Applying Triangle Congruence in Constructing Perpendicular Lines

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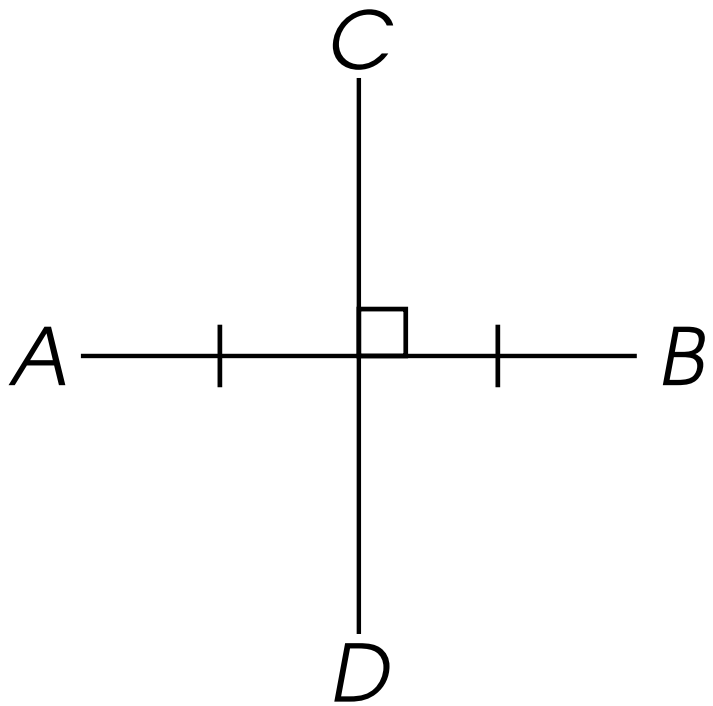
Sauyo High School

What is a Perpendicular Bisector?

The line drawn perpendicular through the midpoint of a given line segment.



What You Need

1. Compass

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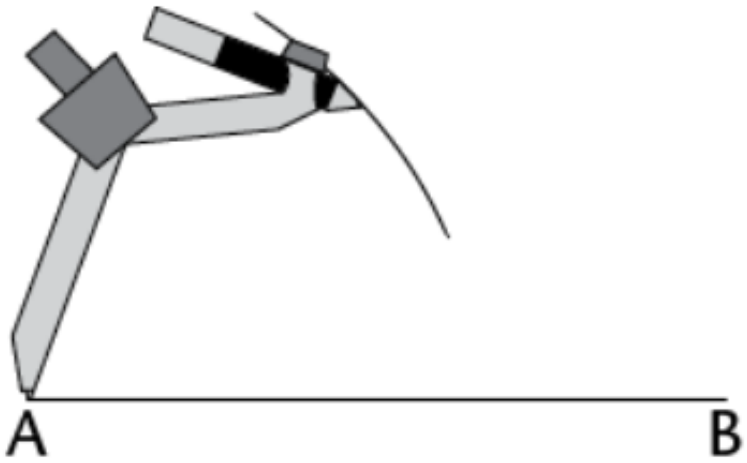
2. Ruler

How to Construct a Perpendicular Bisector?

1. Draw the line segment *AB*.

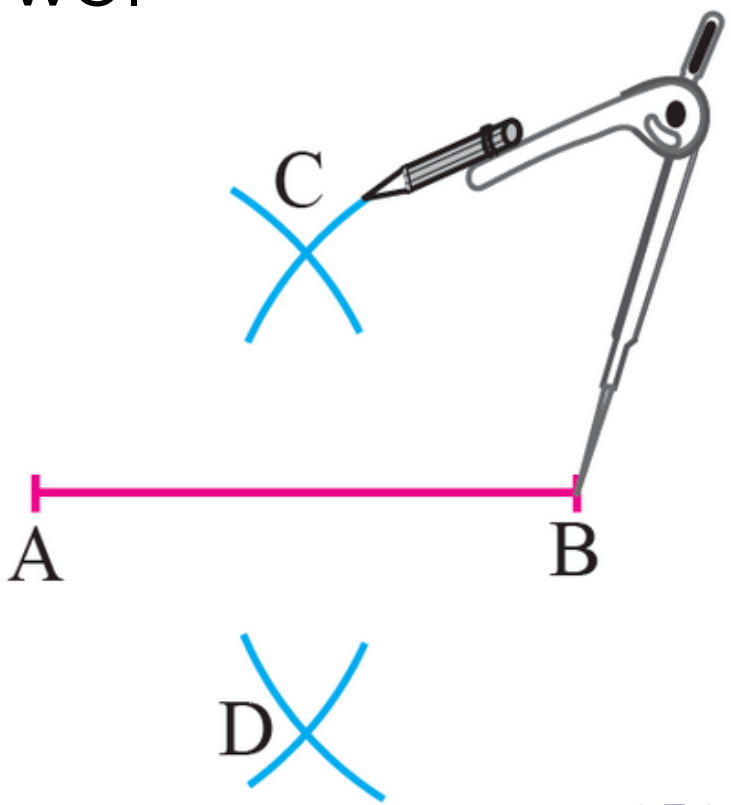
How to Construct a Perpendicular Bisector?

2. Place the compass on one endpoint of the line segment (point A). Draw an arc above and below the line.



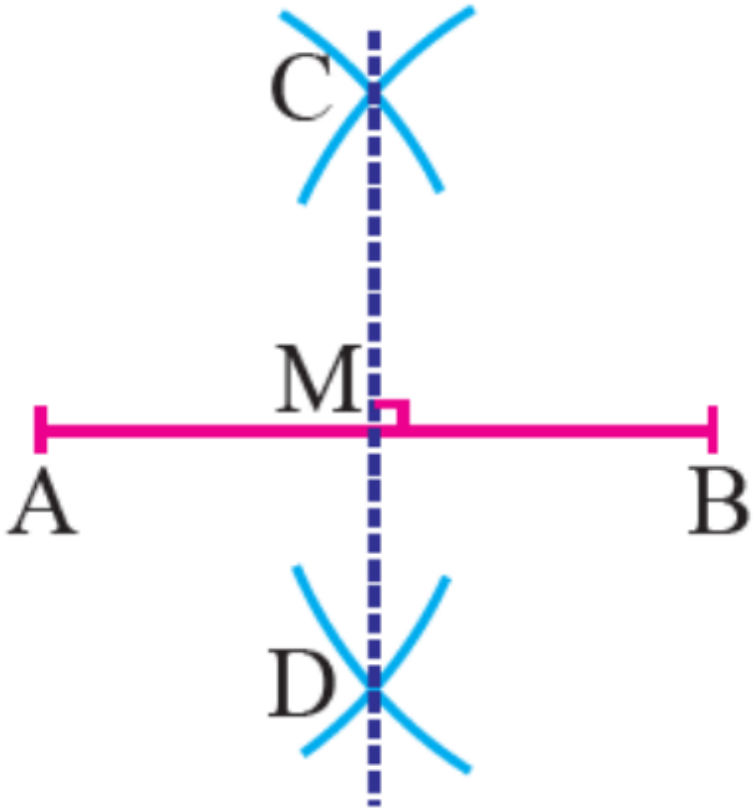
How to Construct a Perpendicular Bisector?

