

Hinge Theorem

Jonathan R. Bacolod

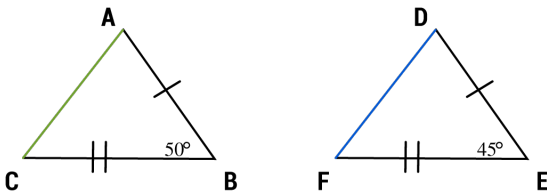
Sauyo High School

What is a Hinge?



What is the Hinge Theorem or SAS Inequality Theorem?

If two sides of one triangle are congruent to two sides of another triangle, but the included angle of the first triangle is greater than the included angle of the second, then the third side of the first triangle is longer than the third side of the second.

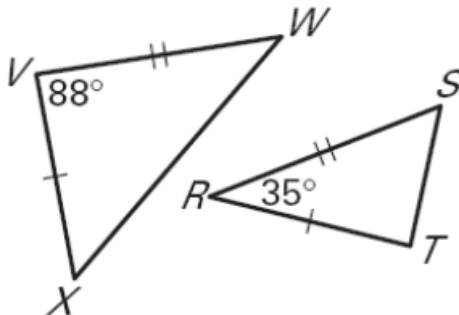


$$\overline{AC} > \overline{DF}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

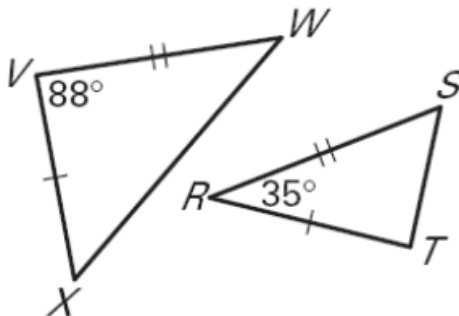
1. \overline{WX} , \overline{ST}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

1. \overline{WX} , \overline{ST}

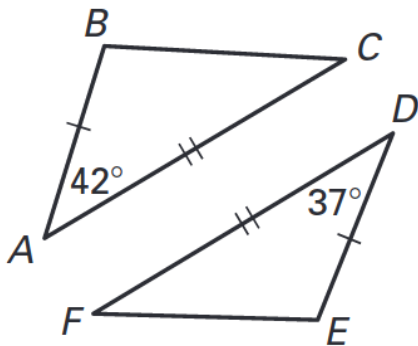


$$m\overline{WX} > m\overline{ST}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

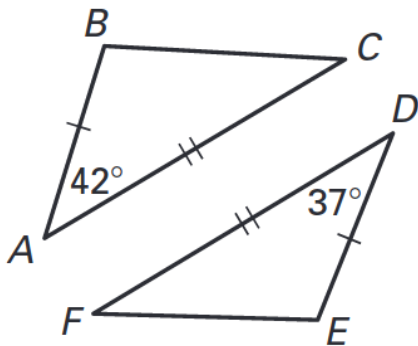
2. \overline{BC} , \overline{EF}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

2. \overline{BC} , \overline{EF}

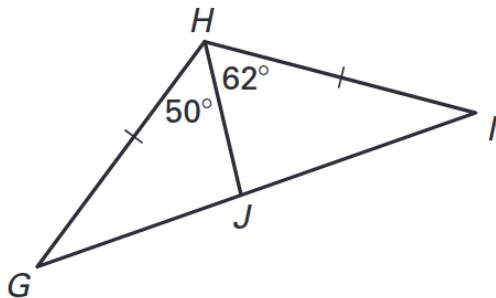


$$m\overline{BC} > m\overline{EF}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

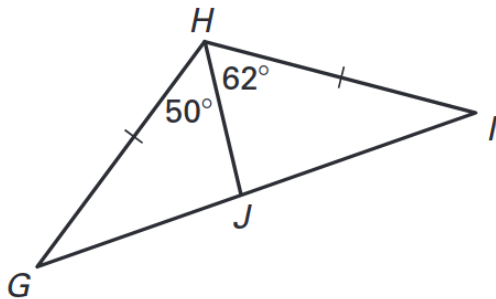
3. \overline{JI} , \overline{JG}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

