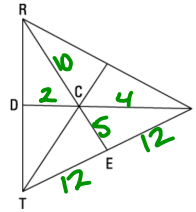## Warm-up

C is the centroid of triangle RST.
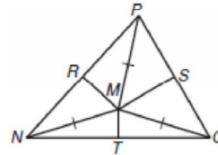
SE = 12, DC = 2, RC = 10

1. Find RE **15**
2. Find CE **5**
3. Find SC **4**
4. Find ST **24**
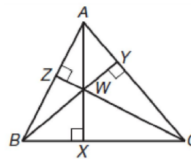
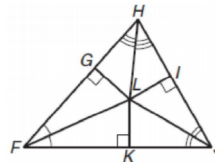5. What does point M represent?

   Circumcenter

6. What does point W represent?

   Orthocenter

7. What does point L represent?
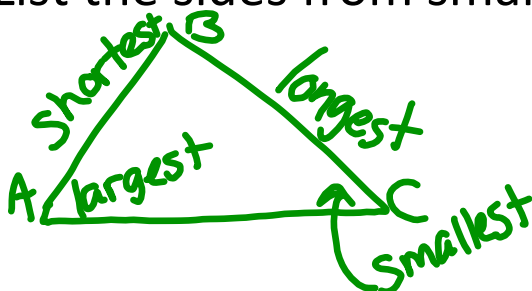
   Incenter

Relationship b/t side lengths and angle measurements:

In a triangle, the largest angle is opposite the longest side, and the smallest angle is opposite the shortest side.

___

In $\triangle ABC$, $m\angle A > m\angle B > m\angle C$

List the sides from smallest to largest

$\overline{AB}, \overline{AC}, \overline{BC}$

$AB < AC < BC$

<u>Triangle Inequality Theorem</u>
The sum of the measures of any 2 sides of a triangle is always GREATER THAN the third

_____

Can the following sets of segment lengths represent the sides of a triangle?

a) 5, 5, 5
Yes, $5 + 5 = 10$

b) 10, 16, 4
No, $4 + 10 < 16$

c) 30, 100, 90
Yes, $30 + 90 > 100$
$100 + 90 > 30$
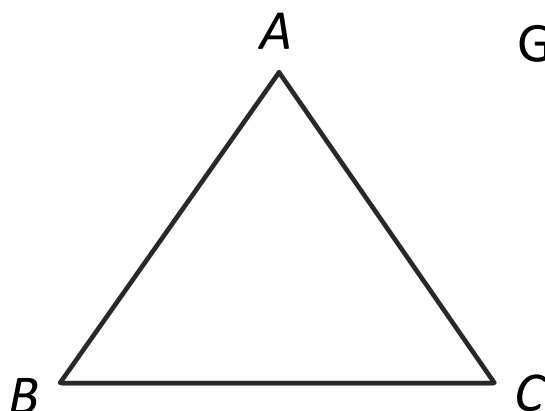$100 + 30 > 90$

d) 11, 5, 16
No, $11 + 5 = 16$

Find the possible lengths of the third side of the triangle

a) 6, 10, ? $4 < x < 16$

b) 12, 9, ? $3 < x < 21$

Find the restrictions on x

A

Given: $m\angle B = (6x - 45)^\circ$
$m\angle C = (15 + x)^\circ$
$AC > AB$

B   C

$6x - 45 + 15 + x < 180$
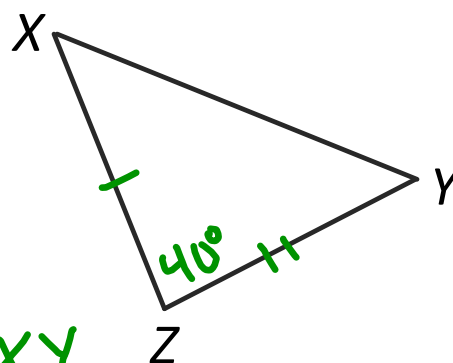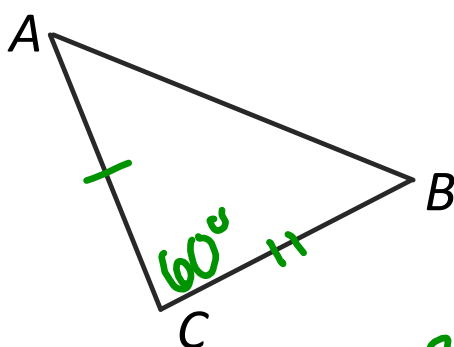$7x - 30 < 180$
$7x < 210$
$x < 30$