3. Without changing the compass width, place the compass on point B. Draw an arc above and below the line so that the arcs cross the first two.



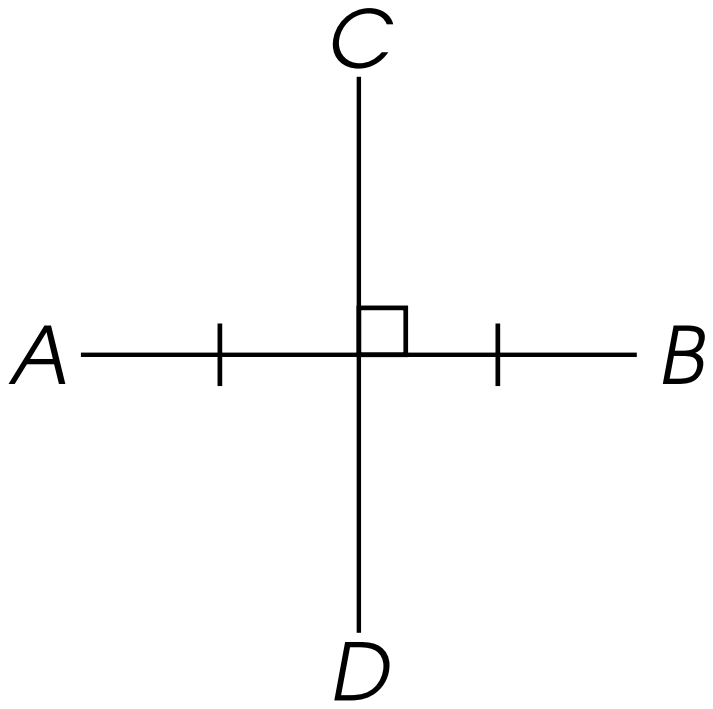
How to Construct a Perpendicular Bisector?

4. Use a ruler to join the points where the arcs intersect. This line segment (*CD*) is the bisector of *AB*.



What is the Perpendicular Bisector Theorem?

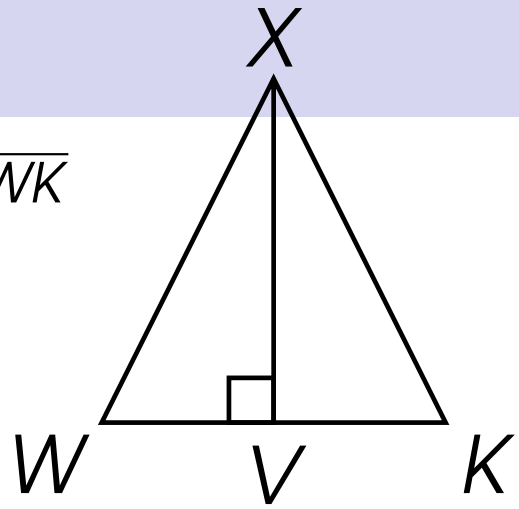
If a point is on the perpendicular bisector of a segment, then it is equidistant from the segment's endpoints.



Proof

Given: $\overline{XV}$ is a perpendicular bisector of $\overline{WK}$

Prove: $\overline{WX} \cong \overline{KX}$



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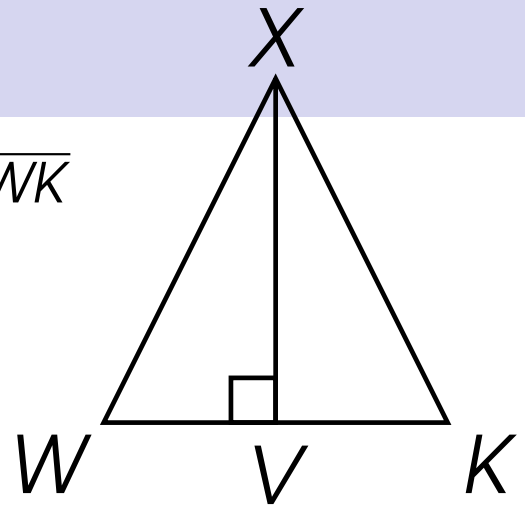

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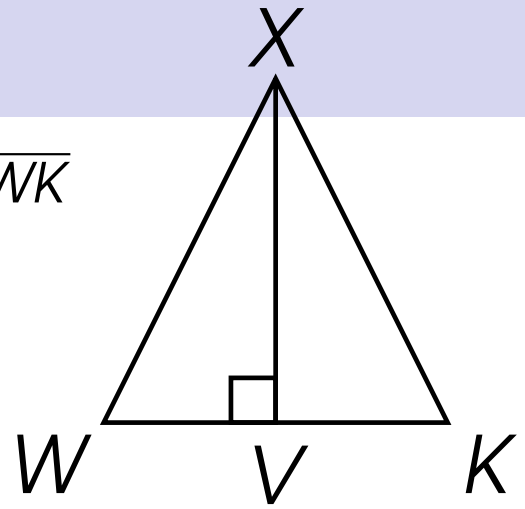

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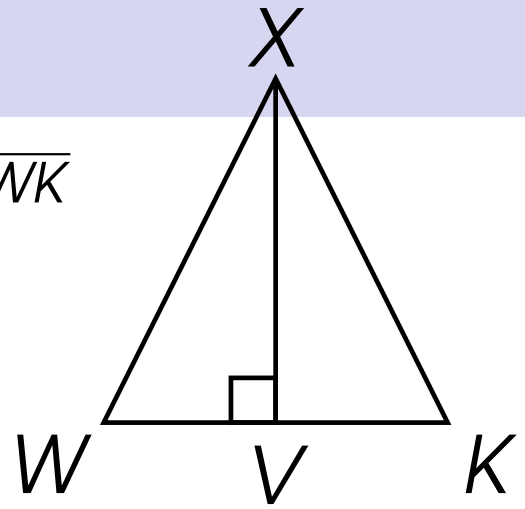

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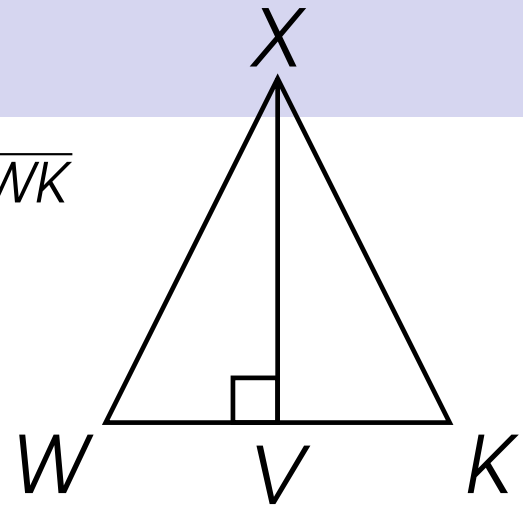