3. \overline{JI} , \overline{JG}

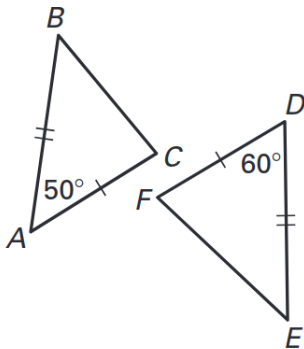


$$m\overline{JI} > m\overline{JG}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

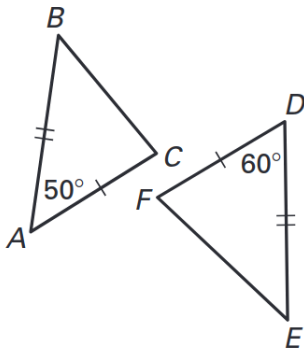
4. \overline{BC} , \overline{EF}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

4. \overline{BC} , \overline{EF}

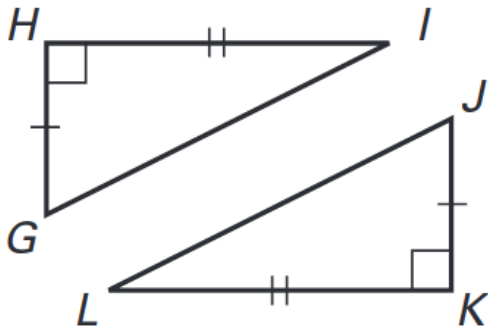


$$m\overline{BC} < m\overline{EF}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

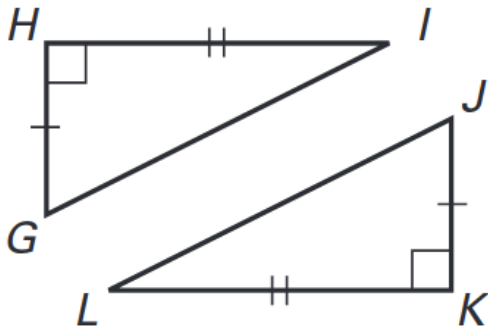
5. \overline{IG} , \overline{LJ}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

5. \overline{IG} , \overline{LJ}

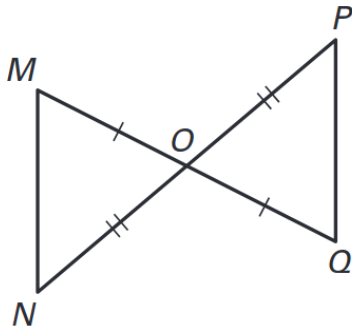


$$m\overline{IG} = m\overline{LJ}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

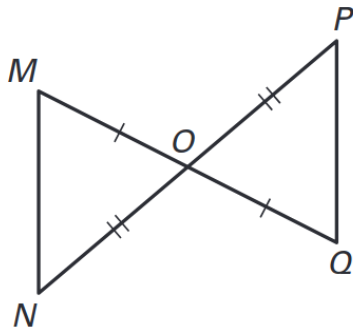
6. \overline{MN} , \overline{QP}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

6. \overline{MN} , \overline{QP}

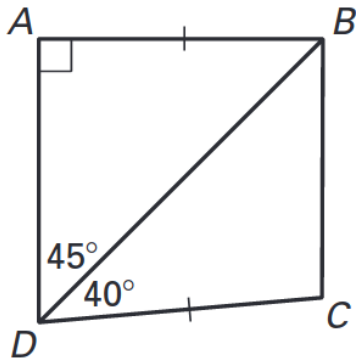


$$m\overline{MN} = m\overline{QP}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

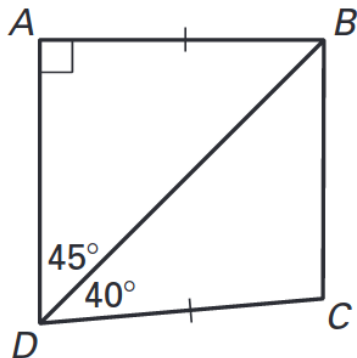
7. \overline{AD} , \overline{BC}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

