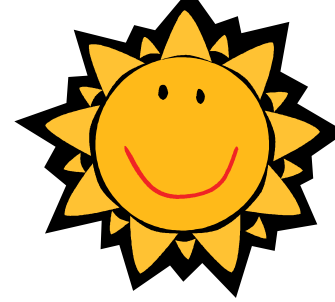


Unit 1 Day 10

Midsegments of Triangles
& Isosceles and Equilateral Triangles

Warm Up



1. Simplify

$$(x - 7)(x + 4)$$

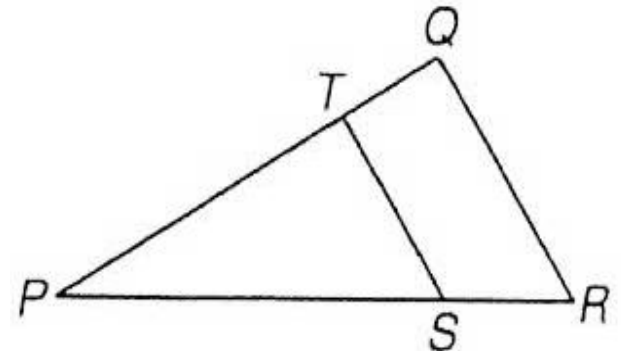
2. Solve for x.

$$\frac{x}{x+5} = \frac{x+3}{x+13}$$

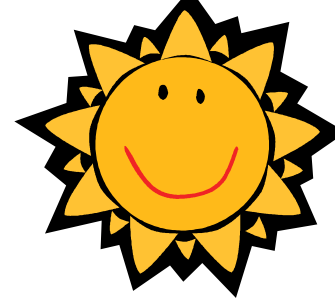
3. Given a triangle with vertices A (2,5), B (3,6) and C (1,6), use the distance formula to decide whether triangle ABC is scalene, isosceles, or equilateral. Show ALL work!!

$$d^2 = (\text{change in } x)^2 + (\text{change in } y)^2$$

4. Given $\overline{TS} \parallel \overline{QR}$, explain why the triangles are similar and write a similarity statement. Then use $TS = 6$, $PS = x + 7$, $QR = 8$, and $SR = x - 1$, to find PS and PR.



Warm Up ANSWERS



1. Simplify

$$(x - 7)(x + 4)$$

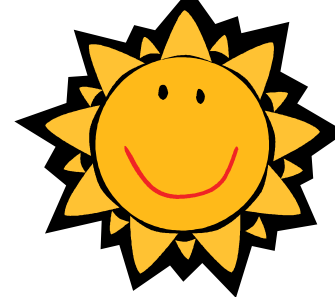
$$x^2 - 3x - 28$$

2. Solve for x.

$$\frac{x}{x+5} = \frac{x+3}{x+13}$$

$x = 3$ (cross multiply and distribute - remember FOIL)

Warm Up ANSWERS



3. Given a triangle with vertices A (2,5), B (3,6) and C (1,6), use the distance formula to decide whether triangle ABC is scalene, isosceles, or equilateral. Show ALL work!!

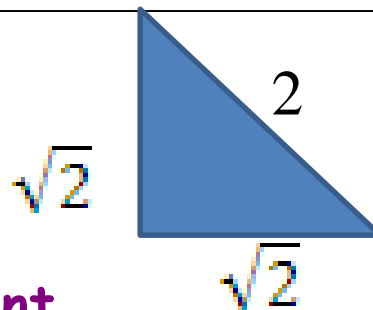
$$\sqrt{(1 - 3)^2 + (6 - 6)^2} = 2$$

$$\sqrt{(3 - 2)^2 + (6 - 5)^2} = \sqrt{2}$$

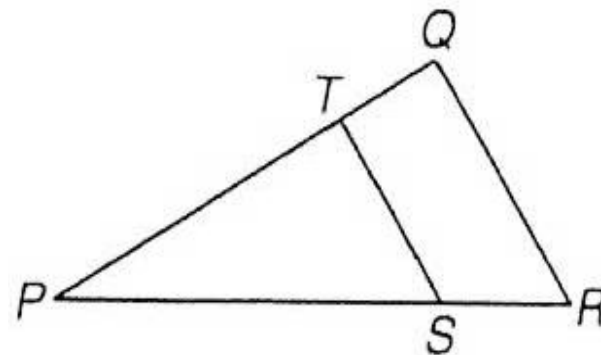
$$\sqrt{(1 - 2)^2 + (6 - 5)^2} = \sqrt{2}$$