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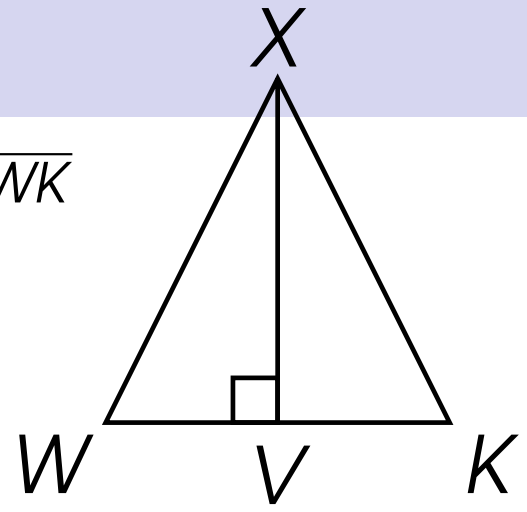

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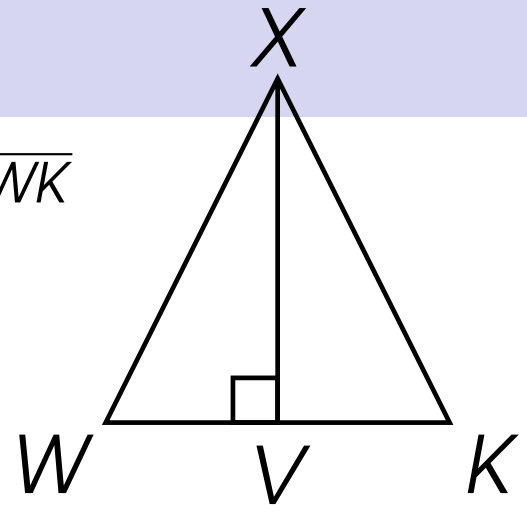

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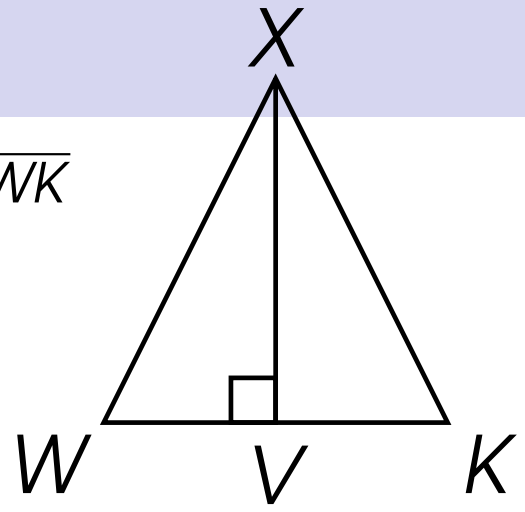

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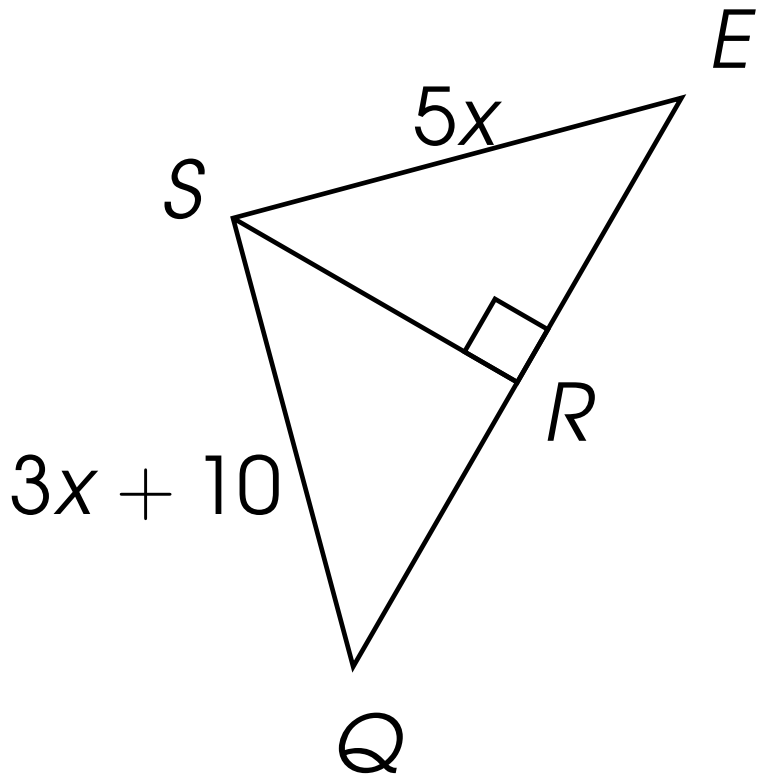
6. $\triangle XVW \cong \triangle XVK$	6. SAS Postulate
7. $\overline{WX} \cong \overline{KX}$	7. Corresponding Parts of $\cong$ Triangles are $\cong$ (CPCTC)

Example 1

Given: $\overline{SR}$ is a perpendicular bisector of $\overline{EQ}$
Find: $m\overline{SQ}$



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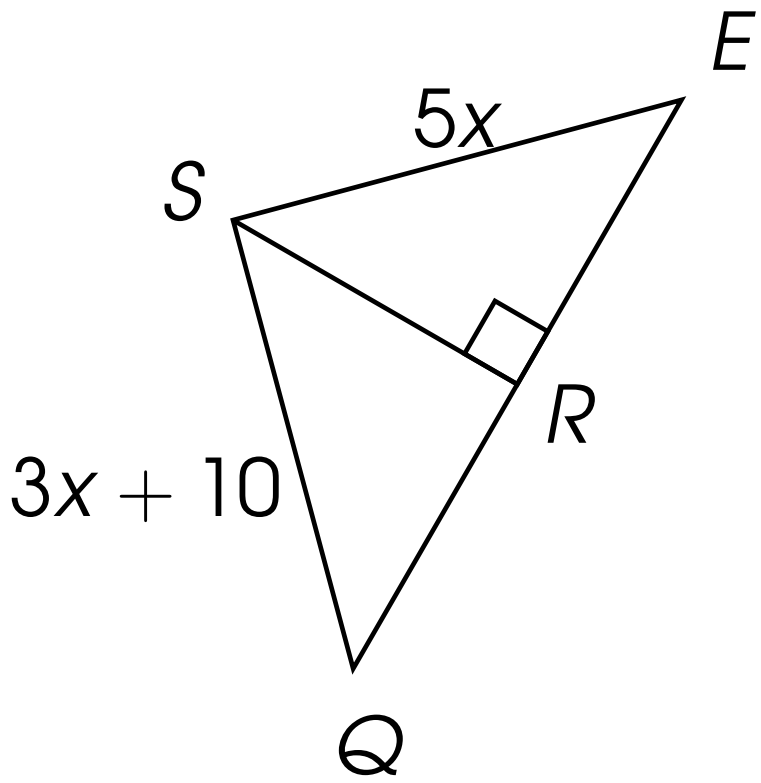