7. \overline{AD} , \overline{BC}

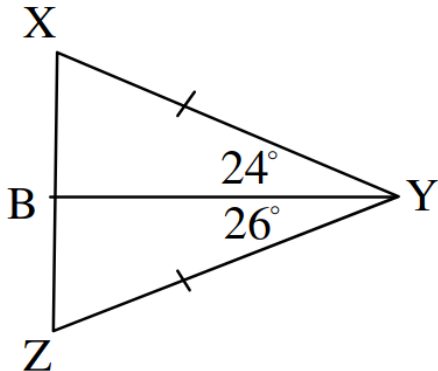


$$m\overline{AD} > m\overline{BC}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

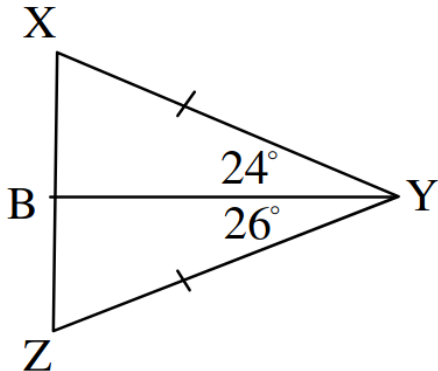
8. \overline{XB} , \overline{ZB}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

8. \overline{XB} , \overline{ZB}

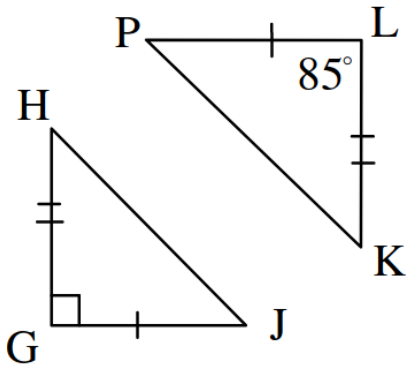


$$m\overline{XB} < m\overline{ZB}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

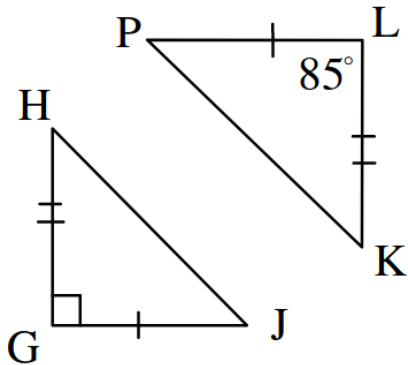
9. \overline{PK} , \overline{JH}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

9. \overline{PK} , \overline{JH}

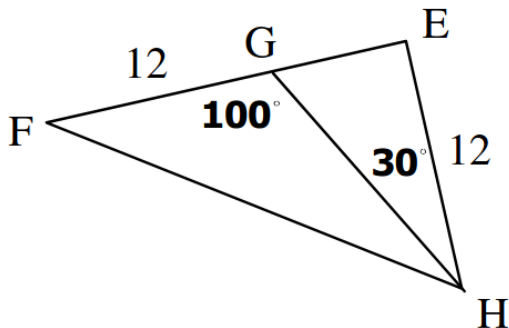


$$m\overline{PK} < m\overline{JH}$$

Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

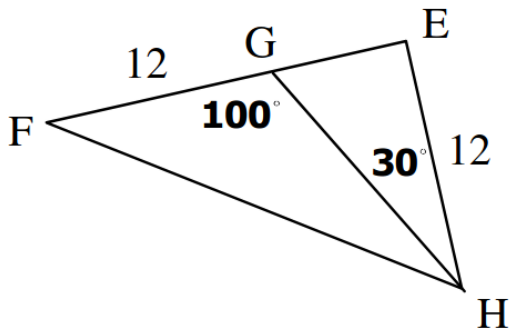
10. \overline{GE} , \overline{FH}



Example 1

Write $<$, $>$, or $=$ to relate the measures of the given pair of segments.

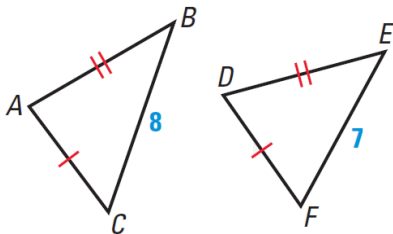
10. \overline{GE} , \overline{FH}



$$m\overline{GE} > m\overline{FH}$$

What is the Converse of Hinge Theorem or SSS Inequality Theorem?

