4-2 Angles of Triangles

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Main Ideas:

- Apply the Angle Sum Theorem
- Apply the Exterior Angle Theorem

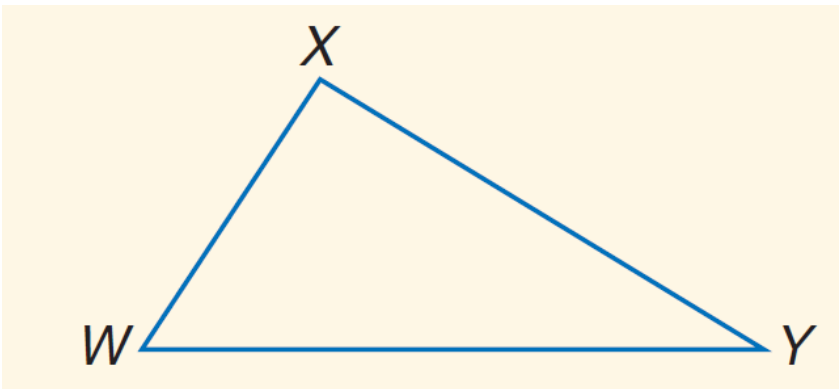
New Vocabulary

- exterior angle
- remote interior angles
- corollary

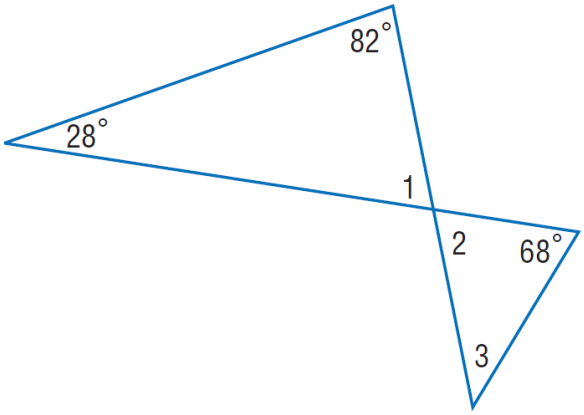
Angle Sum Theorem

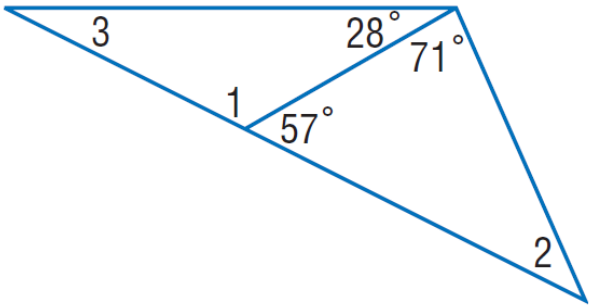
The sum of the measures of the angles of a triangle is 180.

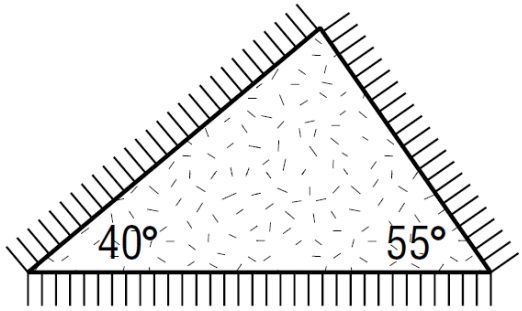
Example: $m\angle W + m\angle X + m\angle Y = 180$