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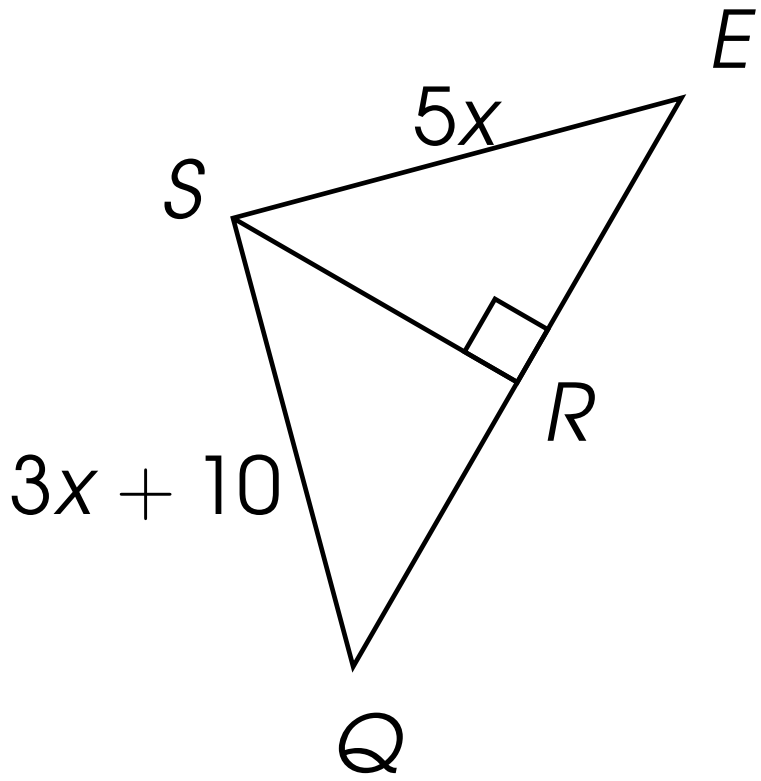

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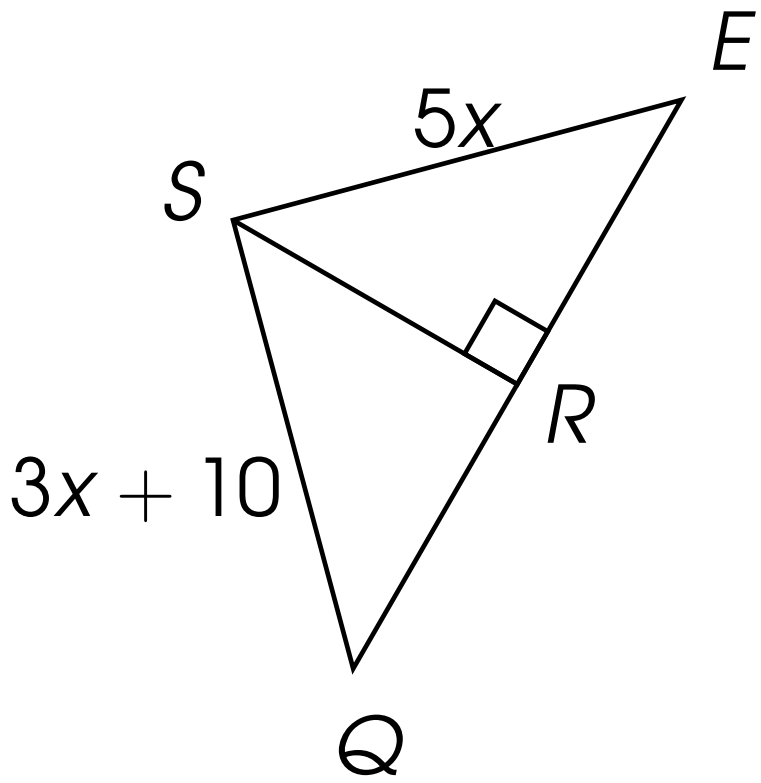

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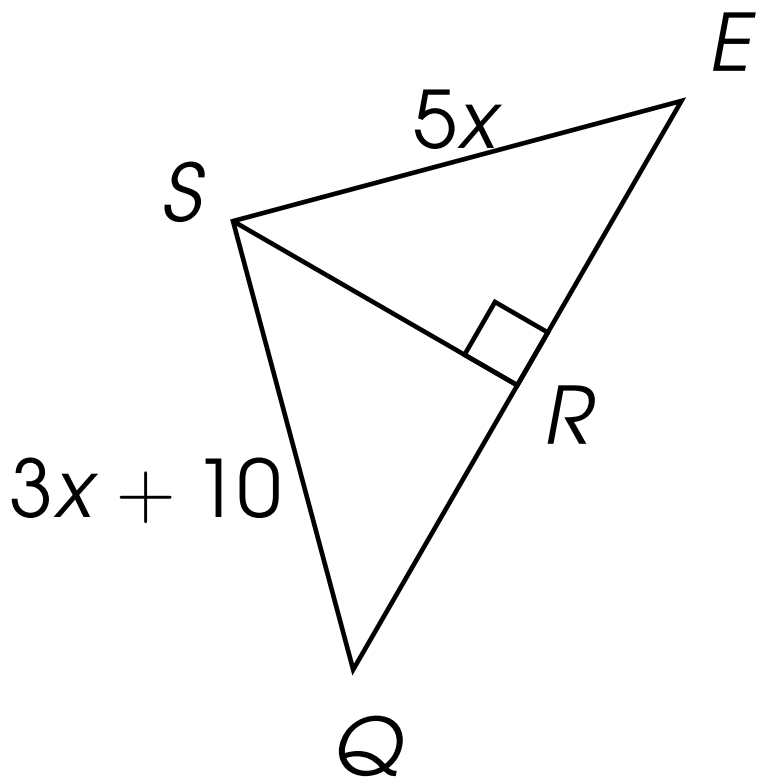

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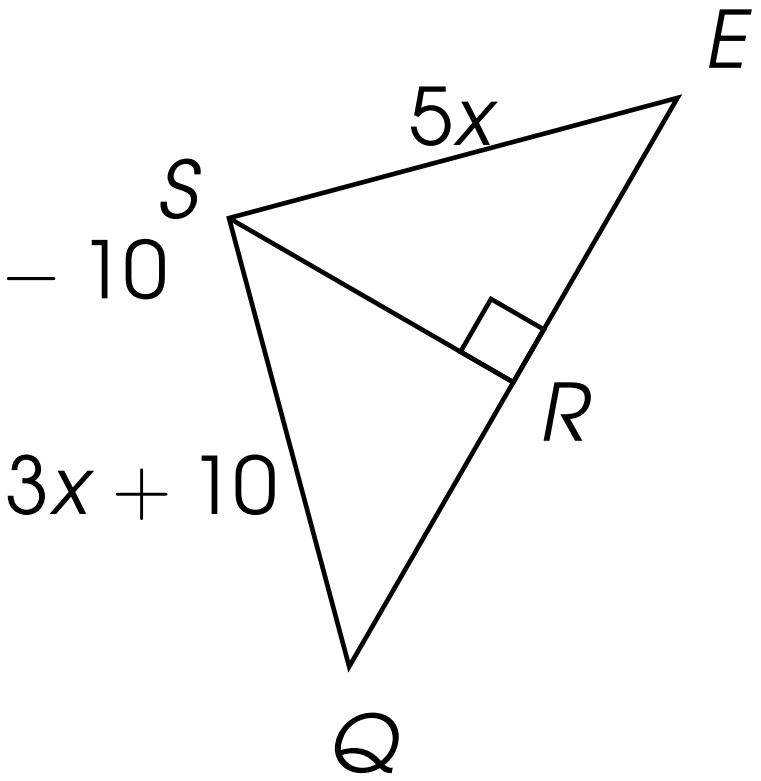