If two sides of one triangle are congruent to two sides of another triangle, but the third side of the first triangle is longer than the third side of the second, then the included angle of the first triangle is larger than the included angle of the second.

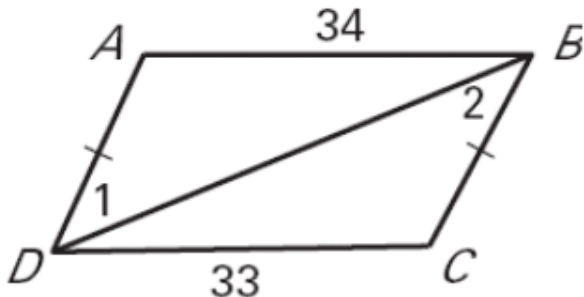


$$m\angle A > m\angle D$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

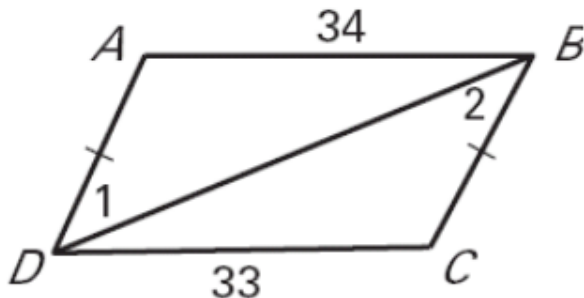
1. $\angle 1$, $\angle 2$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

1. $\angle 1$, $\angle 2$

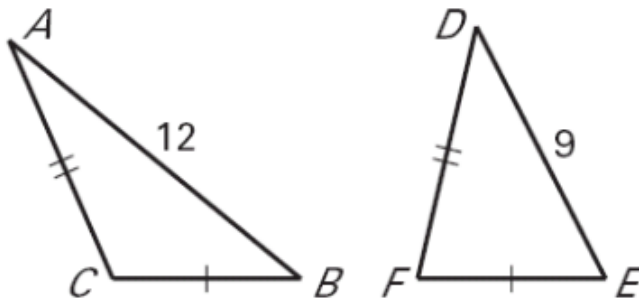


$$m\angle 1 > m\angle 2$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

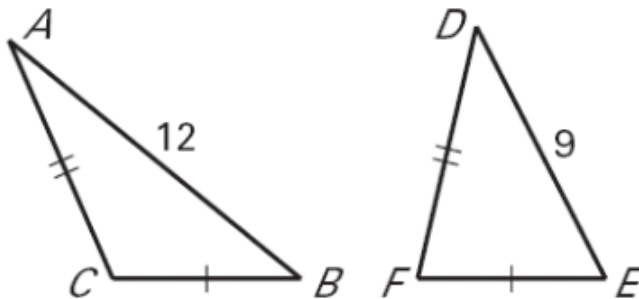
2. $\angle C$, $\angle F$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

2. $\angle C$, $\angle F$

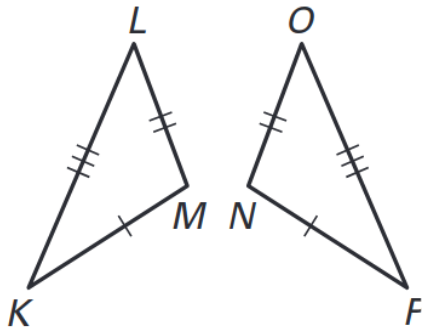


$$m\angle C > m\angle F$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

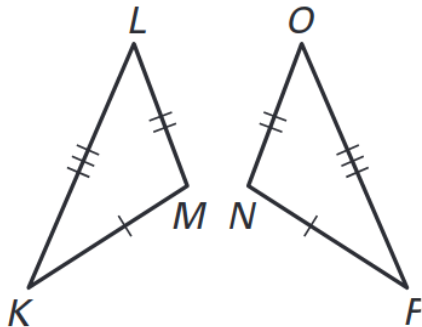
3. $\angle M$, $\angle N$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

