Measuring Angles

Objectives

1. Name angles and identify their parts.
2. Measure angles using a protractor.
3. Work with congruent angles.
4. Solve problems using the Angle Addition Postulate

Angles

Angles are formed by 2 rays with the same endpoint.

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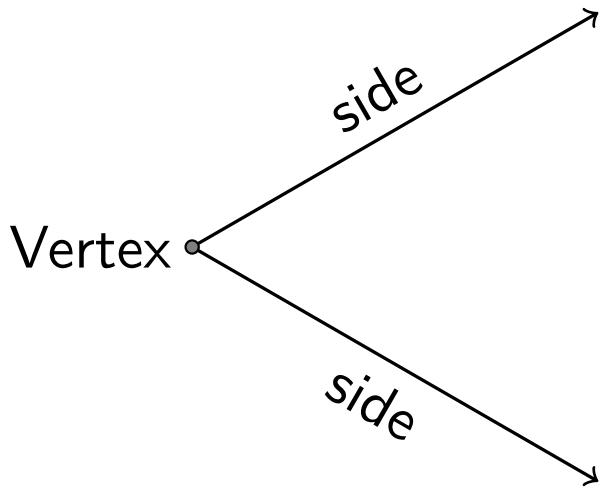
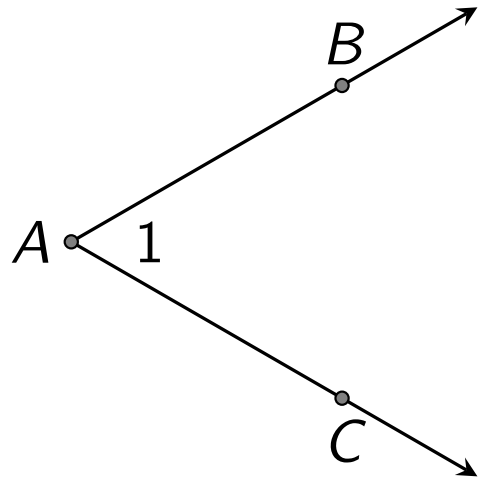
The rays are the **sides** and the endpoint is the **vertex**.



Naming Angles

You can name an angle by

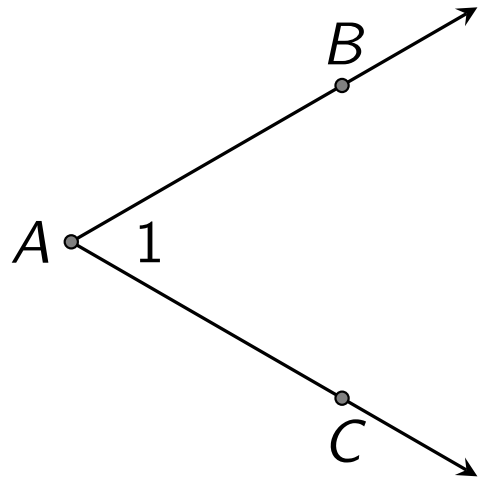
- its vertex, $\angle A$



Naming Angles

You can name an angle by

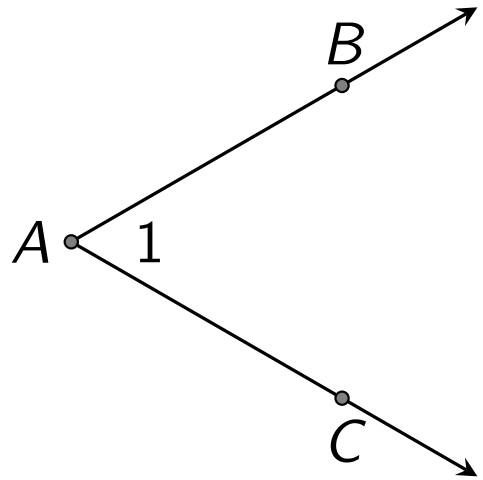
- its vertex, $\angle A$
- a point on each ray and the vertex, $\angle BAC$ or $\angle CAB$



Naming Angles

You can name an angle by

- its vertex, $\angle A$
- a point on each ray and the vertex, $\angle BAC$ or $\angle CAB$
- a number, $\angle 1$



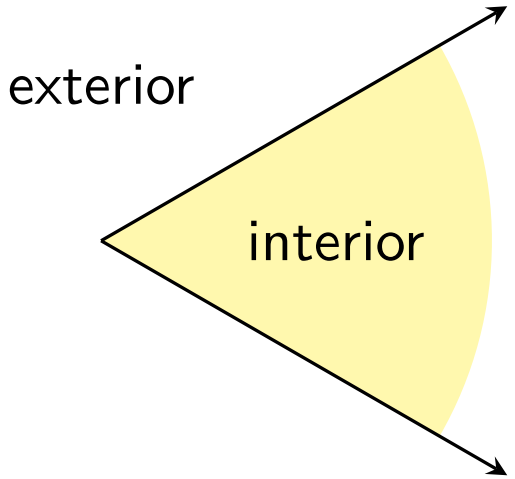
Parts of an Angle

The **interior** of an angle is the region containing all of the points between the rays.

Parts of an Angle

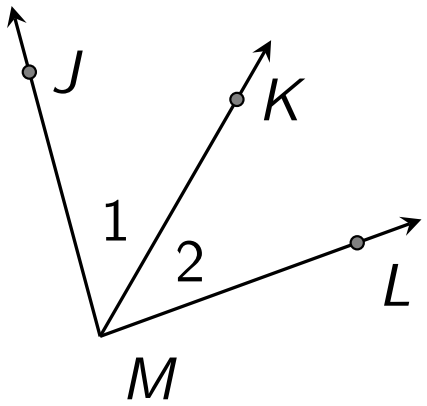
The **interior** of an angle is the region containing all of the points between the rays.

The **exterior** of an angle is all of the points outside the interior.



Example 1

(a) What are two other names for $\angle 1$?



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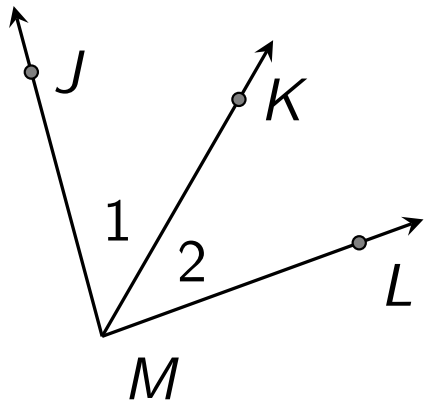
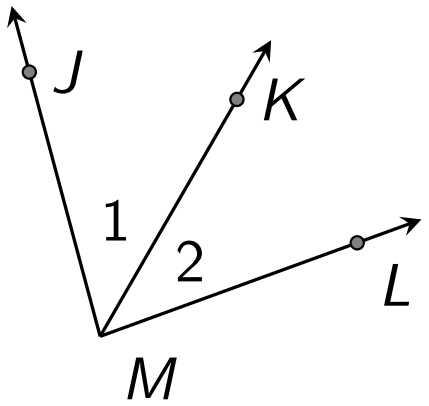


$\angle JMK$ and $\angle KMJ$

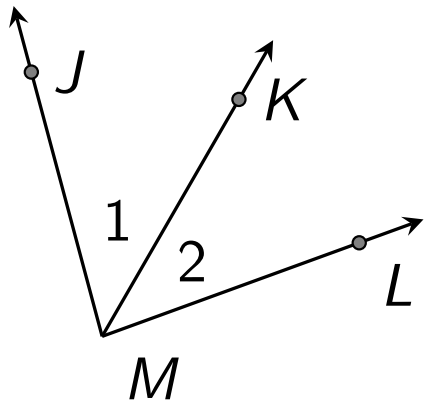
Example 1

(b) What are two other names for $\angle KML$?



Example 1

(b) What are two other names for $\angle KML$?



$\angle LMK$ and $\angle 2$

Objectives

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Using a Protractor

When measuring angles using a protractor, place the middle of the protractor at the vertex of the angle and align the $1800/0^\circ$ line along one of the angle's sides.