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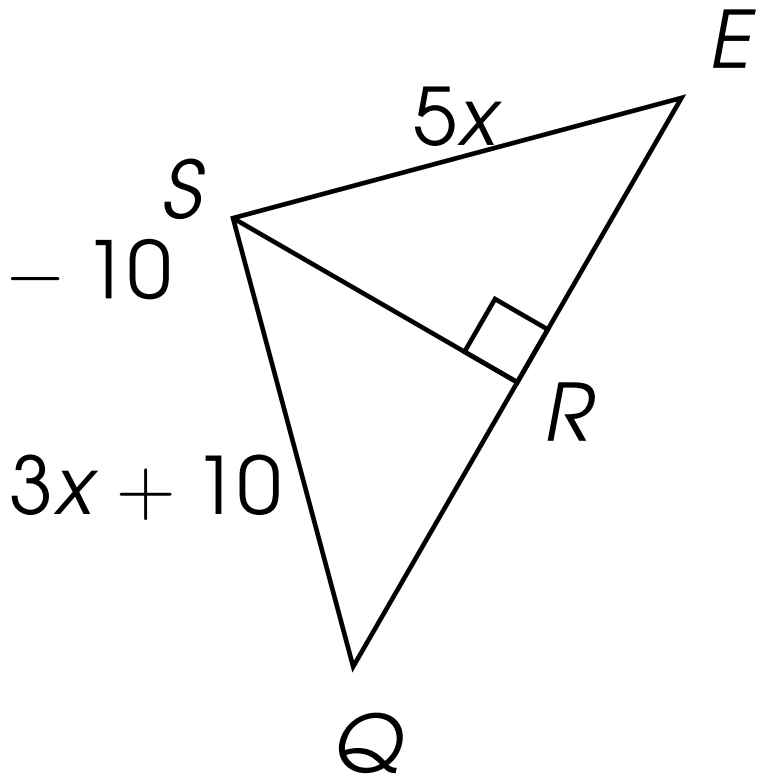

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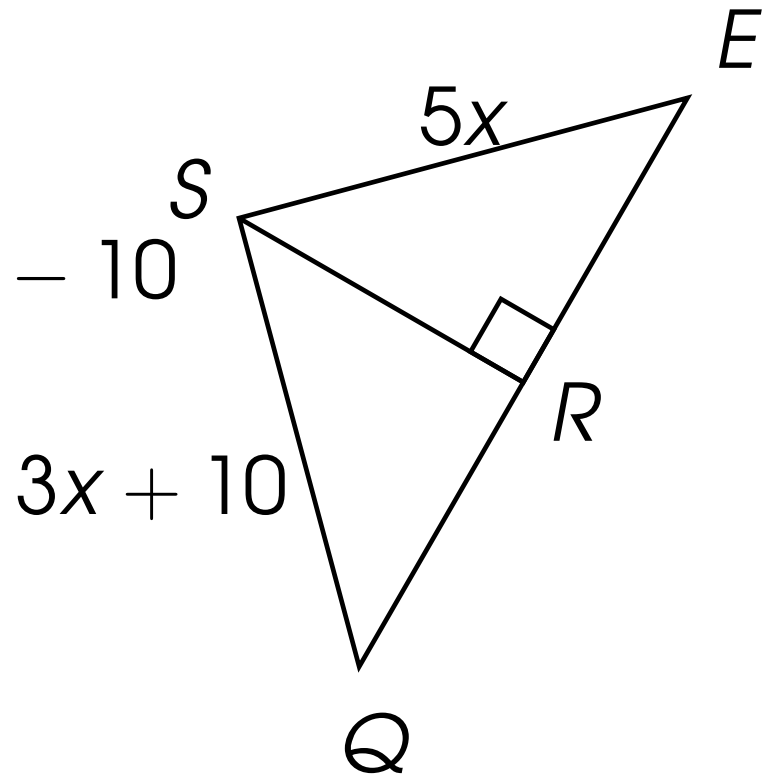

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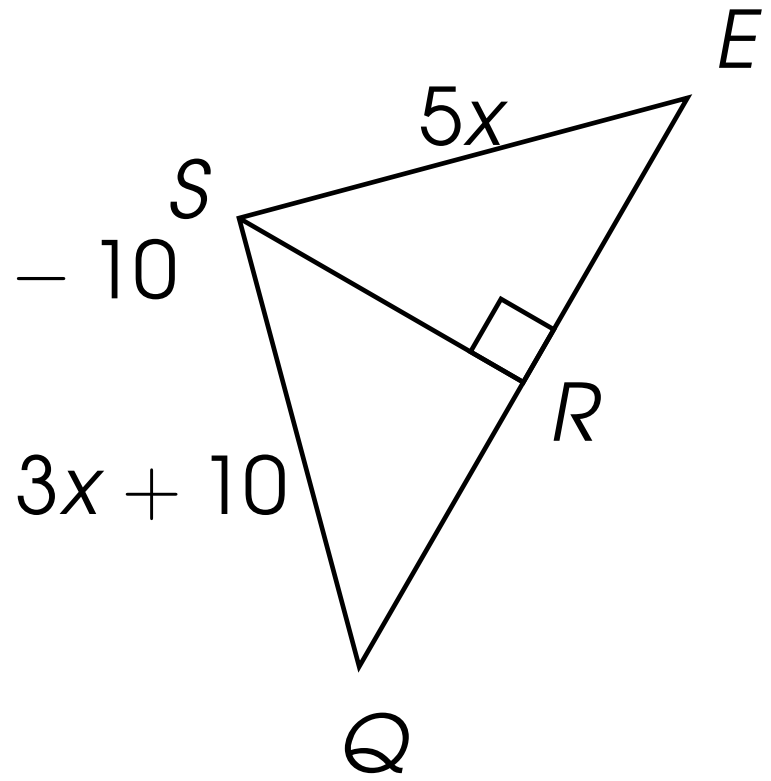