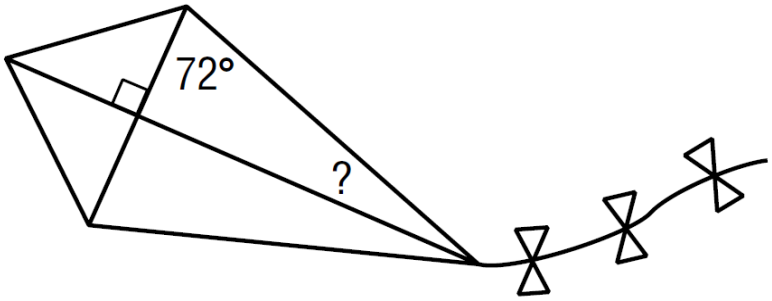


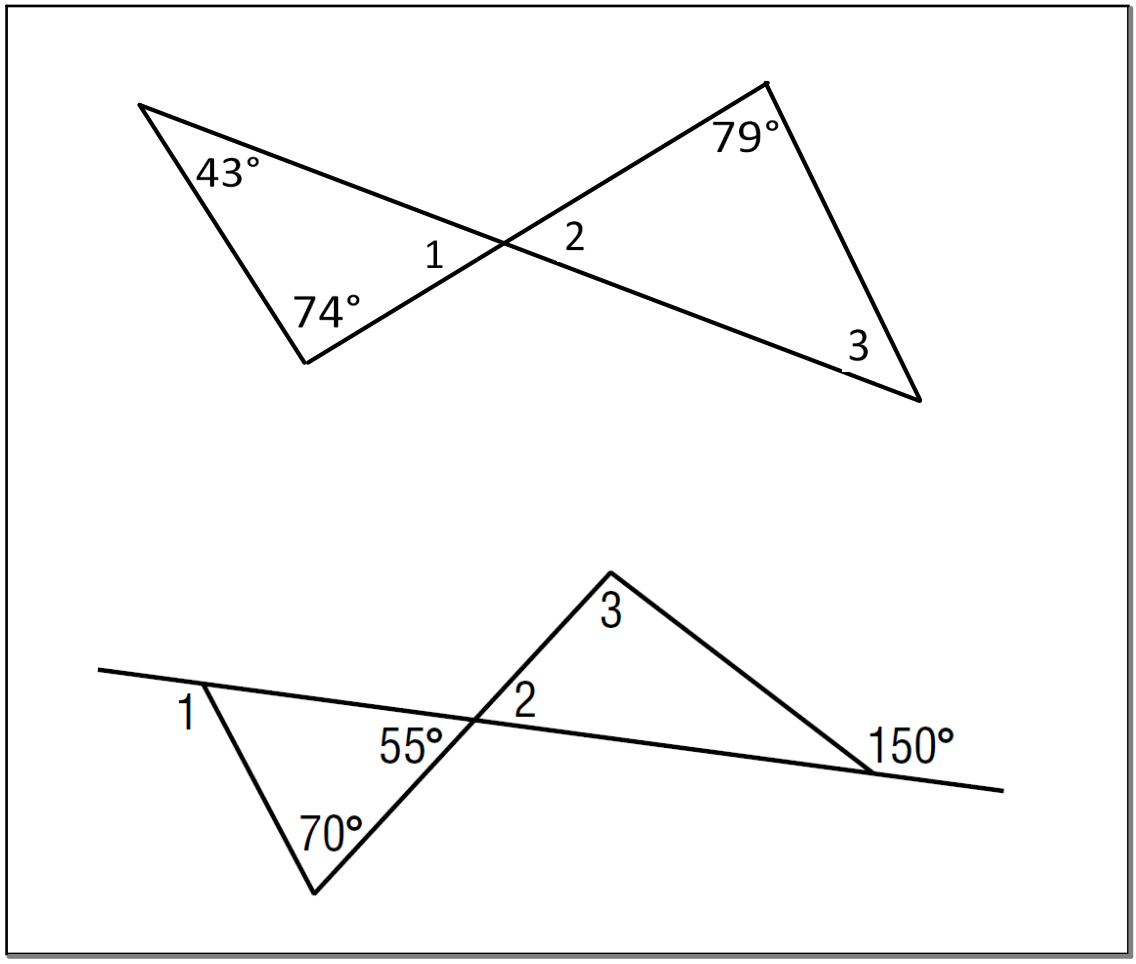
Find the missing angle measures.