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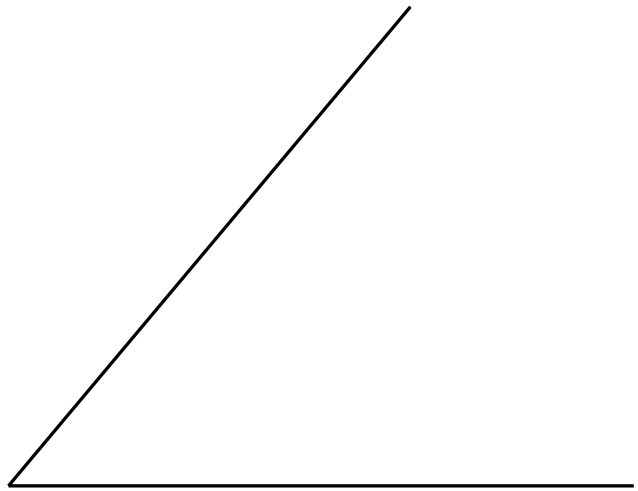
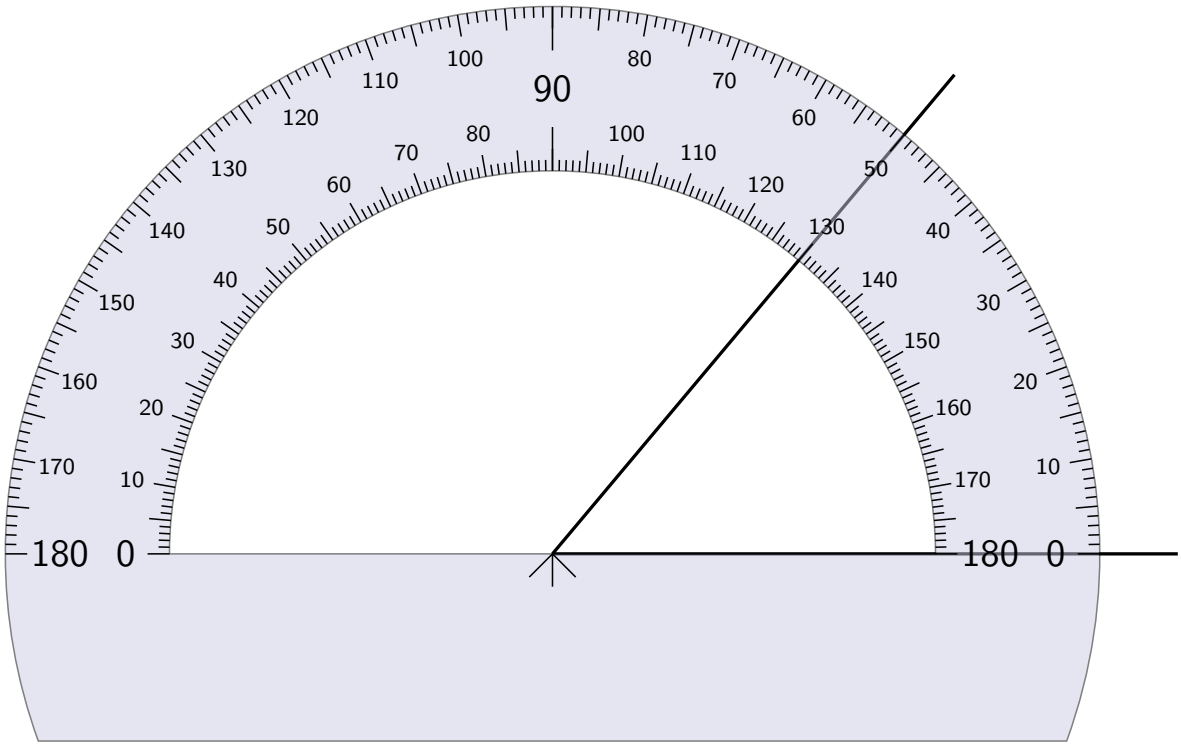


Using a Protractor

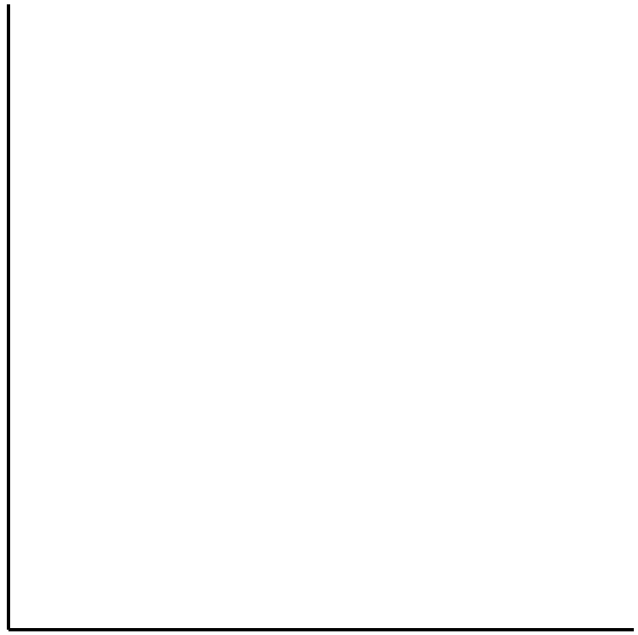
When measuring angles using a protractor, place the middle of the protractor at the vertex of the angle and align the 1800/0° line along one of the angle's sides.



Example 2

Find the measure of each angle.

(a)



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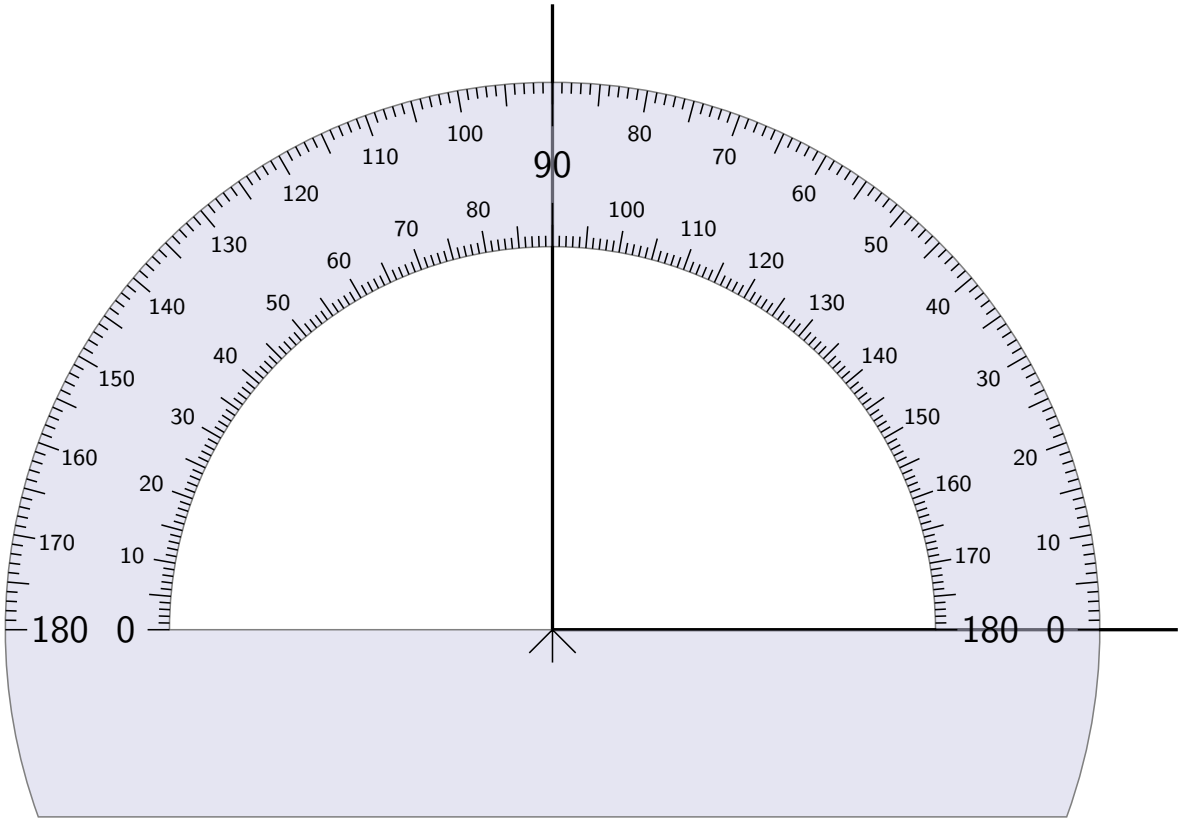
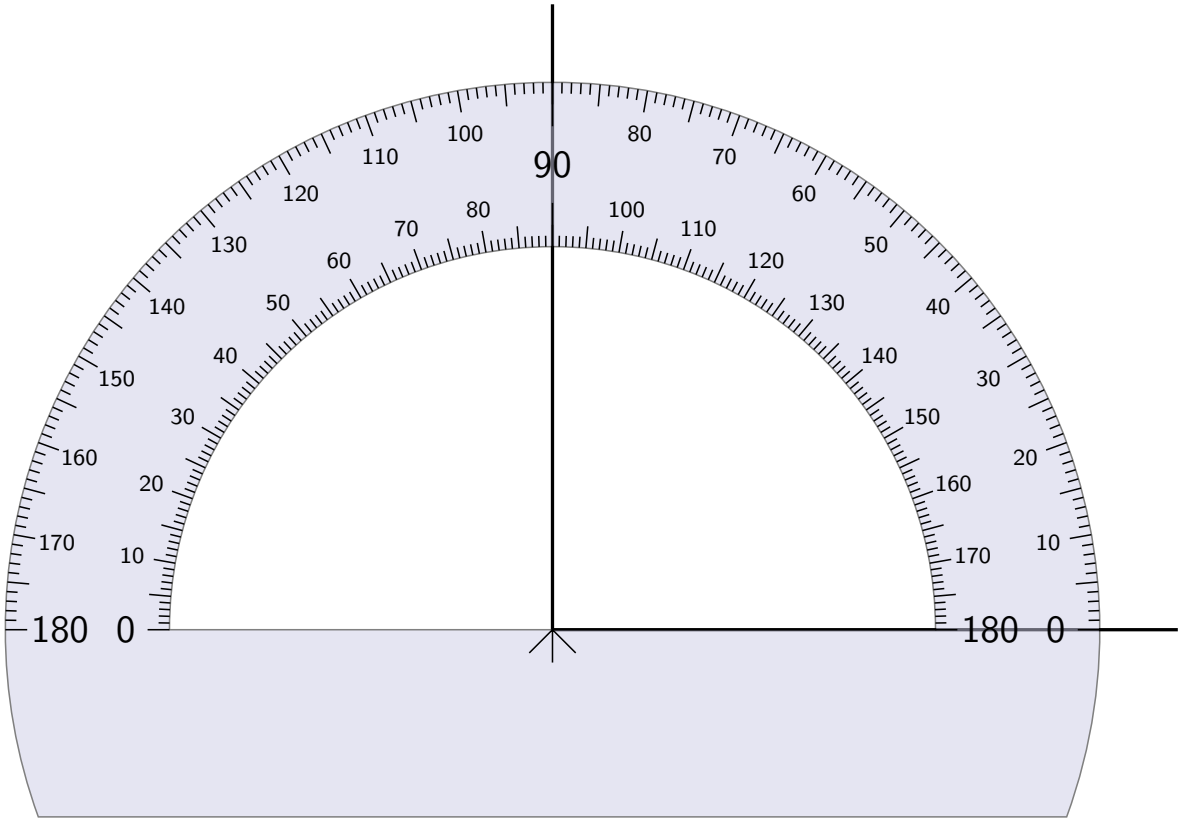