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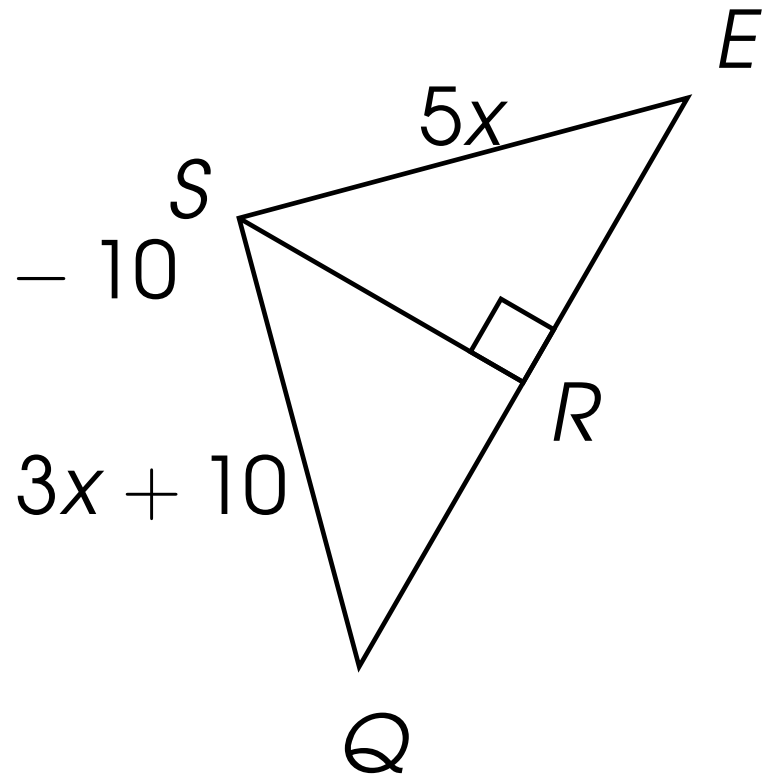
$m\overline{SQ} = 3x + 10$



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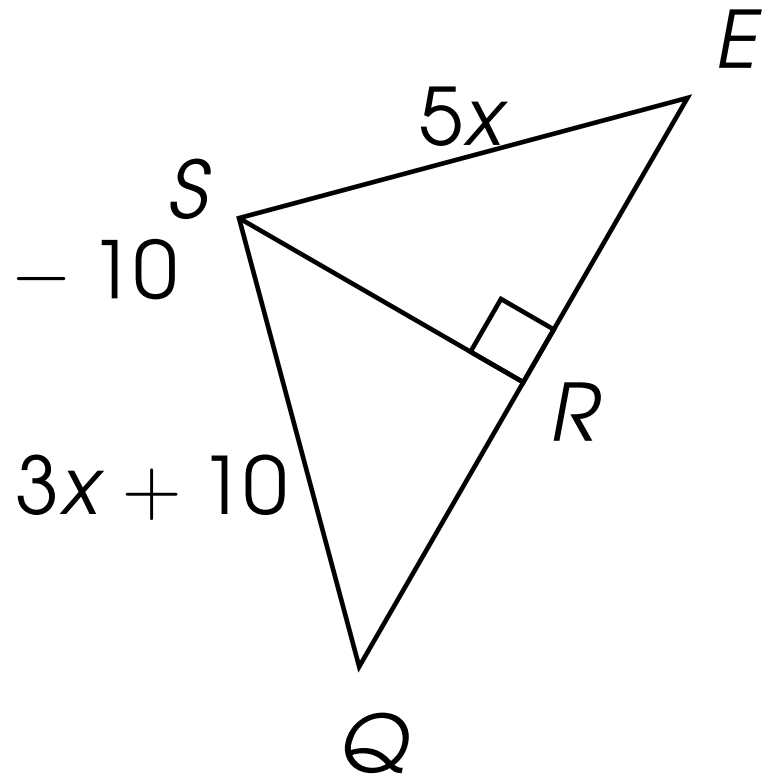

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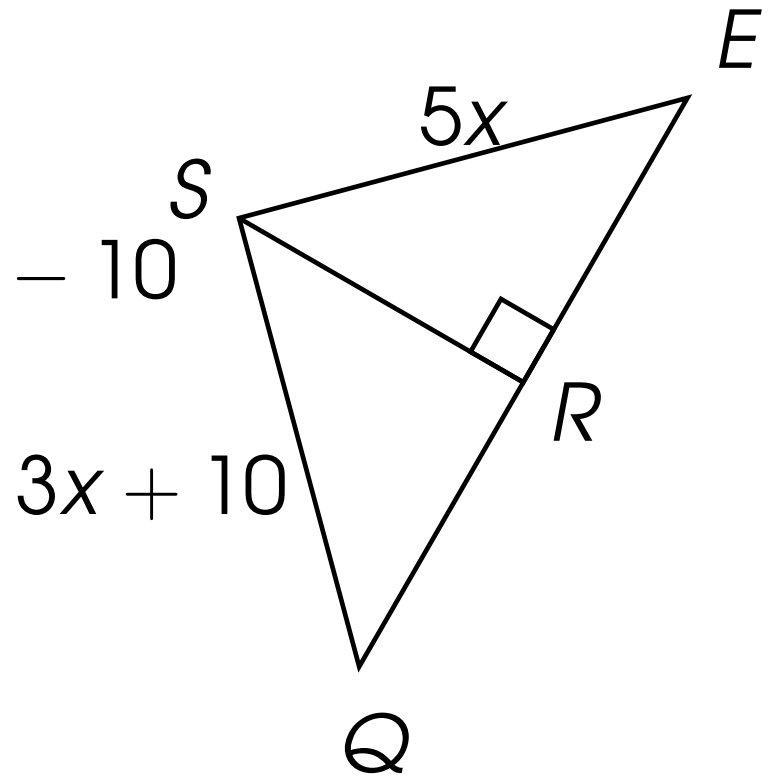
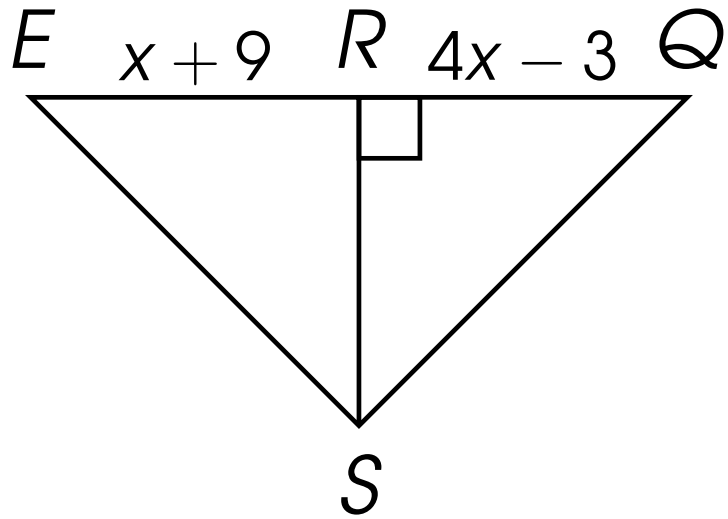


$m\overline{SQ} = 3x + 10$
$m\overline{SQ} = 3(5) + 10$
$m\overline{SQ} = 25$ units

Example 2

Given: $\overline{SR}$ is a perpendicular bisector of $\overline{EQ}$
Find: $m\overline{ER}$



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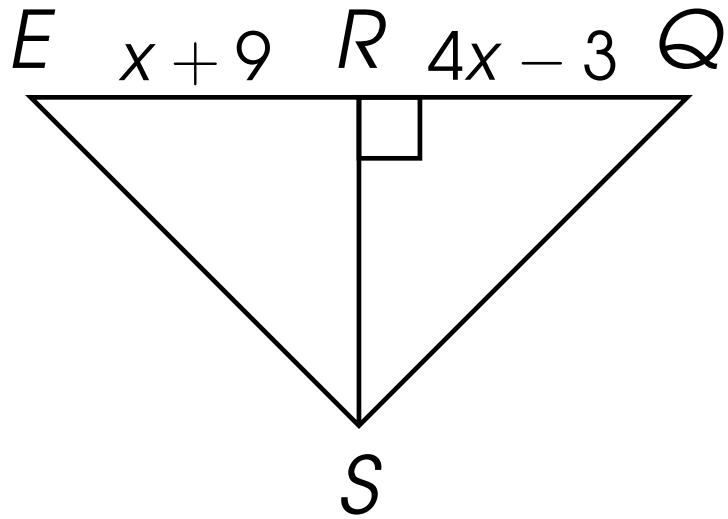