Isosceles because 2 sides are congruent

$$d^2 = (\text{change in } x)^2 + (\text{change in } y)^2$$



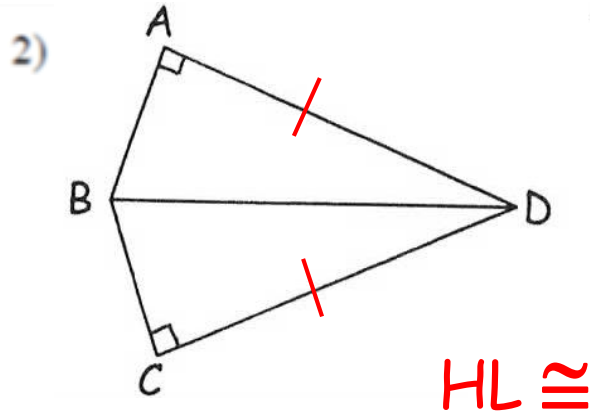
4. Given $\overline{TS} \parallel \overline{QR}$, explain why the triangles are similar and write a similarity statement. Then use $TS = 6$, $PS = x + 7$, $QR = 8$, and $SR = x - 1$, to find PS and PR .



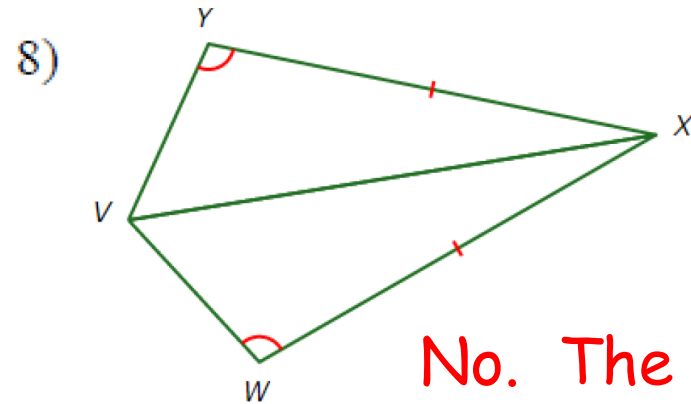
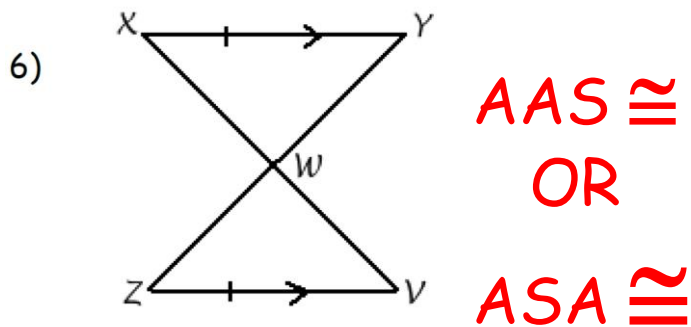
$\Delta TSP \sim \Delta QRP$ by $AA\sim$, $PS = 12$, $PR = 16$

****Remember to do full side : full side = full side : full side**

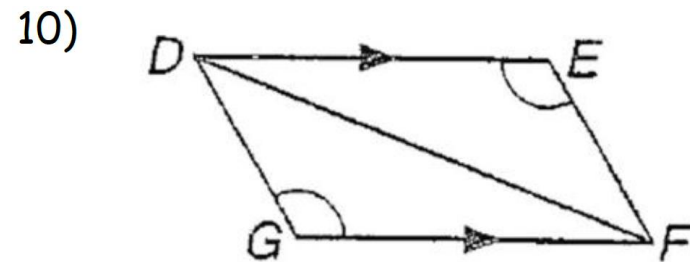
Day 9 Homework Answers



NO. The angles are not corresponding.