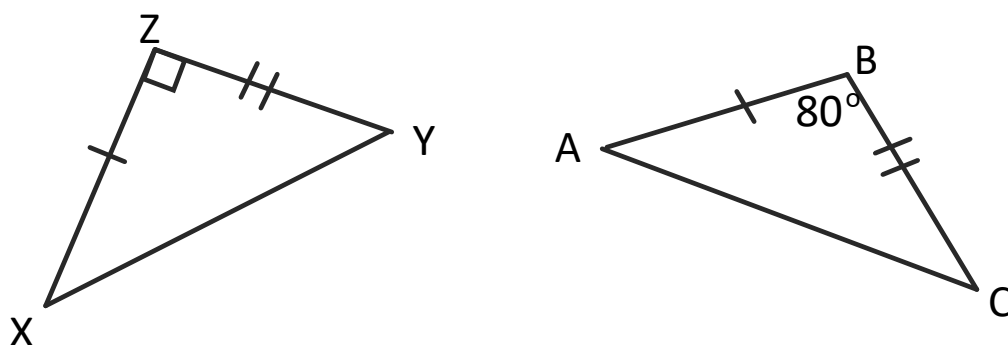$6x - 45 > 15 + x$
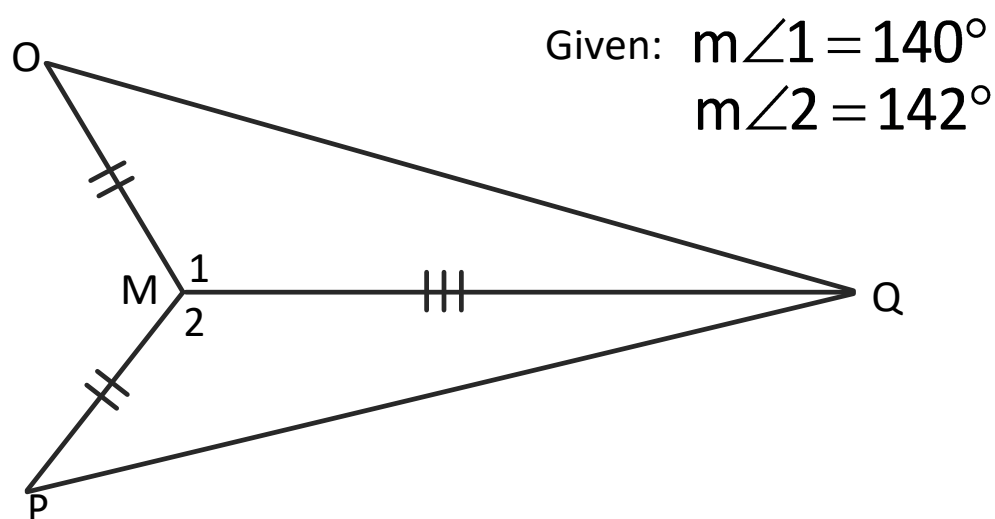$5x > 60$
$x > 12$

$12 < x < 30$

Hinge Theorem

If 2 sides of one triangle are congruent to 2 sides of another triangle, and the included angle of one is larger than the included angle of the other, then the third side of the first is larger

A   B

X   Y

60° 40°

C   Z

$AB > XY$

Z

Y

A

B

80°

C

X

$$XY \quad \underline{\quad > \quad} \quad AC$$

O

Given: $m\angle 1 = 140°$
$m\angle 2 = 142°$

M 1
   2

Q

P

$$OQ \quad \underline{\quad < \quad} \quad PQ$$