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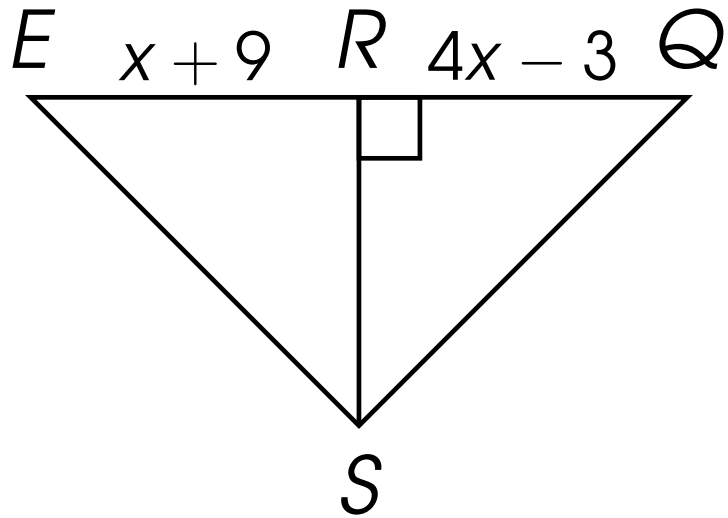

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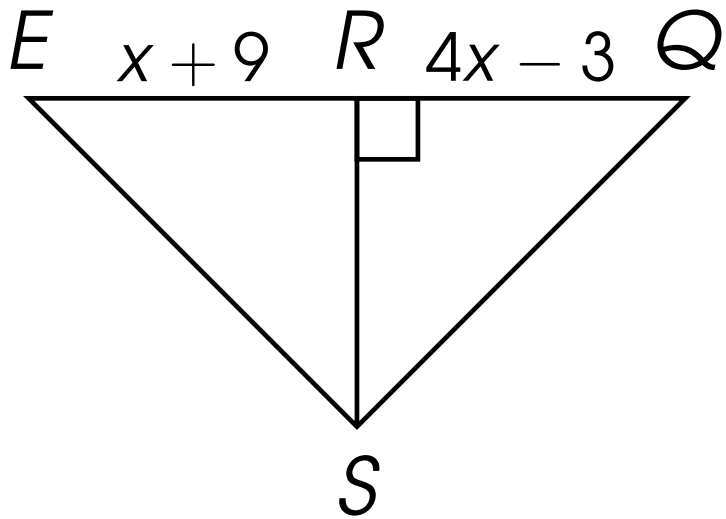

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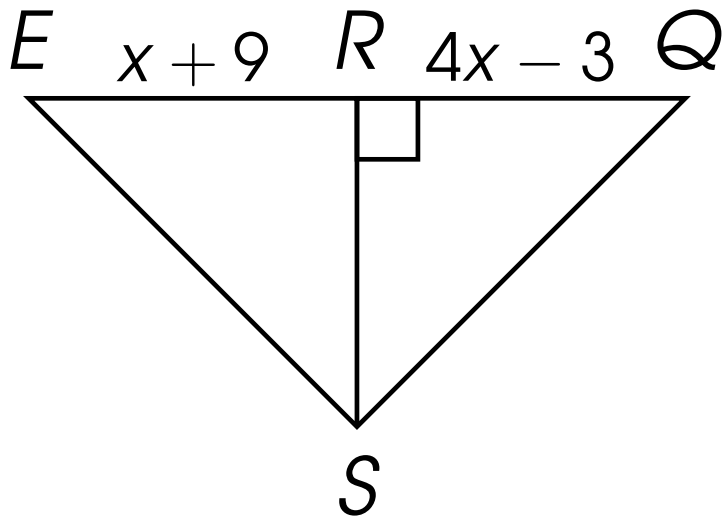

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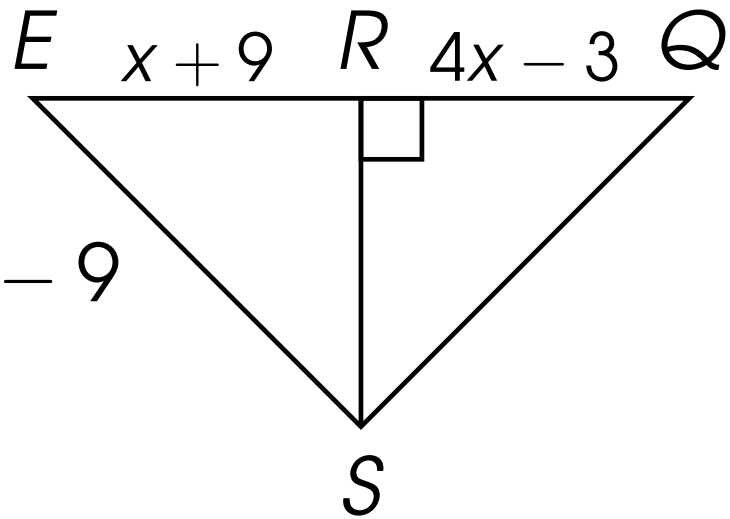

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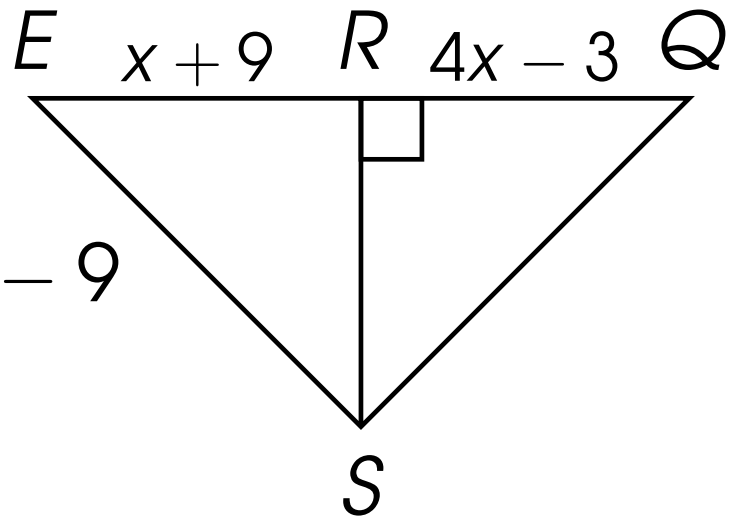