3. $\angle M$, $\angle N$

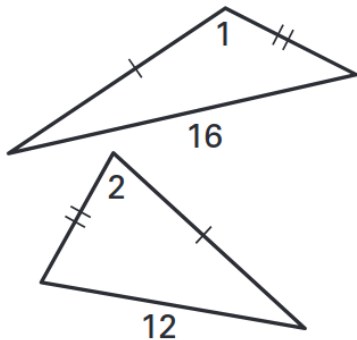


$$m\angle M = m\angle N$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

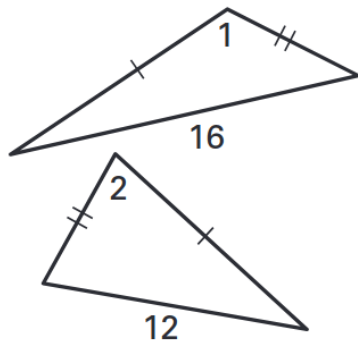
4. $\angle 1$, $\angle 2$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

4. $\angle 1$, $\angle 2$

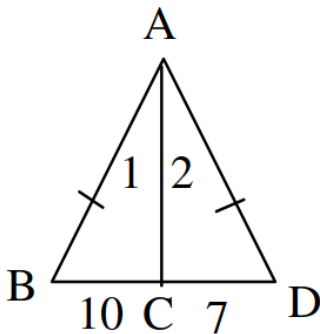


$$m\angle 1 > m\angle 2$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

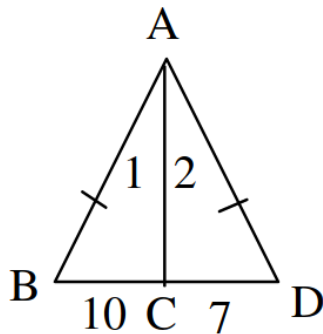
5. $\angle 1$, $\angle 2$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

5. $\angle 1$, $\angle 2$

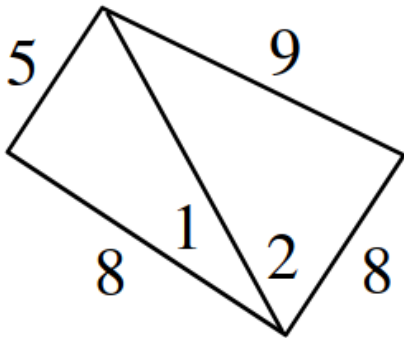


$$m\angle 1 > m\angle 2$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

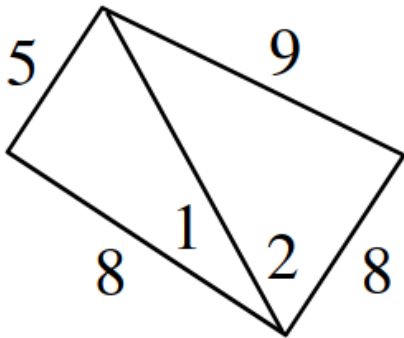
6. $\angle 1$, $\angle 2$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

6. $\angle 1, \angle 2$

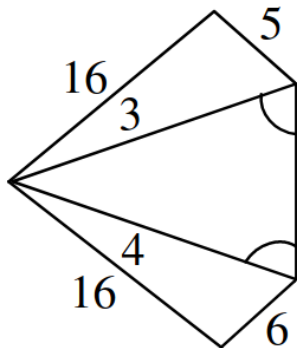


$$m\angle 1 < m\angle 2$$

Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

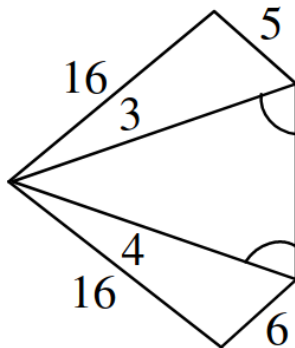
7. $\angle 3$, $\angle 4$



Example 2

Write $<$, $>$, or $=$ to relate the measures of the given pair of angles.

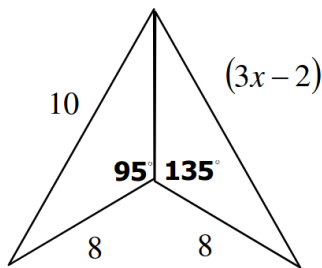
7. $\angle 3$, $\angle 4$



$$m\angle 3 < m\angle 4$$

Example 3

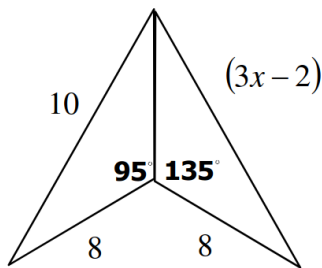
Write an inequality or pair of inequalities to describe the possible values of x .