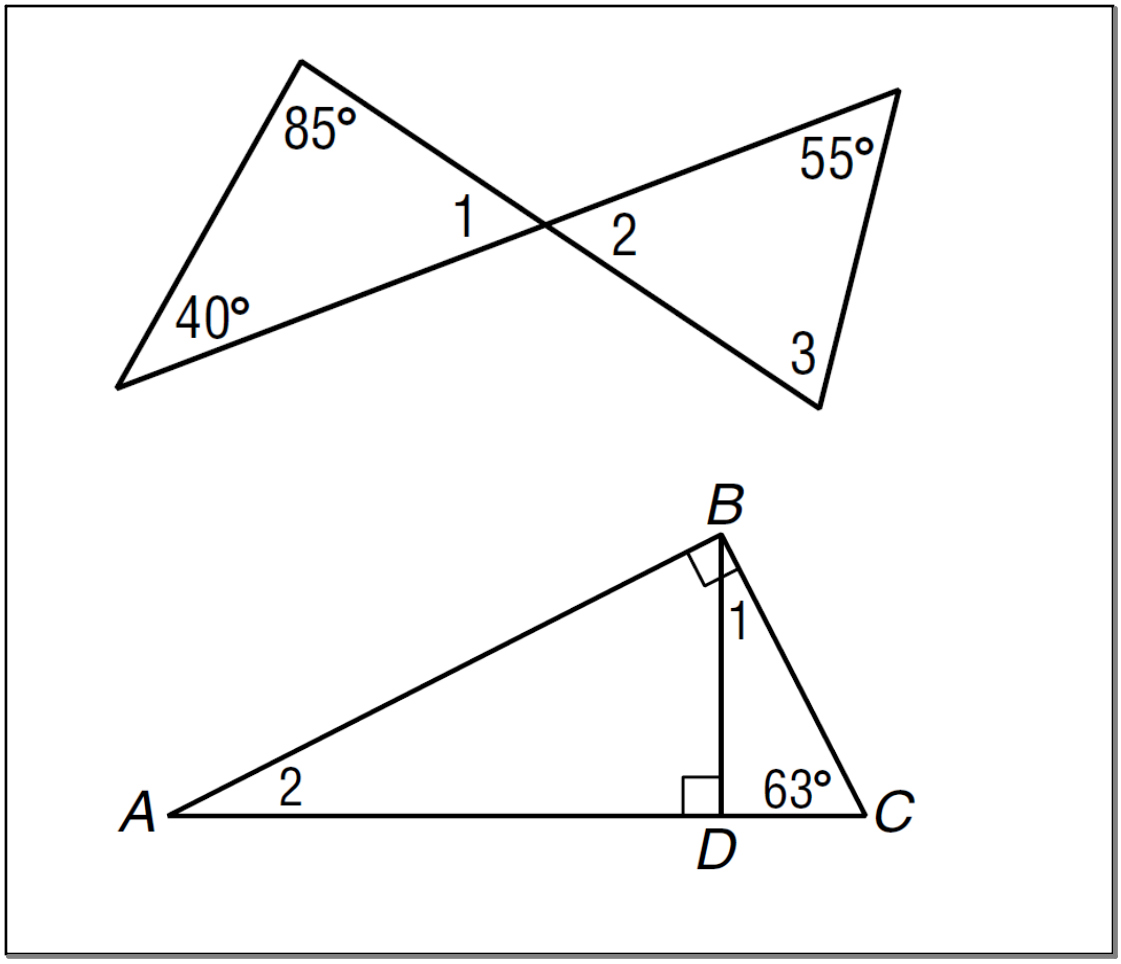


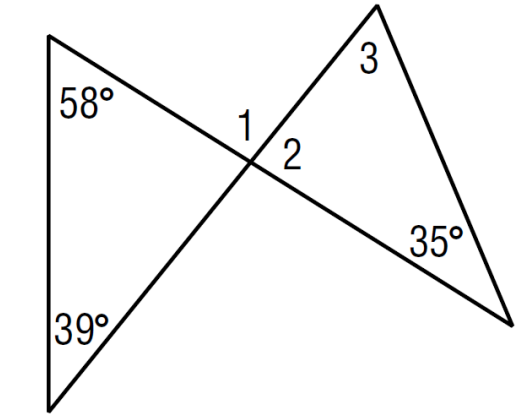




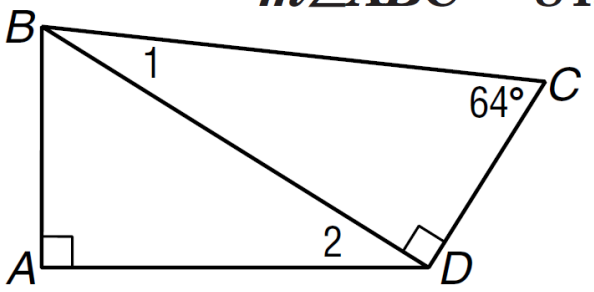



43°
79°
1
2
74°
3
3
1
2
55°
150°
70°

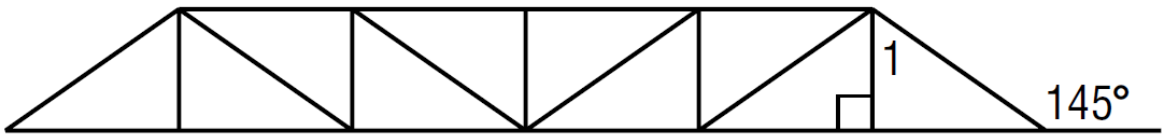

85°
55°
1
2
40°
3
B
1
A
2
63°
C
D



$m\angle ABC = 84.$



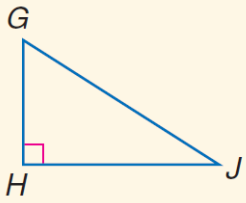
CONSTRUCTION The diagram shows an example of the Pratt Truss used in bridge construction. Use the diagram to find $m\angle 1$.



A statement that can be easily proved using a theorem is often called a **corollary** of that theorem. A corollary, just like a theorem, can be used as a reason in a proof.