Example 2

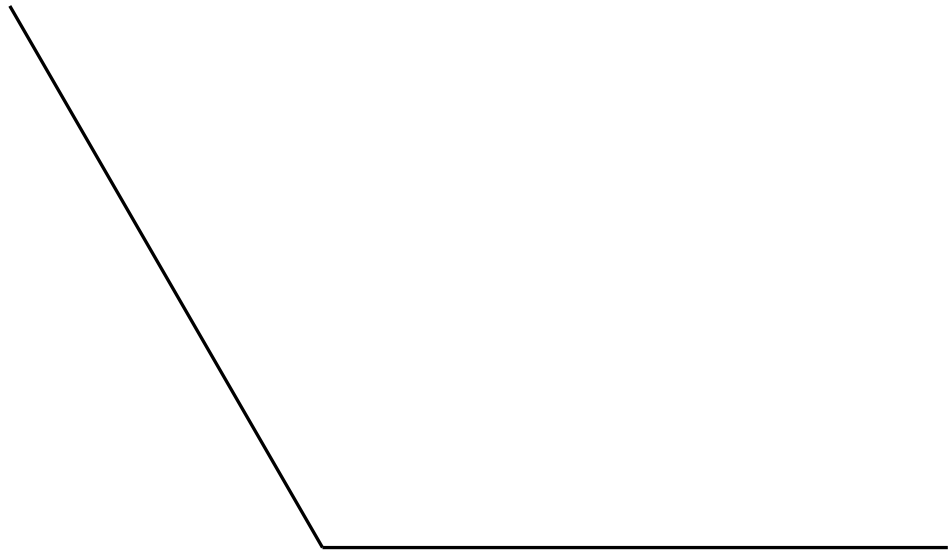
Find the measure of each angle.

(a) **90°**



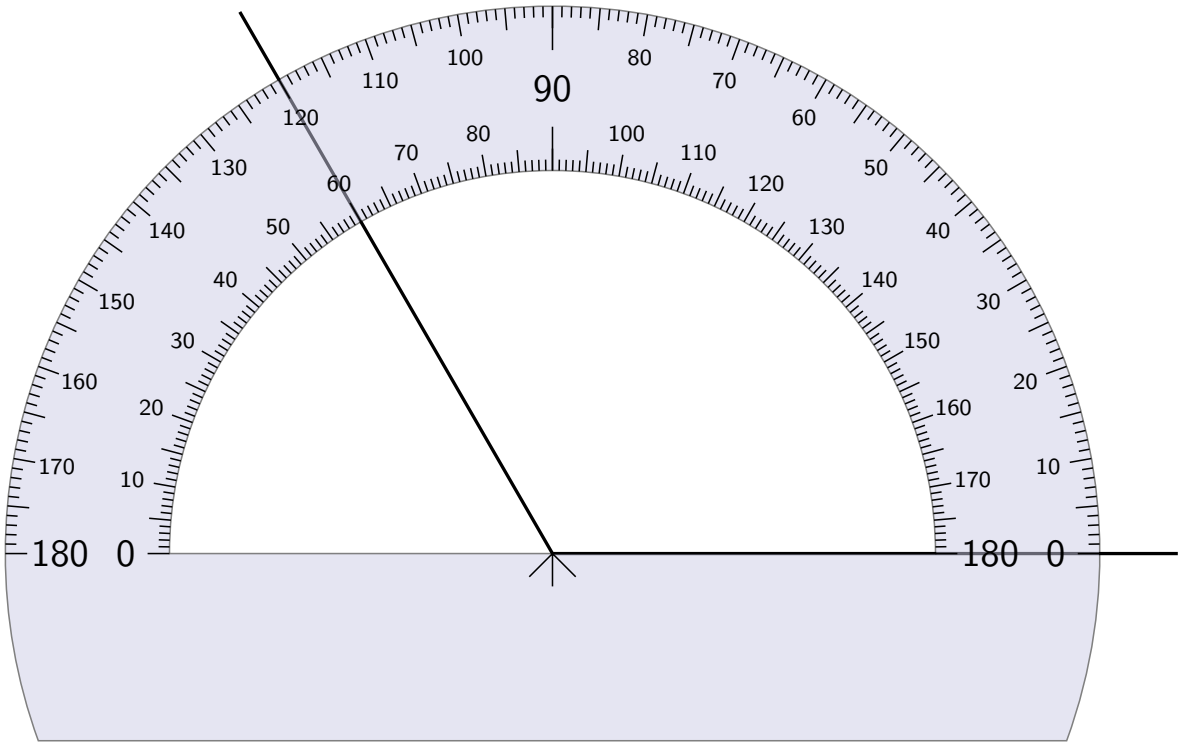
Example 2

(b)



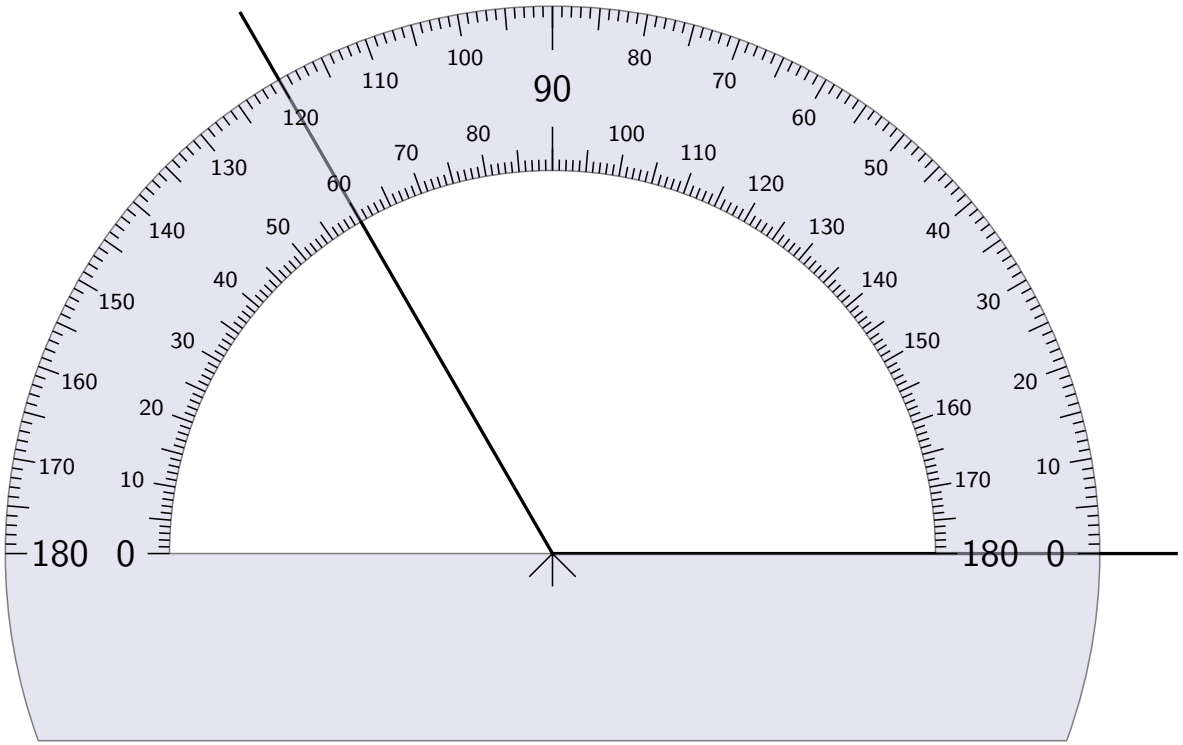
Example 2

(b)