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

1. $3x - 2 > 10$

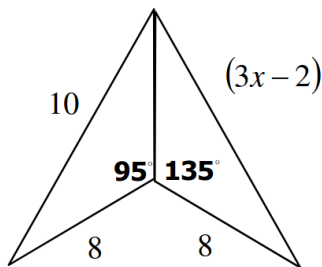


Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$1. 3x - 2 > 10$$

$$3x - 2 + 2 > 10 + 2$$



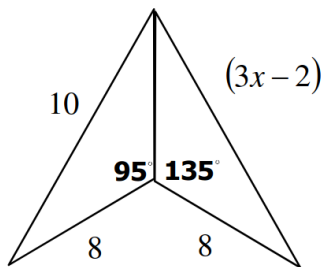
Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$1. \ 3x - 2 > 10$$

$$3x - 2 + 2 > 10 + 2$$

$$3x > 12$$



Example 3

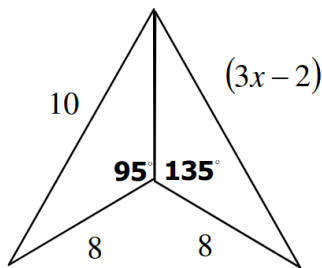
Write an inequality or pair of inequalities to describe the possible values of x .

$$1. 3x - 2 > 10$$

$$3x - 2 + 2 > 10 + 2$$

$$3x > 12$$

$$\frac{3x}{3} > \frac{12}{3}$$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

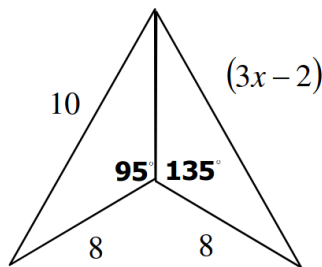
$$1. 3x - 2 > 10$$

$$3x - 2 + 2 > 10 + 2$$

$$3x > 12$$

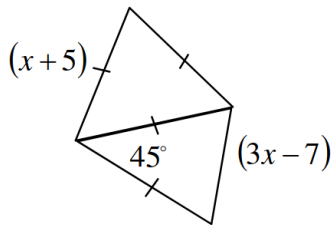
$$\frac{3x}{3} > \frac{12}{3}$$

$$x > 4$$



Example 3

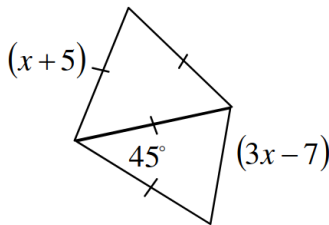
Write an inequality or pair of inequalities to describe the possible values of x .



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

2. $x + 5 > 3x - 7$

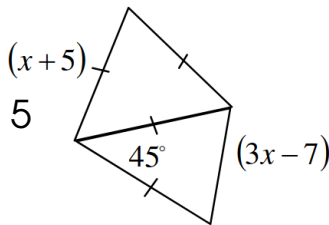


Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$2. \ x + 5 > 3x - 7$$

$$x - 3x + 5 - 5 > 3x - 3x - 7 - 5$$

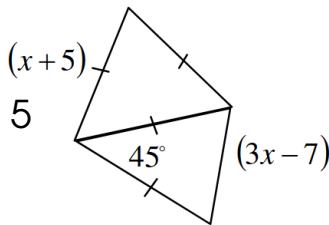


Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$2. \ x + 5 > 3x - 7$$

$$\begin{aligned} x - 3x + 5 - 5 &> 3x - 3x - 7 - 5 \\ -2x &> -12 \end{aligned}$$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

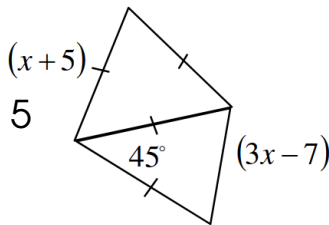
$$2. \ x + 5 > 3x - 7$$

$$x - 3x + 5 - 5 > 3x - 3x - 7 - 5$$

$$-2x > -12$$

$$-2x > -12$$

$$\frac{-2x}{-2} > \frac{-12}{-2}$$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