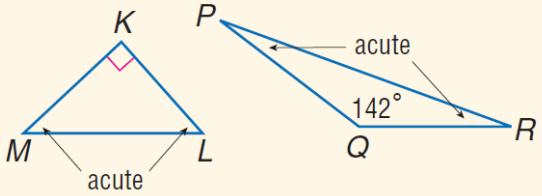
Corollaries to the Angle Sum Theorem

The acute angles of a right triangle are complementary.



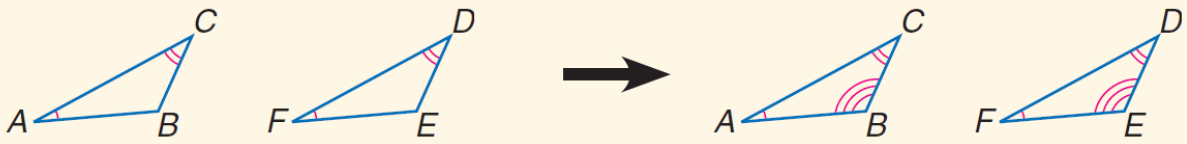
Example: $m\angle G + m\angle J = 90$

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



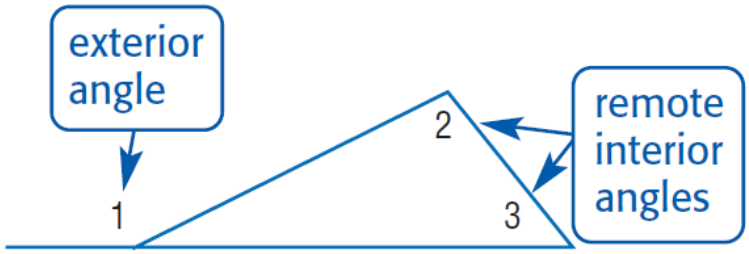
Third Angle Theorem

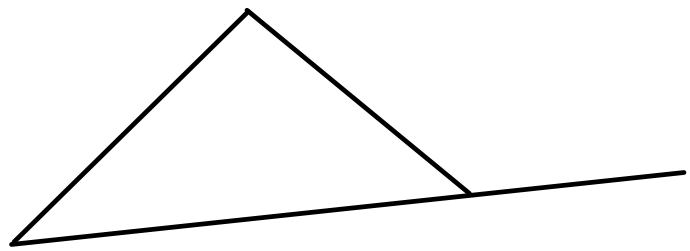
If two angles of one triangle are congruent to two angles of a second triangle, then the third angles of the triangles are congruent.



