math>  <math>x=30</math></p>	<p><math>2x+2x+15+x=180</math>  <math>5x+15=180</math></p>
<p><math>\angle A = 80^\circ</math>  <math>x=25</math> <math>\angle B = 75^\circ</math>  <math>\angle C = 25^\circ</math></p>	<p><math>\angle A = 60^\circ</math>  <math>x=30</math> <math>\angle B = 60^\circ</math>  <math>\angle C = 60^\circ</math></p>	<p><math>\angle A = 33^\circ</math>  <math>x=33</math> <math>\angle B = 66^\circ</math>  <math>\angle C = 81^\circ</math></p>
<p>10) </p>	<p>11) </p>	<p>12) </p>
<p><math>x+40+2x-20+2x+20=180</math>  <math>5x+40=180</math></p>	<p><math>3x+5x+4x+24=180</math>  <math>12x+24=180</math></p>	<p><math>2x+x+2x=180</math>  <math>5x=180</math></p>
<p><math>\angle A = 68^\circ</math>  <math>x=28</math> <math>\angle B = 76^\circ</math>  <math>\angle C = 36^\circ</math></p>	<p><math>\angle A = 65^\circ</math>  <math>x=13</math> <math>\angle B = 76^\circ</math>  <math>\angle C = 39^\circ</math></p>	<p><math>\angle A = 72^\circ</math>  <math>x=36</math> <math>\angle B = 72^\circ</math>  <math>\angle C = 36^\circ</math></p>

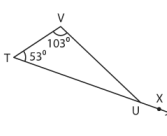
Name: \_\_\_\_\_

**Triangle - Exterior Angles** Sheet 1

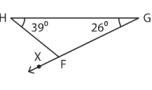
Find the measure of the indicated angle in each triangle.

1) 

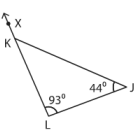
$m\angle QRX =$  \_\_\_\_\_

2) 

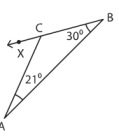
$m\angle VUX =$  \_\_\_\_\_

3) 

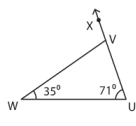
$m\angle HFX =$  \_\_\_\_\_

4) 

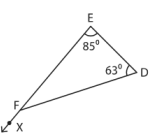
$m\angle JKL =$  \_\_\_\_\_

5) 


$m\angle ACX =$  \_\_\_\_\_

6) 

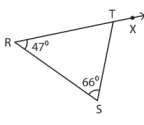
$m\angle WVX =$  \_\_\_\_\_

7) 

$m\angle DFX =$  \_\_\_\_\_

8) 

$m\angle LMN =$  \_\_\_\_\_

9) 

$m\angle STX =$  \_\_\_\_\_

Printable Worksheets @ www.mathworksheets4kids.com

Name : \_\_\_\_\_

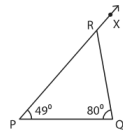
Answer key

Triangle - Exterior Angles

Sheet 1

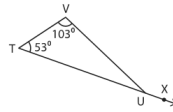
Find the measure of the indicated angle in each triangle.

1)



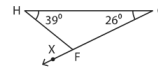
$m\angle QRX = 129^\circ$

2)



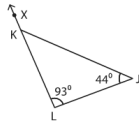
$m\angle VUX = 156^\circ$

3)



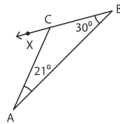
$m\angle HFX = 65^\circ$

4)



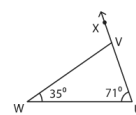
$m\angle JKL = 137^\circ$

5)



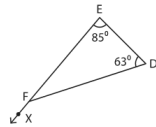
$m\angle ACX = 51^\circ$

6)



$m\angle WVX = 106^\circ$

7)



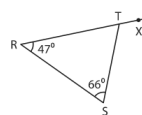
$m\angle DFX = 148^\circ$

8)



$m\angle LMN = 150^\circ$

9)



$m\angle STX = 113^\circ$