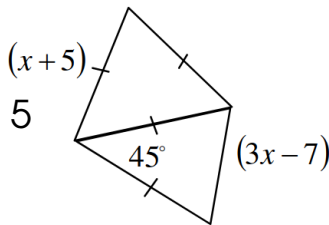
$$2. \ x + 5 > 3x - 7$$

$$x - 3x + 5 - 5 > 3x - 3x - 7 - 5$$

$$-2x > -12$$

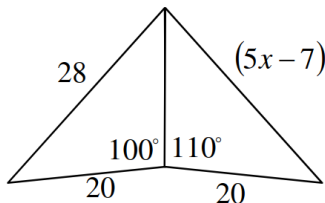
$$\frac{-2x}{-2} > \frac{-12}{-2}$$

$$x < 6$$



Example 3

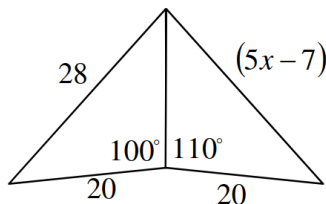
Write an inequality or pair of inequalities to describe the possible values of x .



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

3. $5x - 7 > 28$

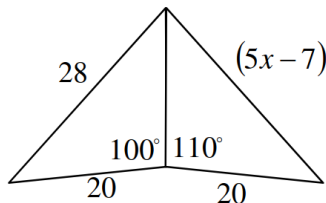


Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$3. \ 5x - 7 > 28$$

$$5x - 7 + 7 > 28 + 7$$



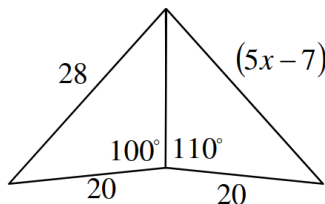
Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$3. \ 5x - 7 > 28$$

$$5x - 7 + 7 > 28 + 7$$

$$5x > 35$$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

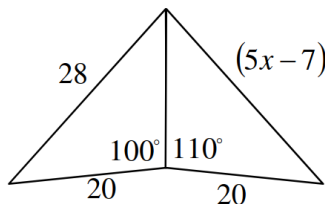
$$3. \ 5x - 7 > 28$$

$$5x - 7 + 7 > 28 + 7$$

$$5x > 35$$

$$5x > 35$$

$$\frac{5x}{5} > \frac{35}{5}$$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

$$3. \ 5x - 7 > 28$$

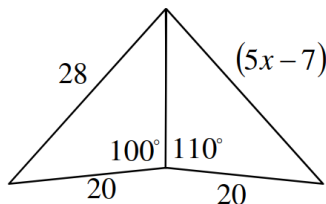
$$5x - 7 + 7 > 28 + 7$$

$$5x > 35$$

$$5x > 35$$

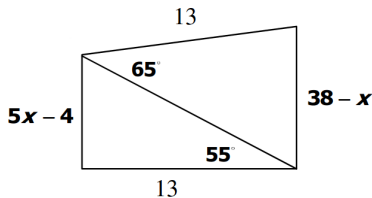
$$\frac{5x}{5} > \frac{35}{5}$$

$$x > 7$$



Example 3

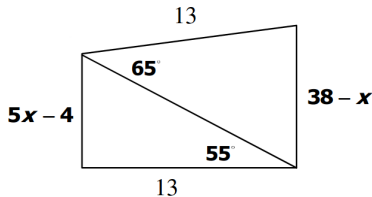
Write an inequality or pair of inequalities to describe the possible values of x .



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

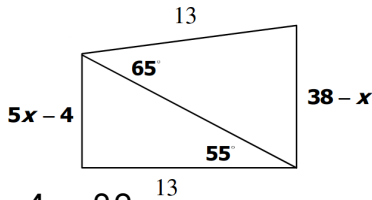
4. $38 - x > 5x - 4$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

4. $38 - x > 5x - 4$

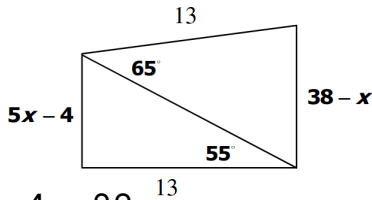


$38 - 38 - x - 5x > 5x - 5x - 4 - 38$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