Example: If $\angle A \cong \angle F$ and $\angle C \cong \angle D$, then $\angle B \cong \angle E$.

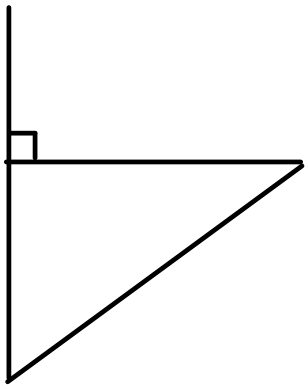
Exterior Angle Theorem Each angle of a triangle has an exterior angle. An **exterior angle** is formed by one side of a triangle and the extension of another side. The interior angles of the triangle not adjacent to a given exterior angle are called **remote interior angles** of the exterior angle.

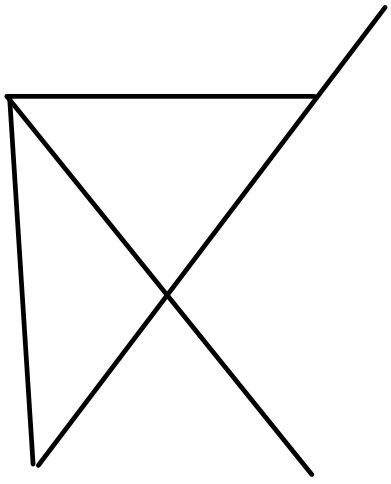