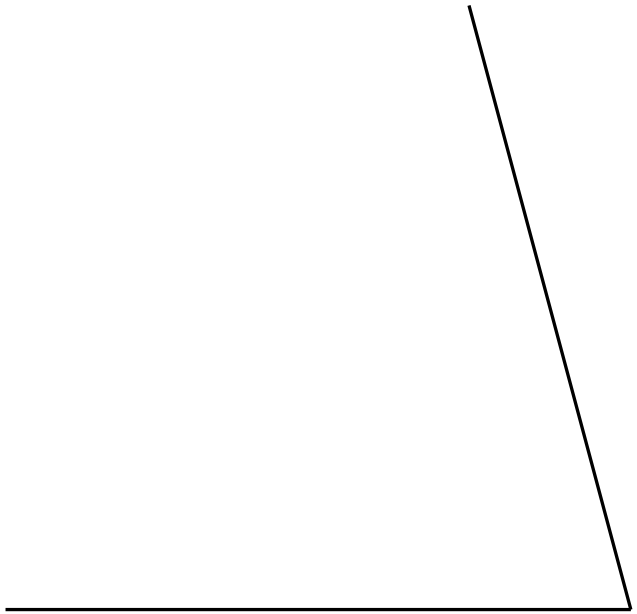
Example 2

(b) $\mathbf{120^\circ}$



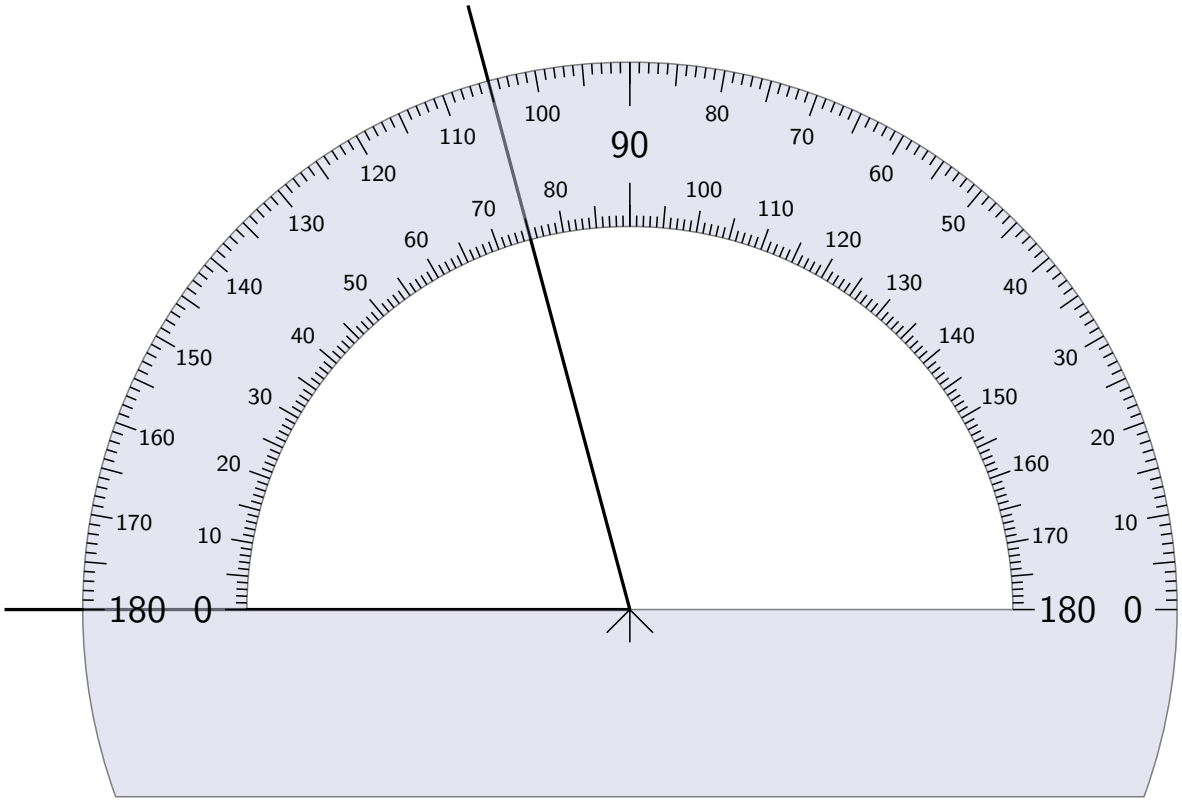
Example 2

(c)



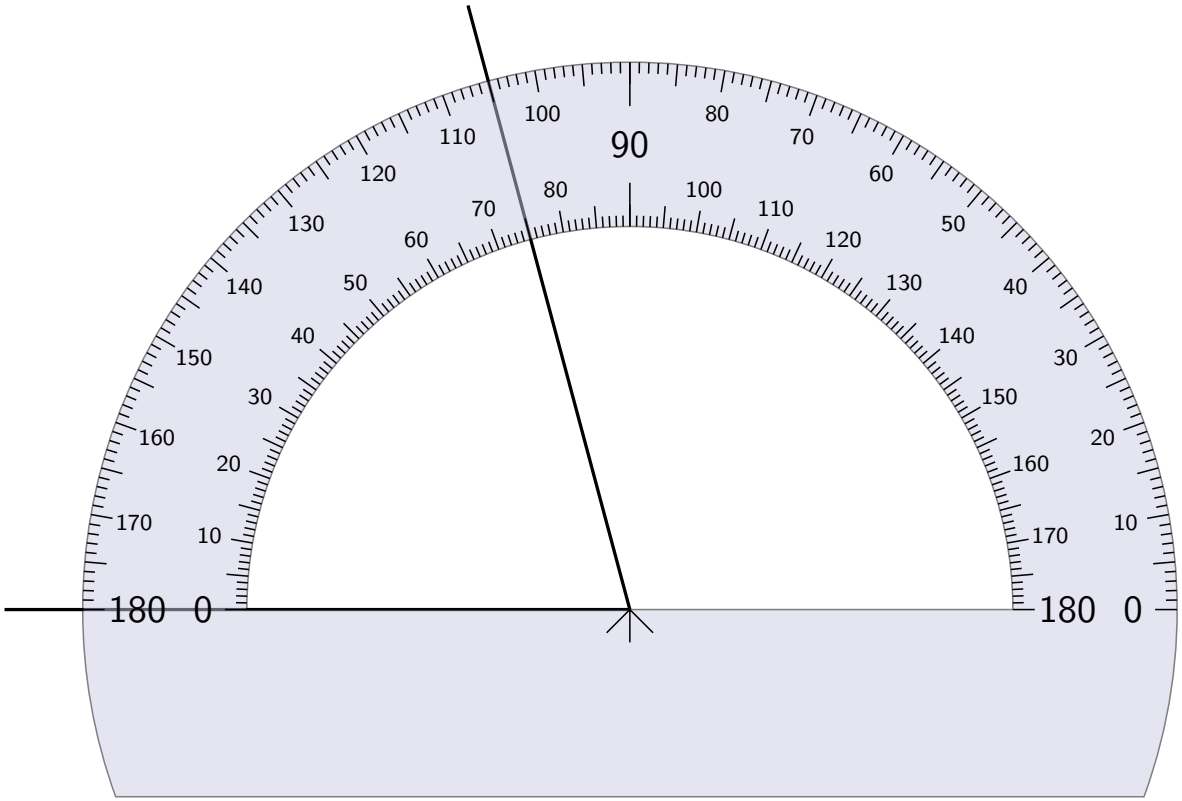
Example 2

(c)



Example 2

(c) **75°**



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Congruent Angles

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Congruent angles have the same degree measure.

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$$m\angle A = m\angle B$$

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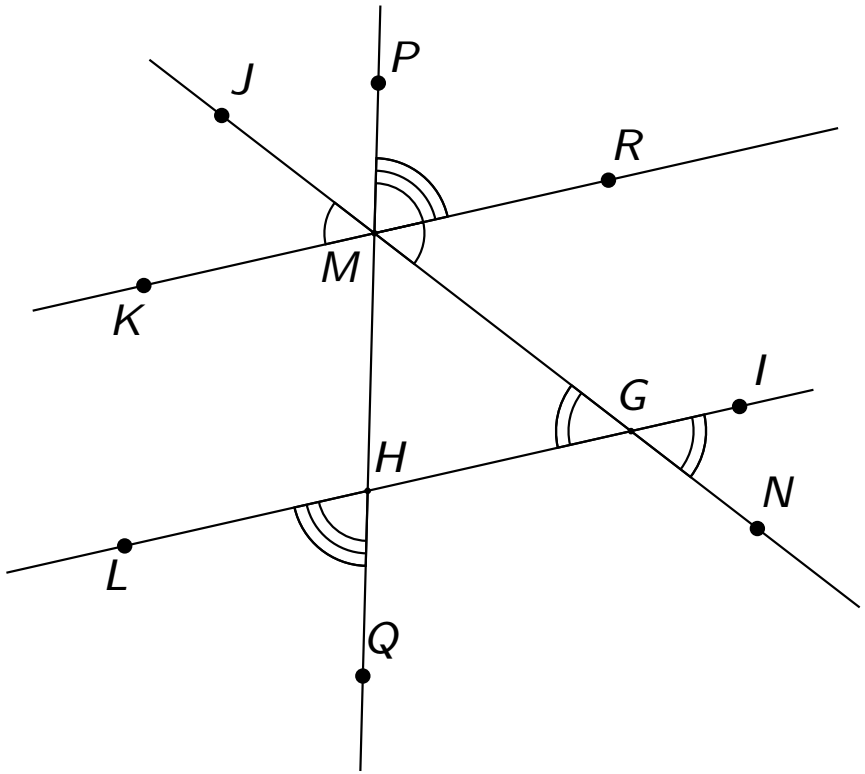
$$m\angle A = m\angle B$$

$$\angle A \cong \angle B$$

Example 3

Use the figure to find the missing value.