4. $38 - x > 5x - 4$

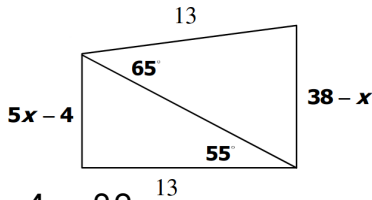


$$38 - 38 - x - 5x > 5x - 5x - 4 - 38$$
$$-6x > -42$$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

4. $38 - x > 5x - 4$



$$38 - 38 - x - 5x > 5x - 5x - 4 - 38$$

$$-6x > -42$$

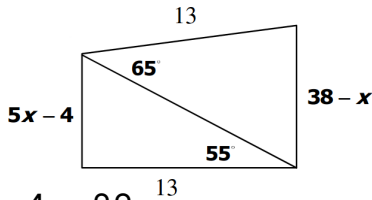
$$\frac{-6x}{-6} > \frac{-42}{-6}$$

$$x > 7$$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

4. $38 - x > 5x - 4$



$$38 - 38 - x - 5x > 5x - 5x - 4 - 38$$

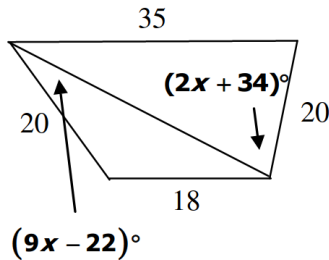
$$-6x > -42$$

$$\frac{-6x}{-6} > \frac{-42}{-6}$$

$$x < 7$$

Example 3

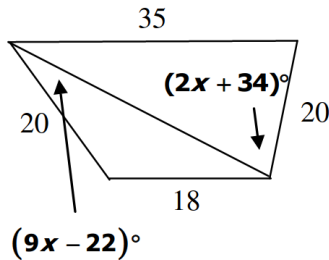
Write an inequality or pair of inequalities to describe the possible values of x .



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

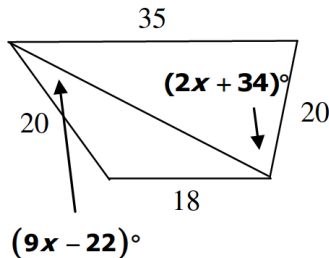
5. $2x + 34 > 9x - 22$



Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

5. $2x + 34 > 9x - 22$

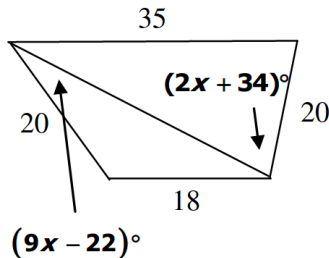


$$2x - 9x + 34 - 34 > 9x - 9x - 22 - 34$$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

5. $2x + 34 > 9x - 22$

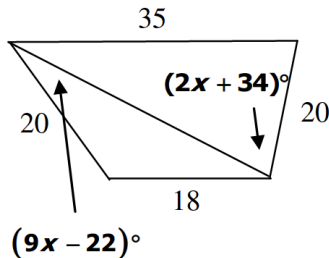


$$\begin{aligned} 2x - 9x + 34 - 34 &> 9x - 9x - 22 - 34 \\ -7x &> -56 \end{aligned}$$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .

5. $2x + 34 > 9x - 22$



$$2x - 9x + 34 - 34 > 9x - 9x - 22 - 34$$

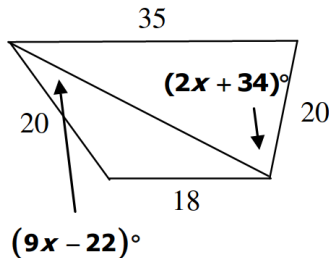
$$-7x > -56$$

$$\frac{-7x}{-7} > \frac{-56}{-7}$$

$$x > 8$$

Example 3

Write an inequality or pair of inequalities to describe the possible values of x .



$$5. 2x + 34 > 9x - 22$$

$$2x - 9x + 34 - 34 > 9x - 9x - 22 - 34$$

$$-7x > -56$$

$$\frac{-7x}{-7} > \frac{-56}{-7}$$

$$x < 8$$

$$x < 8$$

**Thank you for attending
the virtual class.**