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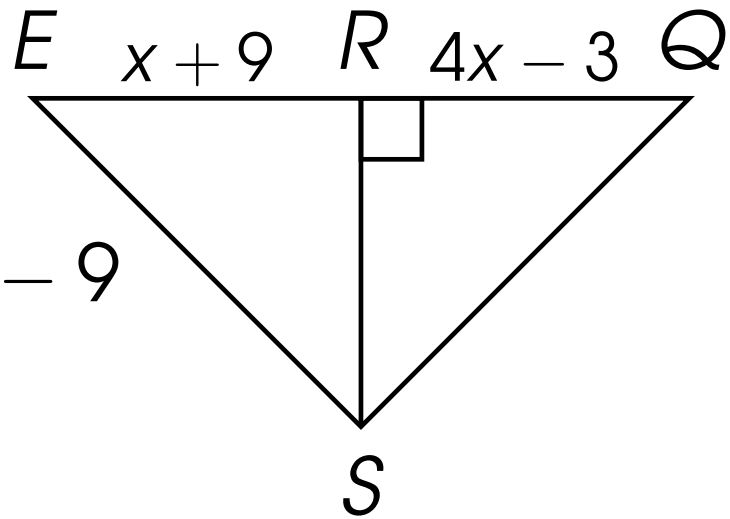

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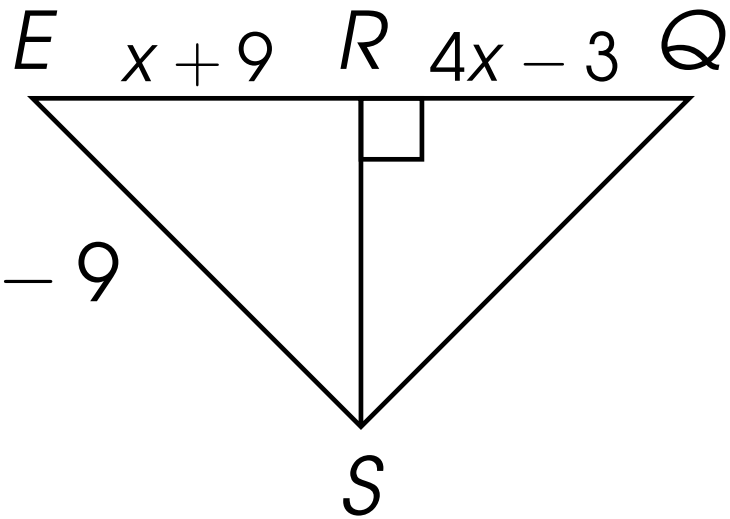

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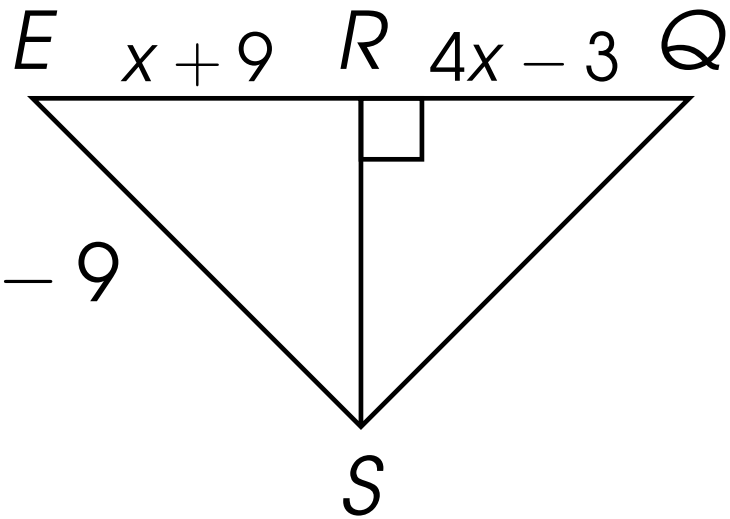

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$m\overline{ER} = x + 9$

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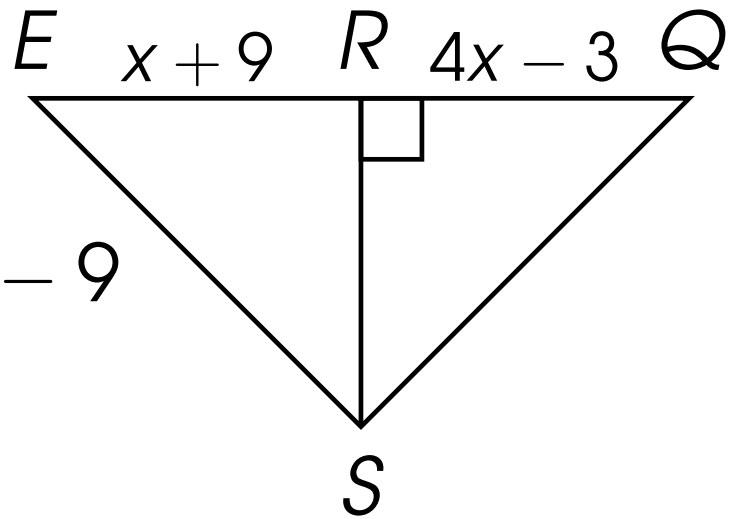

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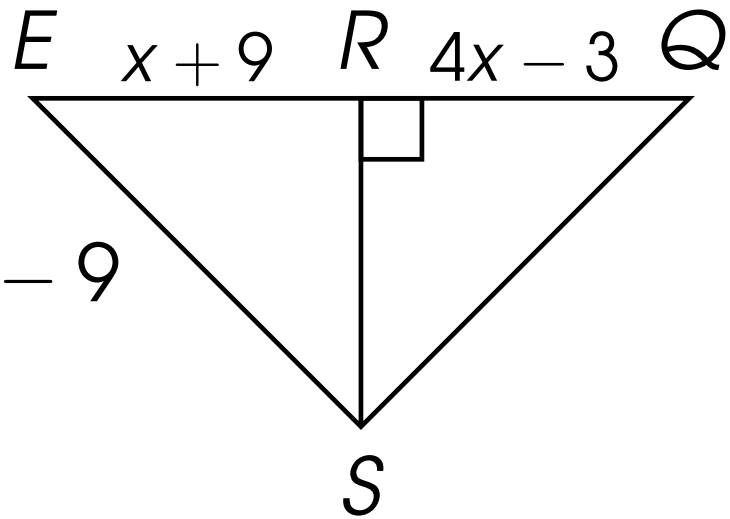
$x + 9 = 4x - 3$
$x - 4x + 9 - 9 = 4x - 4x - 3 - 9$
$-3x = -12$
$\frac{-3x}{-3} = \frac{-12}{-3}$
$x = 4$

$m\overline{ER} = x + 9$
$m\overline{ER} = 4 + 9$

Example 2

Given: $\overline{SR}$ is a perpendicular bisector of $\overline{EQ}$
Find: $m\overline{ER}$



$\overline{ER} \cong \overline{QR}$
$m\overline{ER} = m\overline{QR}$
$x + 9 = 4x - 3$
$x - 4x + 9 - 9 = 4x - 4x - 3 - 9$
$-3x = -12$
$\frac{-3x}{-3} = \frac{-12}{-3}$
$x = 4$

$m\overline{ER} = x + 9$
$m\overline{ER} = 4 + 9$
$m\overline{ER} = 13$ units

Thank you for watching.