Geometry 4.2

Apply the triangle sum theorem = 180

Apply the exterior angle theorem

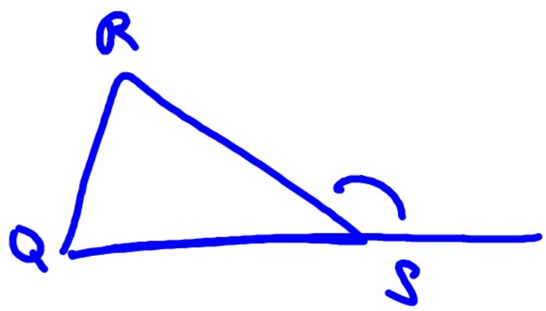
remote far away

straight angle 180°

linear pair

auxiliary line

exterior angle (of a triangle)



interior angle (of a triangle)

flow proof (meh)

corollary

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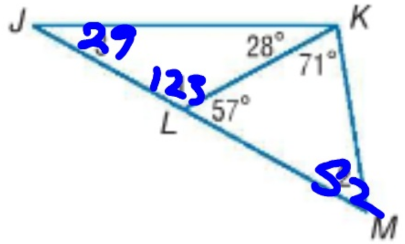
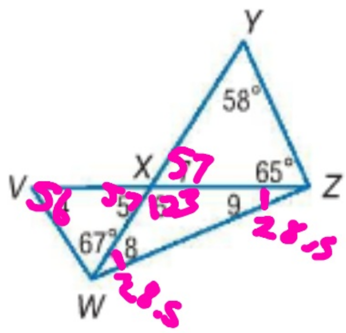
Find the measures of each numbered angle.

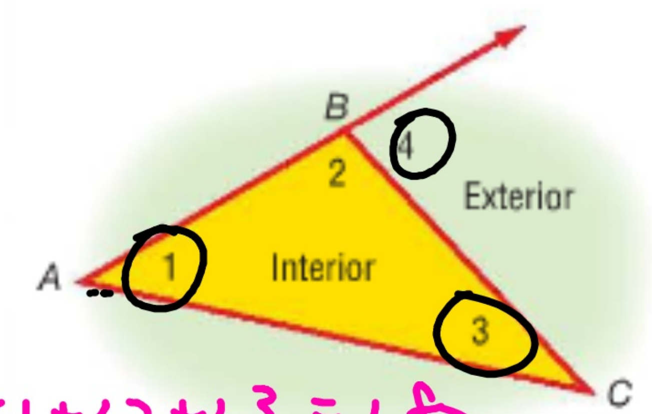
1A.



1B.



angle chase



$m\angle 1 + m\angle 2 + m\angle 3 = \underline{180}$

$m\angle 2 + m\angle 4 = \underline{180}$

$$\cancel{m\angle 2} + m\angle 4 = m\angle 1 + \cancel{m\angle 2} + m\angle 3$$
$$-\cancel{m\angle 2} \qquad\qquad -\cancel{m\angle 2}$$
$$m\angle 4 = m\angle 1 + m\angle 3$$

What do you call it...?

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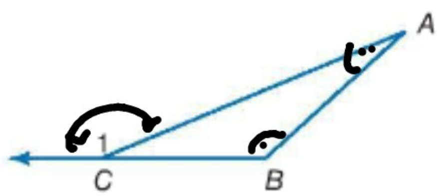
Theorem 4.2 Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.

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



:/ meh

A **flow proof** uses statements written in boxes and arrows to show the logical progression of an argument. The reason justifying each statement is written below the box. You can use a flow proof to prove the Exterior Angle Theorem.

Proof Exterior Angle Theorem

Given: $\triangle ABC$

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

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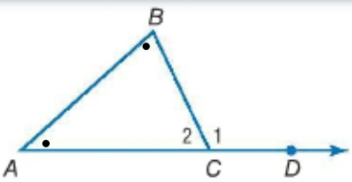
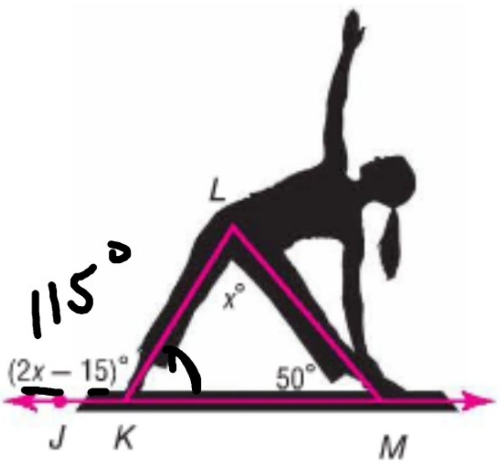


[redacted]

1. $\triangle ABC$	1. given
2. $m\angle A + m\angle B + m\angle 2 = 180$	2. $\triangle$ sum 180
3. $m\angle 1 + m\angle 2 = 180$	3. L. P.
4. $m\angle 1 + \cancel{m\angle 2} = m\angle A + m\angle B + \cancel{m\angle 2}$ $-m\angle 2 \qquad -m\angle 2$	4. subs
5. $m\angle 1 = m\angle A + m\angle B$	5. subtr. (subs)

Real-World Example 2 Use the Exterior Angle Theorem

FITNESS Find the measure of $\angle JKL$ in the Triangle Pose shown.



115°

$2 \cdot 65 - 15$

$$
\begin{array}{rcl}
2x - 15 &=& x + 50 \\
-x + 15 && -x + 15 \\
\hline
x &=& 65
\end{array}
$$

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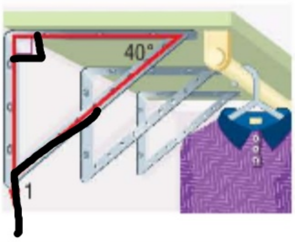
2. **CLOSET ORGANIZING** Tanya mounts the shelving bracket shown to the wall of her closet. What is the measure of $\angle 1$, the angle that the bracket makes with the wall?



130°

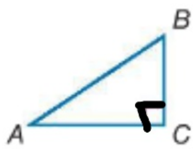
A **corollary** is a theorem with a proof that follows as a direct result of another theorem. As with a theorem, a corollary can be used as a reason in a proof. The corollaries below follow directly from the Triangle Angle-Sum Theorem.

Corollaries Triangle Angle-Sum Corollaries

4.1 The acute angles of a right triangle are complementary.

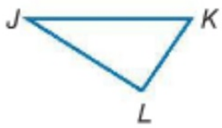
Abbreviation: *Acute ∠s of a rt. △ are comp.*

Example: If $\angle C$ is a right angle, then $\angle A$ and $\angle B$ are complementary.



4.2 There can be at most one right or obtuse angle in a triangle.

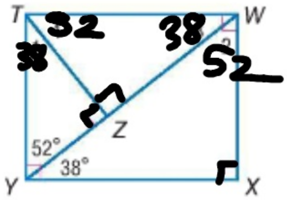
Example: If $\angle L$ is a right or an obtuse angle, then $\angle J$ and $\angle K$ must be acute angles.



Example 3 Find Angle Measures in Right Triangles

Find the measures of each numbered angle.

$m\angle 1 + m\angle TYZ = 90$	Acute ∠s of a rt. △ are comp.
$m\angle 1 + 52 = 90$	Substitution
$m\angle 1 = 38$	Subtract 52 from each side.



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3A. $\angle 2$ **3B.** $\angle 3$ **3C.** $\angle 4$

4,2

WB prac.