(a) $\angle JMK \cong ?$

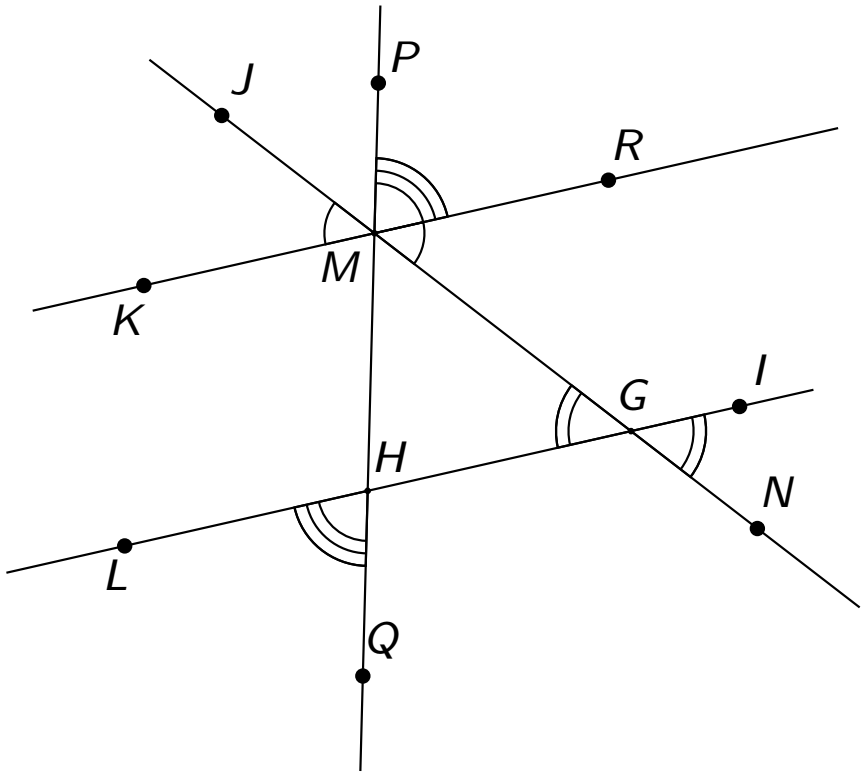


Example 3

Use the figure to find the missing value.

(a) $\angle JMK \cong ?$

$\angle RMG$



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Use the figure to find the missing value.

(a) $\angle JMK \cong ?$

$\angle RMG$

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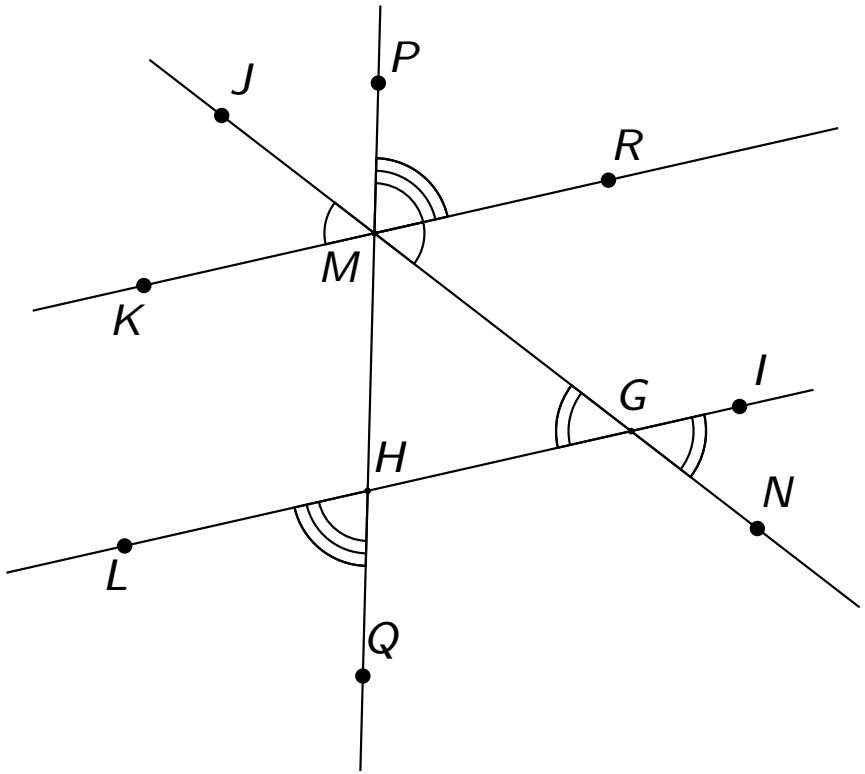


Example 3

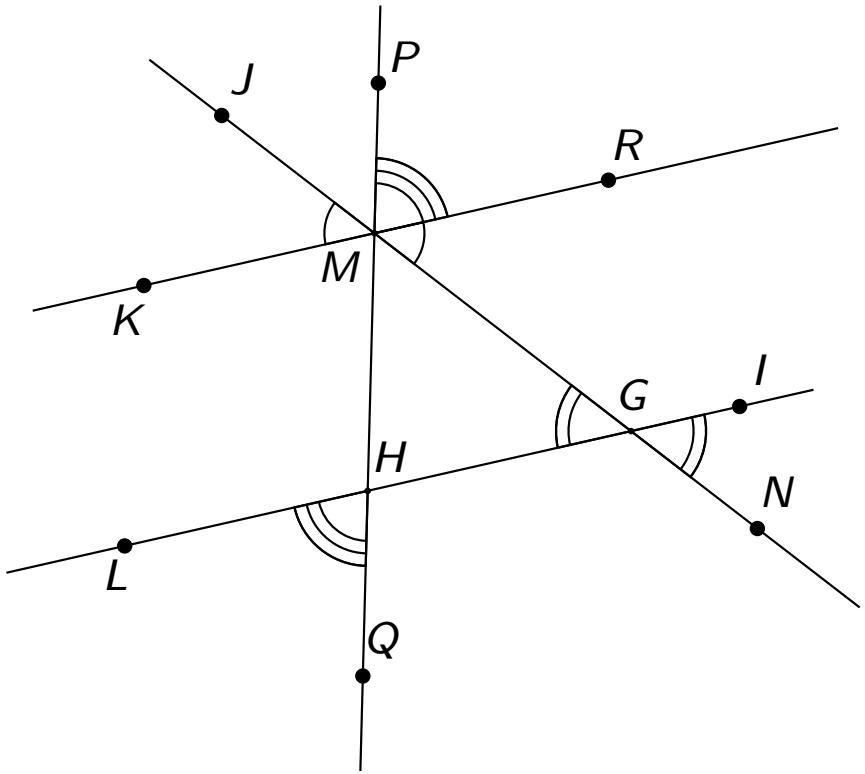
Use the figure to find the missing value.

