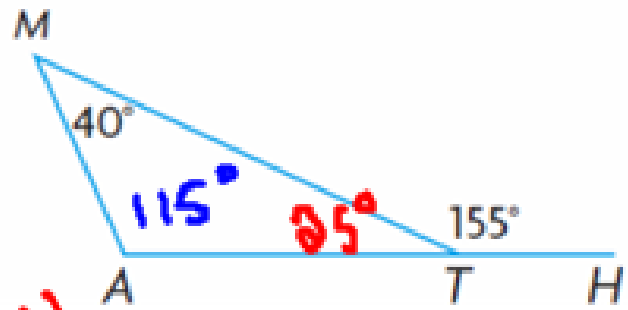
2.3 Angle Properties in Triangles

p. 87 **EXAMPLE 1** Using angle sums to determine angle measures

In the diagram, $\angle MTH$ is an **exterior angle** of $\triangle MAT$. Determine the measures of the unknown angles in $\triangle MAT$.



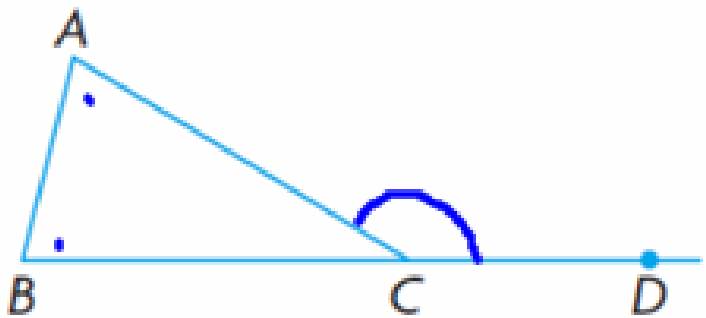
$\angle MTA = 25°$ (supplemental)

$\angle MAT = 115°$ (angles of $\triangle$ add to 180°)

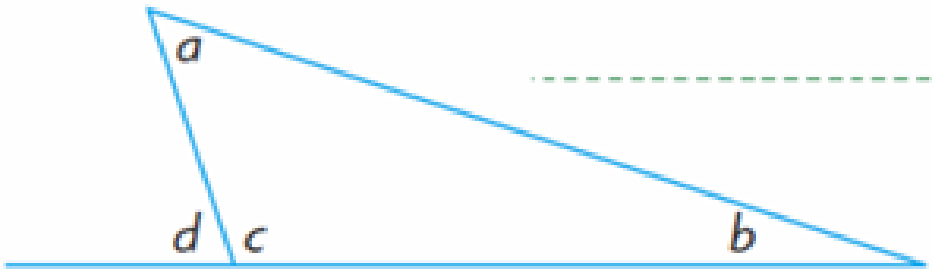
non-adjacent interior angles

The two angles of a triangle that do not have the same vertex as an exterior angle.

$\angle A + \angle B = \angle ACD$



$\angle A$ and $\angle B$ are non-adjacent interior angles to exterior $\angle ACD$.



Prove $\angle d = \angle a + \angle b$

$\angle d + \angle c = 180°$

$\angle d = \underline{180° - \angle c}$

Straight line (supplemental)

$\angle a + \angle b + \angle c = 180°$

$\angle a + \angle b = \underline{180° - \angle c}$

$\triangle$'s add to 180°

$\angle d = \angle a + \angle b$

transitive property. *

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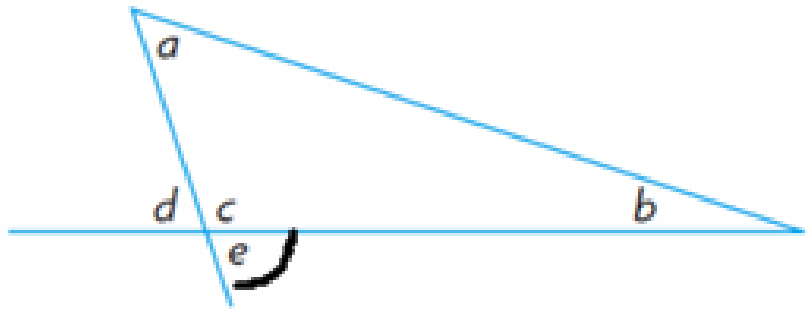
Your Turn

Prove: $\angle e = \angle a + \angle b$



$\angle c + \angle e = 180^\circ$ supplemental

$\angle e = \underline{180^\circ - \angle c}$

$\angle a + \angle b + \angle c = 180^\circ$ angles of a triangle.

$\angle a + \angle b = \underline{180^\circ - \angle c}$

$\therefore \angle e = \angle a + \angle b$ transitive property

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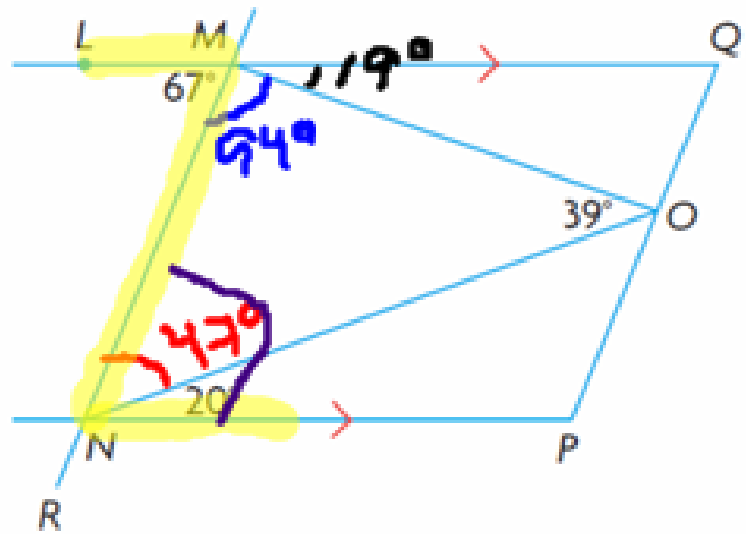
EXAMPLE 3 Using reasoning to solve problems

Determine the measures of $\angle NMO$, $\angle MNO$, and $\angle QMO$.



$\angle MNP = 67°$ (Z-Theorem)

$\angle MNO = 67° - 20° = 47°$

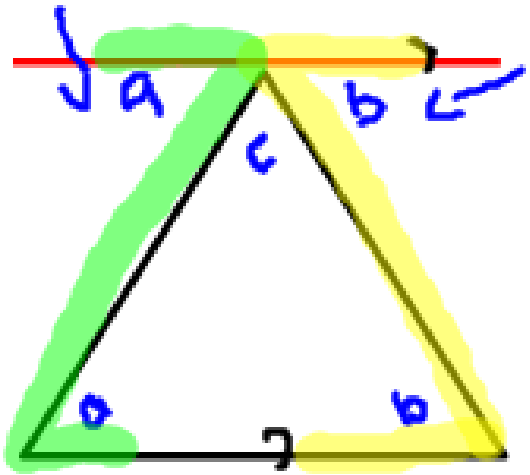
$\angle NMO = 94°$ (Δ's add 180°)

$\angle QMO = 180° - 67° - 94° = 19°$ (supplemental)

Closing

17. Explain how drawing a line that is parallel to one side of any triangle can help you prove that the sum of the angles in the triangle is 180°.

Z-theorem.



Z-theorem.

$\angle a + \angle b + \angle c = 180°$ (straight)

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