exterior angle

remote interior angle

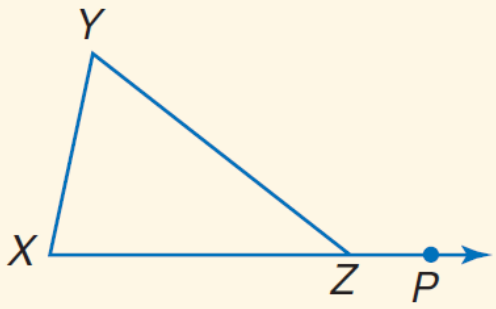




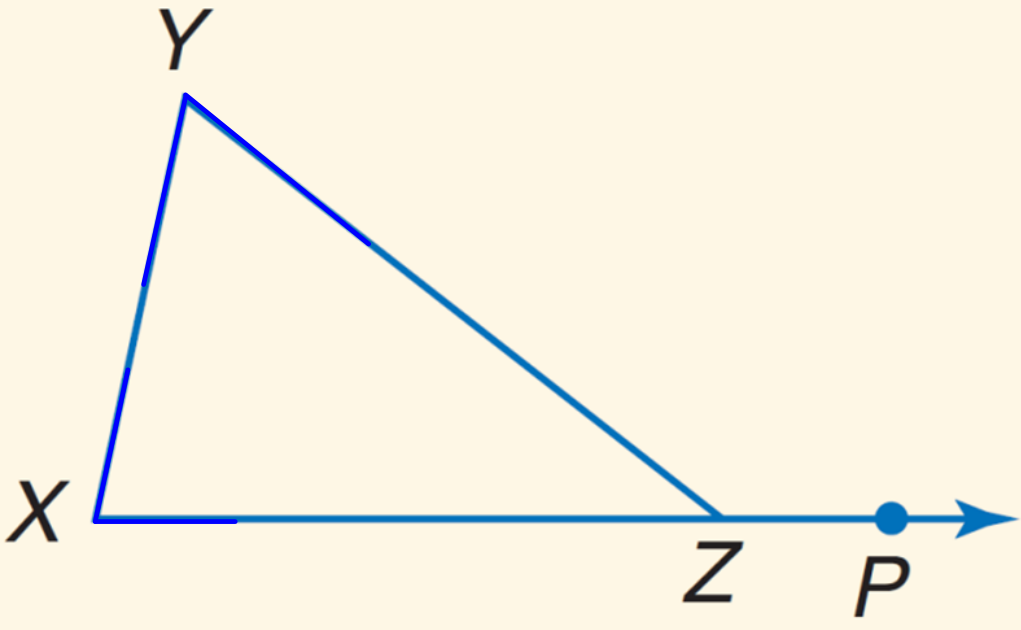
Exterior Angle Theorem

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

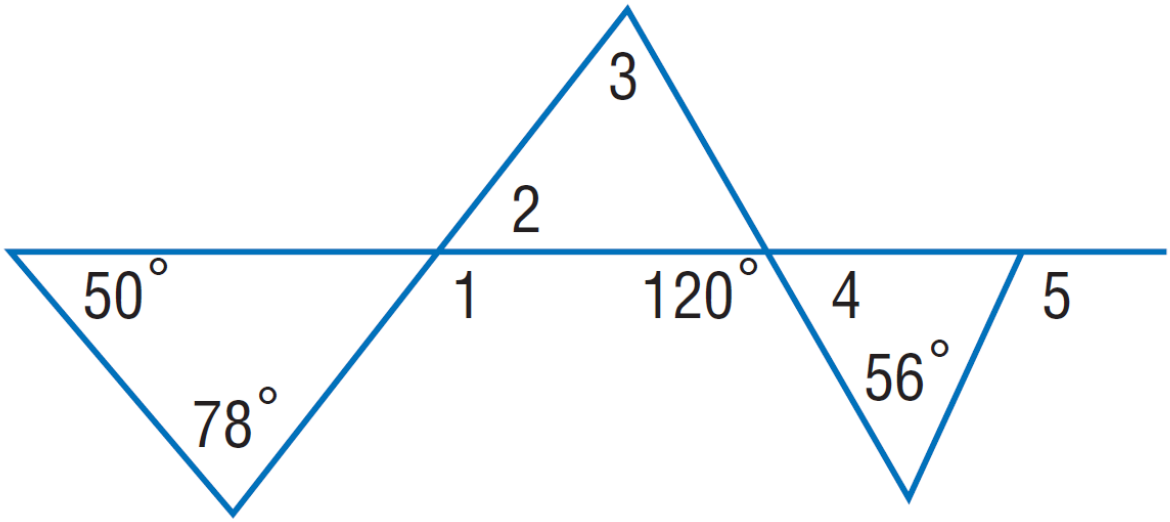
Example: $m\angle X + m\angle Y = m\angle YZP$



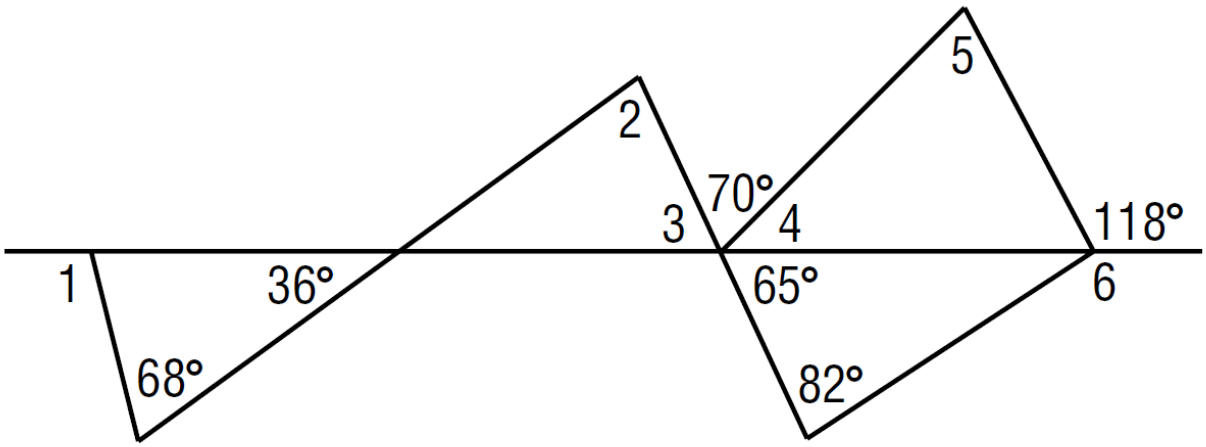
Visual Proof of Exterior Angle Theorem, with animaon



Find the missing angle measures.



Find the missing angle measures.



Find the missing angle measures.