(a) $\angle JMK \cong ?$

$\angle RMG$

(b) $\angle IGN \cong ?$

$\angle HGM$



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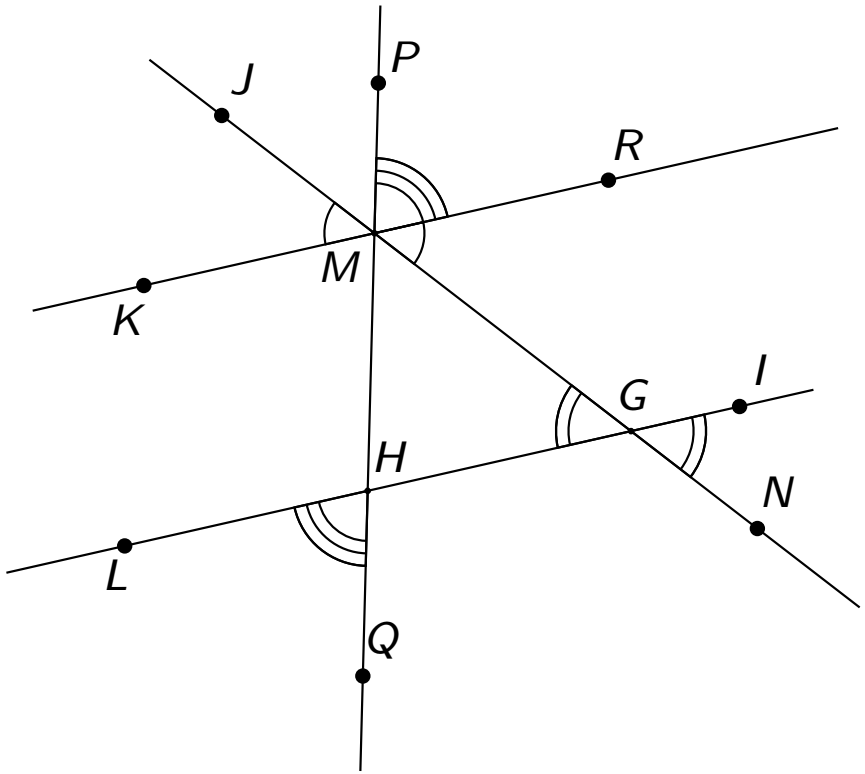

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$\angle HGM$

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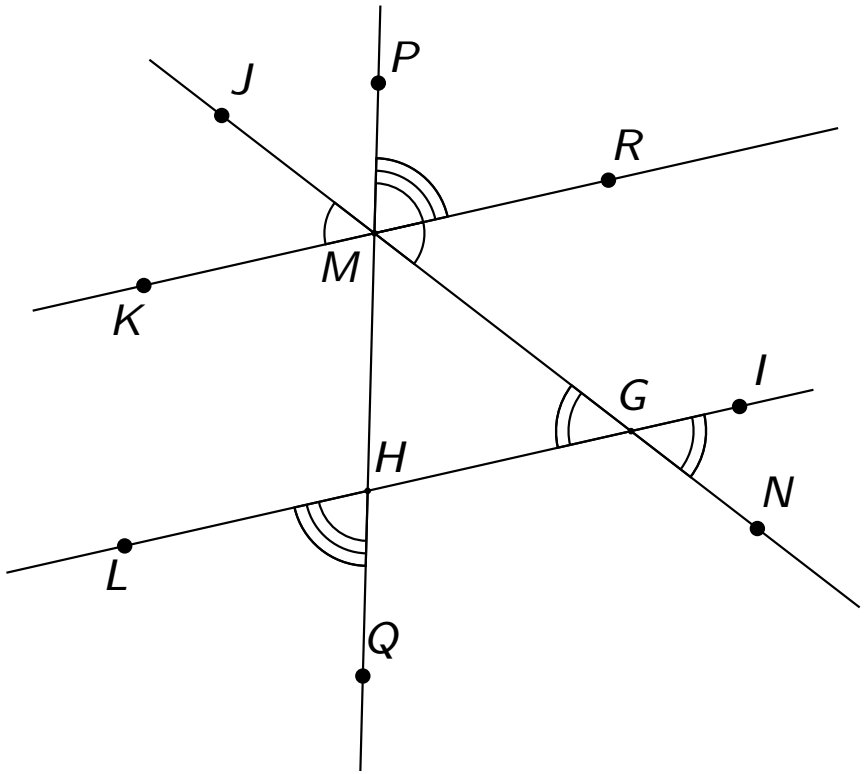
$\angle QHL$



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Angle Addition Postulate

The **Angle Addition Postulate** is similar to the Segment Addition Postulate.

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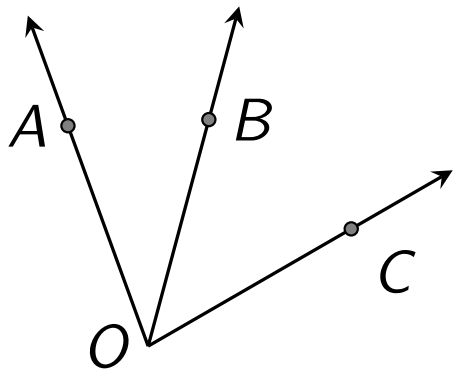
If B is in the interior of $\angle AOC$ then

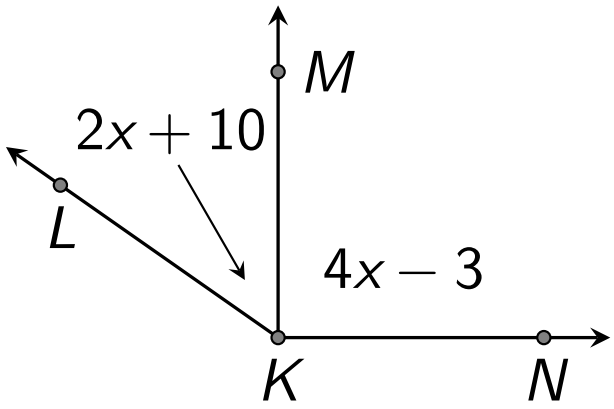
$$m\angle AOB + m\angle BOC = m\angle AOC$$



Example 4

Find the measure of each angle.

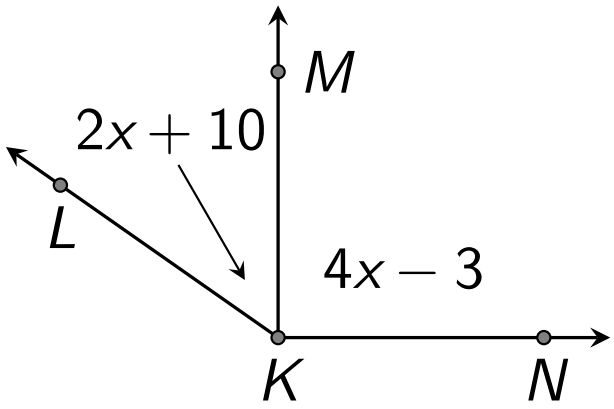
(a) $m\angle LKN = 145^\circ$



Example 4

Find the measure of each angle.

(a) $m\angle LKN = 145^\circ$



$$m\angle LKM + m\angle MKN = m\angle LKN$$

Example 4

Find the measure of each angle.

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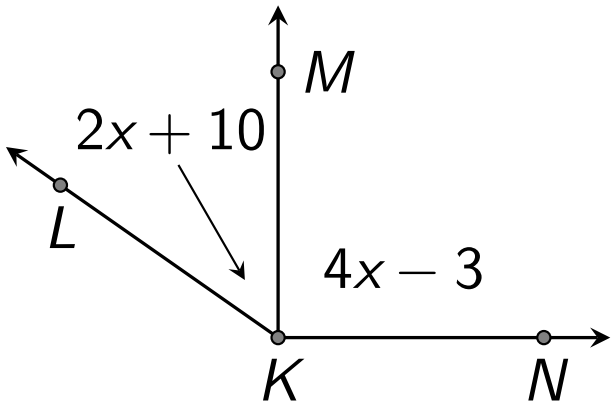
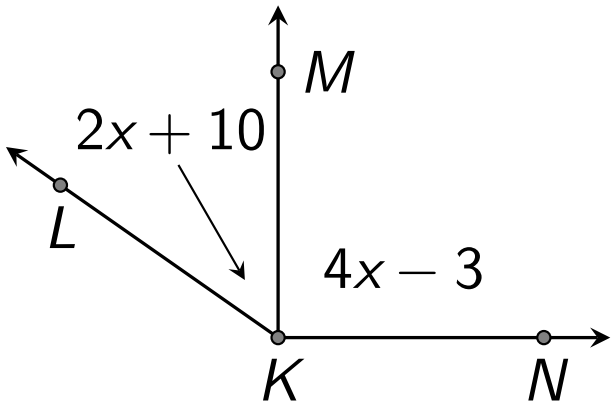


$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$

Example 4

Find the measure of each angle.

(a) $m\angle LKN = 145°$



$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$
$$6x + 7 = 145$$

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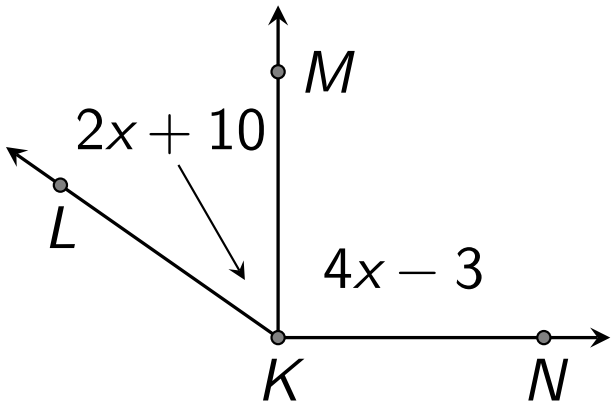

$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$
$$6x + 7 = 145$$
$$6x = 138$$

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Find the measure of each angle.

