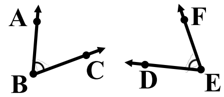
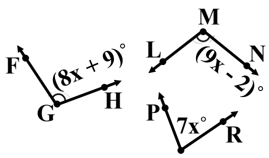
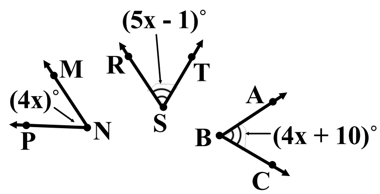
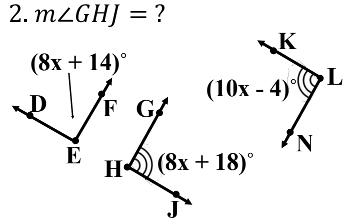
Name: ______________________ Per: ______

Measuring Angles Using Bisectors and Congruence

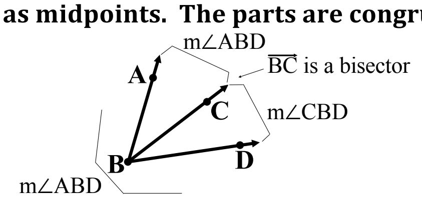
If angles are congruent, you can set them equal, just like segments. Except, instead of tick marks, you use curves to show that the angles are congruent.



Because of the curve at the corner, I know that $\angle ABC \cong \angle DEF$, which means that $m\angle ABC = m\angle DEF$.

Example	**Your Turn**	**Still Your Turn**
$m\angle FGH = ?$  *The curves tell me that* $\angle FGH \cong \angle LMN$, *so* $m\angle FGH = m\angle LMN!$ $(8x+9)^\circ = (9x-2)^\circ$ $9 = x - 2$ $11 = x$ *Plug it in!* $m\angle FGH = (8x+9)^\circ = 8(11)+9$ $m\angle FGH = 88 + 9 = 97^\circ$	1. $m\angle RST = ?$ 	2. $m\angle GHJ = ?$ 

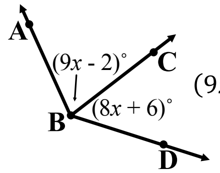
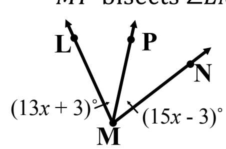
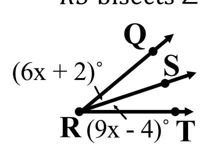
Angle bisectors follow the same rules as midpoints. The parts are congruent, and the whole = 2(part).

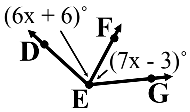


Because $\overrightarrow{BC}$ is a bisector:

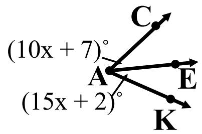
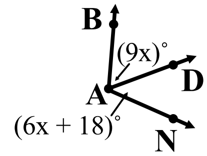
$$m\angle ABC = m\angle CBD \text{ and } 2(m\angle ABC) = m\angle ABD$$

Remember: You can also write it as $m\angle ABC + m\angle CBD = m\angle ABD!$

Example	**Your Turn**	**Still Your Turn**
$\overrightarrow{BC}$ bisects $\angle ABD$. $m\angle ABC = ?$  If it's bisected, $m\angle ABC = m\angle CBD$ $(9x-2)^\circ = (8x+6)^\circ$ $x - 2 = 6$ $x = 8$ *Now, plug it in:* $m\angle ABC = (9x-2)^\circ$ $m\angle ABD = 9(8) - 2 = 72 - 2 = 70^\circ$	1. $\overrightarrow{MP}$ bisects $\angle LMN$. $m\angle PMN = ?$ 	2. $\overrightarrow{RS}$ bisects $\angle QRT$. $m\angle SRT = ?$ 

<table>
<tr>
<td>$\overrightarrow{EF}$ bisects $\angle DEG$. $m\angle DEG = ?$


If it's bisected,
$m\angle DEF = m\angle FEG$
$(6x+6)^\circ = (7x-3)^\circ$
$6 = x - 3$
$9 = x$

Now, plug it in. Since $\overrightarrow{EF}$ bisects $\angle DEG$,
I know that: $m\angle DEG = 2(m\angle DEF)$
$m\angle DEG = 2(6x+6)^\circ$
$m\angle DEG = 12x + 12 = 12(9) + 12$
$m\angle DEG = 108 + 12 = 120^\circ$</td>
<td>3. $\overrightarrow{AE}$ bisects $\angle CAK$. $m\angle CAK = ?$

</td>
<td>4. $\overrightarrow{AD}$ bisects $\angle BAN$. $m\angle BAN = ?$

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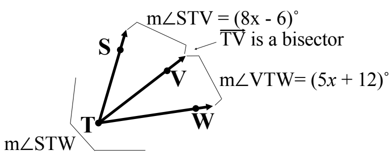
<tr>
<td>$\overrightarrow{TV}$ bisects $\angle STW$. $m\angle VTW = (5x+12)^\circ$ and $m\angle STV = (8x-6)^\circ$. $m\angle STW = ?$
1st, draw it out!


Since $\overrightarrow{TV}$ is a bisector, I know that
$m\angle STV = m\angle VTW$
$(8x-6)^\circ = (5x+12)^\circ$
$3x - 6 = 12$
$3x = 18$
$x = 6$
Now, plug it in.
$m\angle STW = 2(m\angle STV)$
$m\angle STW = 2(8x-6)^\circ = 16x - 12$
$m\angle STW = 16(6) - 12 = 96 - 12$
$m\angle STW = 84^\circ$</td>
<td>5. $\overrightarrow{BC}$ bisects $\angle ABD$. $m\angle ABC = (12x+6)^\circ$ and $m\angle CBD = (14x-8)^\circ$. $m\angle ABD = ?$</td>
<td>6. $\overrightarrow{QR}$ bisects $\angle PQS$. $m\angle RQS = (8x+4)^\circ$ and $m\angle PQR = (6x+20)^\circ$. $m\angle PQS = ?$</td>
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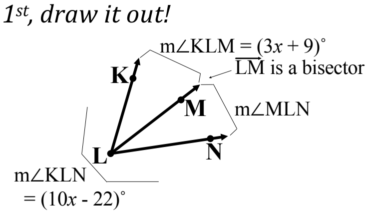
<tr>
<td>$\overrightarrow{LM}$ bisects $\angle KLN$. $m\angle KLM = (3x+9)^\circ$ and $m\angle KLN = (10x-22)^\circ$. $m\angle MLN = ?$
1st, draw it out!


Since $\overrightarrow{LM}$ is a bisector, I know that
$2(m\angle KLM) = m\angle KLN$
$2(3x+9)^\circ = (10x-22)^\circ$
$6x + 18 = 10x - 22$
$18 = 4x - 22$
$40 = 4x$
$10 = x$
Now, plug it in. $m\angle MLN = m\angle KLM$
$m\angle MLN = (3x+9)^\circ = 3(10) + 9$
$m\angle MLN = 30 + 9 = 39^\circ$</td>
<td>7. $\overrightarrow{GH}$ bisects $\angle FGI$. $m\angle FGI = (13x+1)^\circ$ and $m\angle HGI = (5x+5)^\circ$. $m\angle FGH = ?$</td>
<td>8. $\overrightarrow{AT}$ bisects $\angle MAH$. $m\angle TAH = (7x+14)^\circ$ and $m\angle MAH = (15x+25)^\circ$. $m\angle MAT = ?$</td>
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