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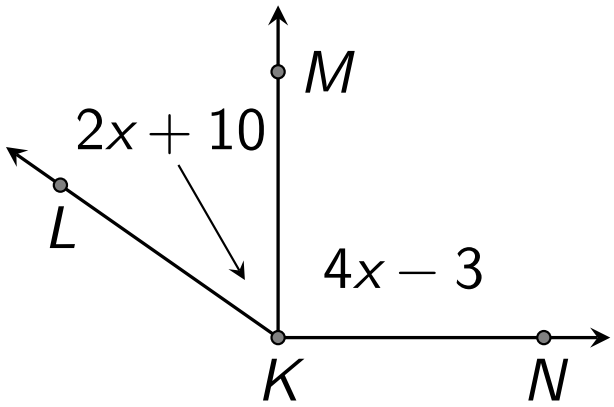

$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$
$$6x + 7 = 145$$
$$6x = 138$$
$$x = 23$$

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Find the measure of each angle.

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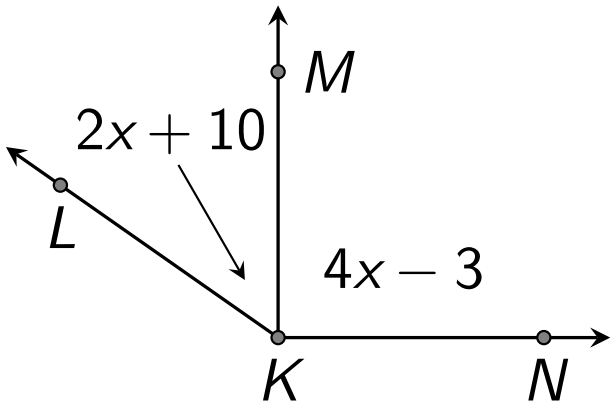

$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$
$$6x + 7 = 145$$
$$6x = 138$$
$$x = 23$$

$m\angle LKM = 2(23) + 10$ $\qquad$ $m\angle MKN = 4(23) - 3$

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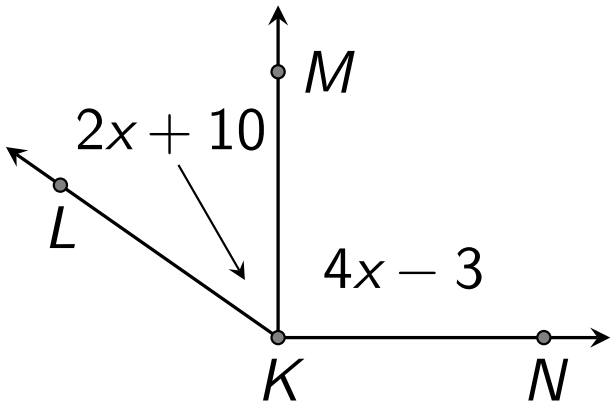


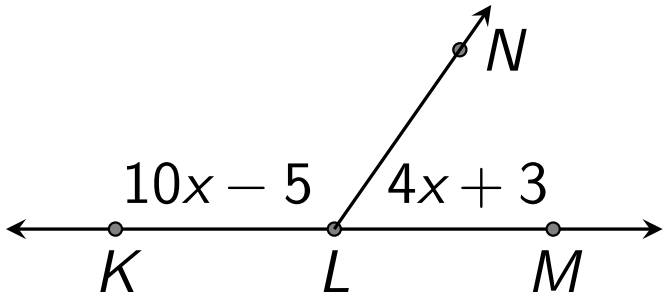
$$m\angle LKM + m\angle MKN = m\angle LKN$$
$$2x + 10 + 4x - 3 = 145$$
$$6x + 7 = 145$$
$$6x = 138$$
$$x = 23$$

$$m\angle LKM = 2(23) + 10$$
$$m\angle LKM = 56^\circ$$

$$m\angle MKN = 4(23) - 3$$
$$m\angle MKN = 89^\circ$$

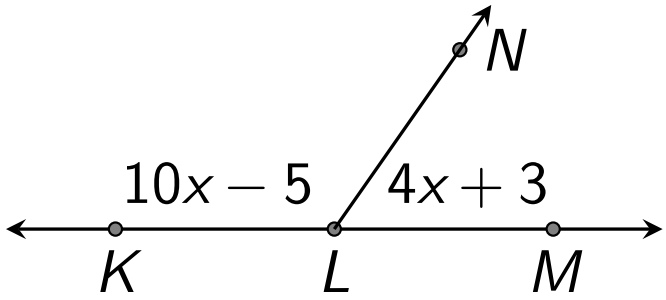
Example 4

(b) Given $\overleftrightarrow{KM}$



Example 4

(b) Given $\overleftrightarrow{KM}$



$$m\angle KLN + m\angle MLN = m\angle KLM$$

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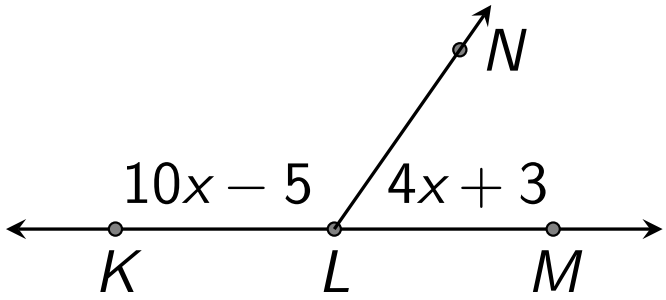
(b) Given $\overleftrightarrow{KM}$

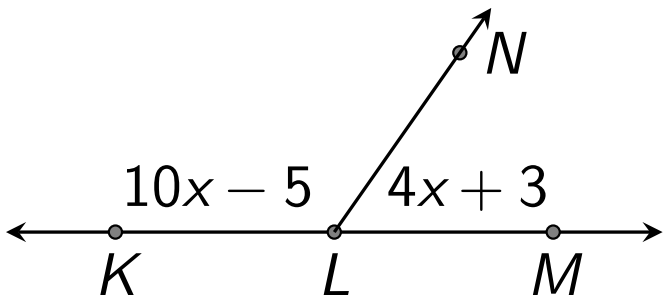


$$m\angle KLN + m\angle MLN = m\angle KLM$$

$$10x - 5 + 4x + 3 = 180$$

Example 4

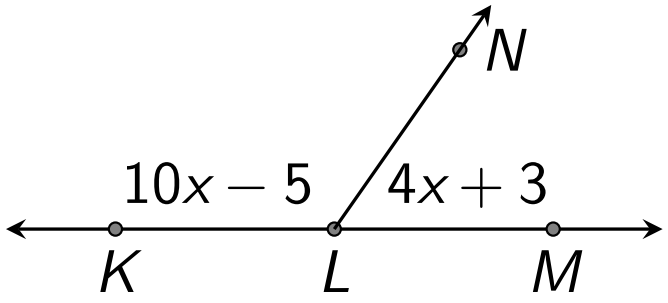
(b) Given $\overleftrightarrow{KM}$



$$m\angle KLN + m\angle MLN = m\angle KLM$$
$$10x - 5 + 4x + 3 = 180$$
$$14x - 2 = 180$$

Example 4

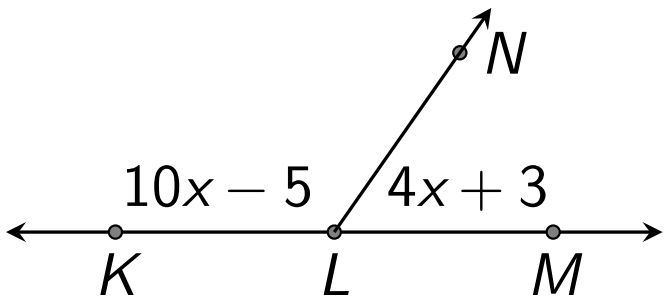
(b) Given $\overleftrightarrow{KM}$



$$m\angle KLN + m\angle MLN = m\angle KLM$$
$$10x - 5 + 4x + 3 = 180$$
$$14x - 2 = 180$$
$$14x = 182$$

Example 4

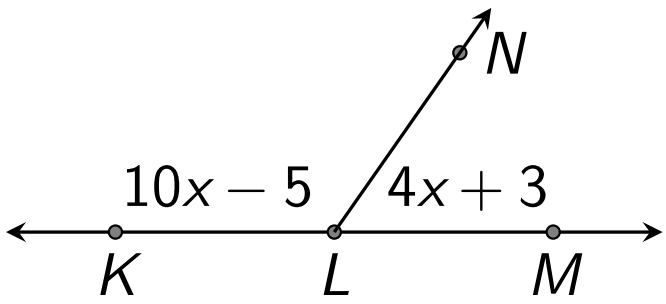
(b) Given $\overleftrightarrow{KM}$



$$m\angle KLN + m\angle MLN = m\angle KLM$$
$$10x - 5 + 4x + 3 = 180$$
$$14x - 2 = 180$$
$$14x = 182$$
$$x = 13$$

Example 4

(b) Given $\overleftrightarrow{KM}$

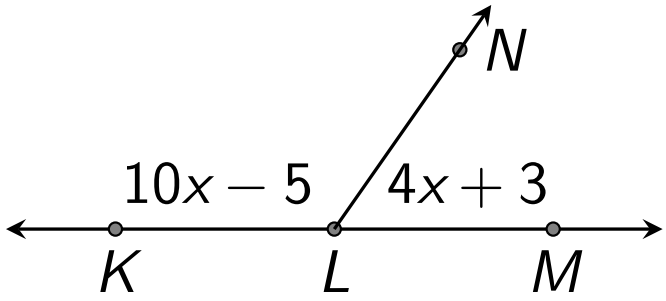


$$m\angle KLN + m\angle MLN = m\angle KLM$$
$$10x - 5 + 4x + 3 = 180$$
$$14x - 2 = 180$$
$$14x = 182$$
$$x = 13$$

$$m\angle KLN = 10(13) - 5 \qquad m\angle MLN = 4(13) + 3$$

Example 4

(b) Given $\overleftrightarrow{KM}$

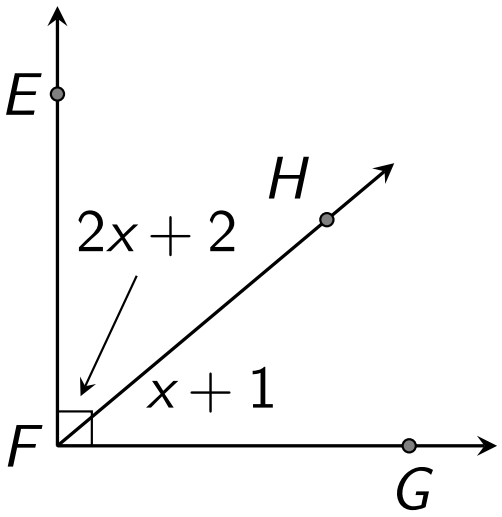


$$m\angle KLN + m\angle MLN = m\angle KLM$$
$$10x - 5 + 4x + 3 = 180$$
$$14x - 2 = 180$$
$$14x = 182$$
$$x = 13$$

$$m\angle KLN = 10(13) - 5 \qquad m\angle MLN = 4(13) + 3$$
$$m\angle KLN = 125^\circ \qquad m\angle MLN = 55^\circ$$

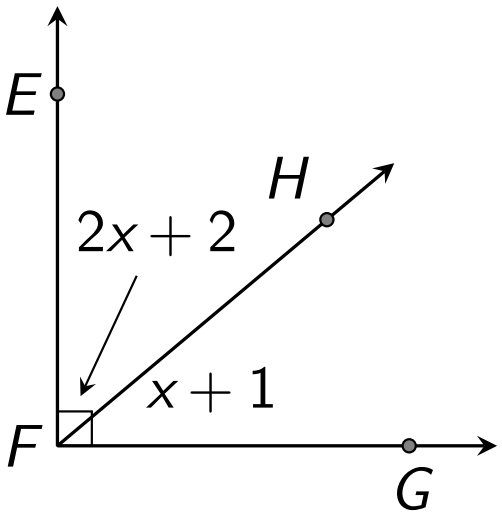
Example 4

(c)



Example 4

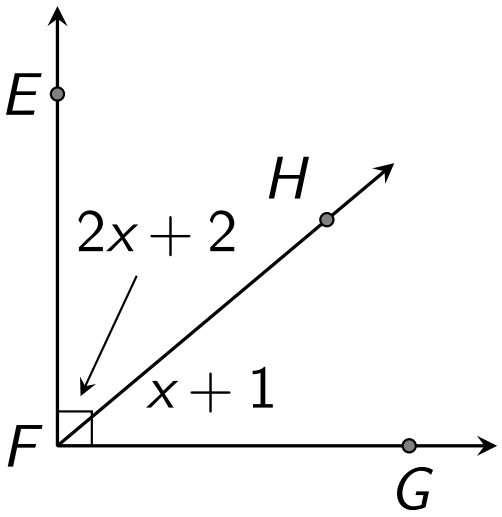
(c)



$$m\angle EFH + m\angle GFH = 90$$

Example 4

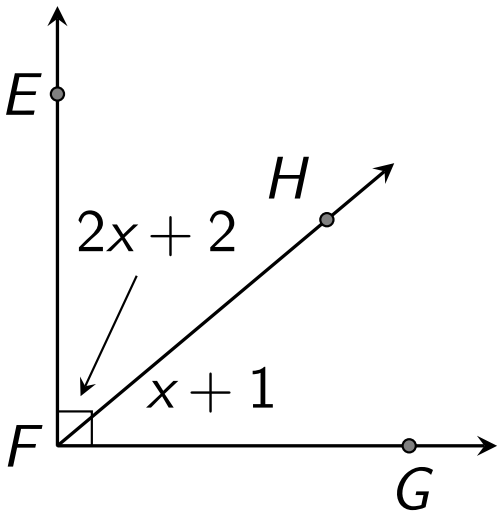
(c)



$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$

Example 4

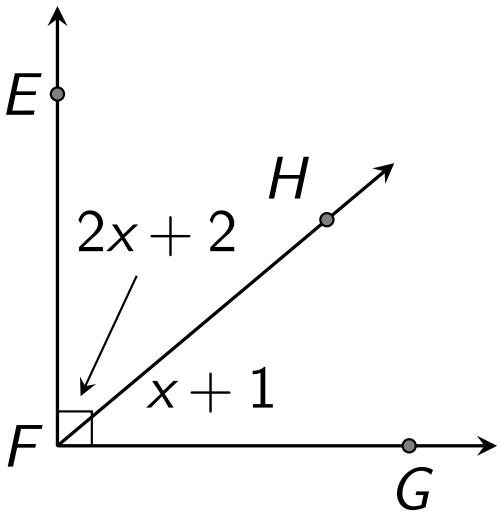
(c)



$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$
$$3x + 3 = 90$$

Example 4

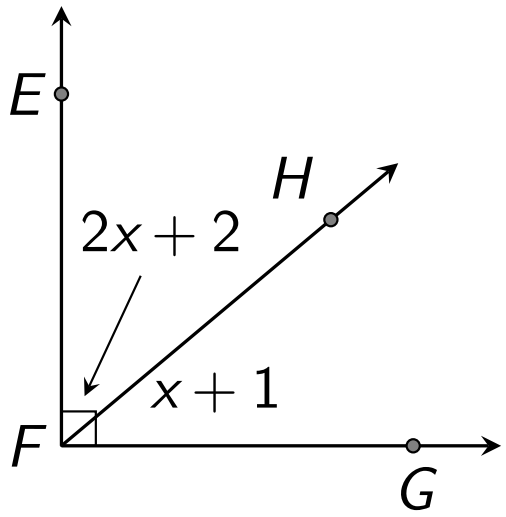
(c)



$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$
$$3x + 3 = 90$$
$$3x = 87$$

Example 4

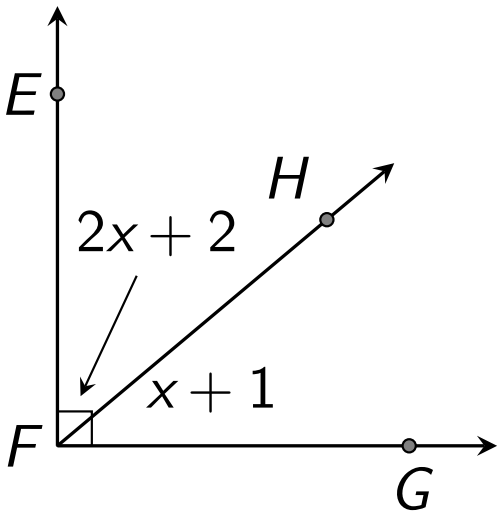
(c)



$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$
$$3x + 3 = 90$$
$$3x = 87$$
$$x = 29$$

Example 4

(c)



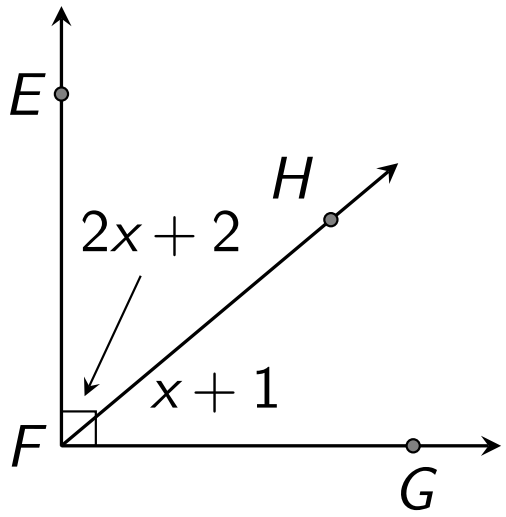
$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$
$$3x + 3 = 90$$
$$3x = 87$$
$$x = 29$$

$m\angle EFH = 2(29) + 2$

$m\angle GFH = 29 + 1$

Example 4

(c)



$$m\angle EFH + m\angle GFH = 90$$
$$2x + 2 + x + 1 = 90$$
$$3x + 3 = 90$$
$$3x = 87$$
$$x = 29$$

$$m\angle EFH = 2(29) + 2$$
$$m\angle EFH = 60^\circ$$

$$m\angle GFH = 29 + 1$$
$$m\angle GFH = 30^\circ$$