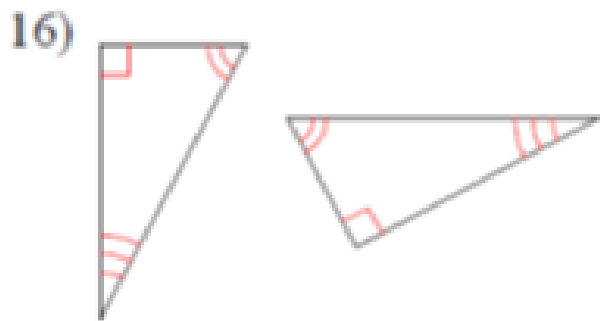
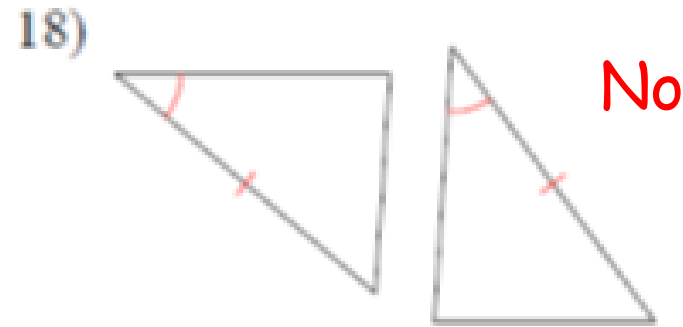
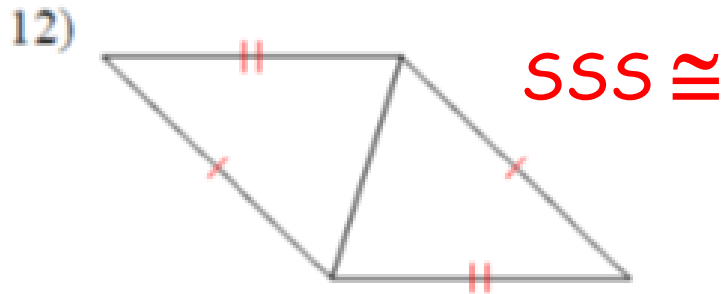


No. The angle is nonincluded.

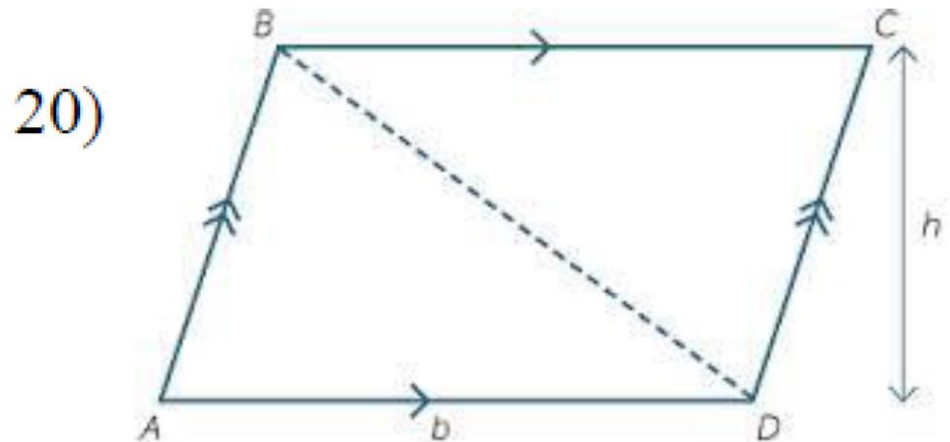


$AAS \cong$ Be careful! The arrows mark parallel sides (not congruent ones)

Day 9 Homework Answers



No. You must have ≥ 1 pair of sides \cong .

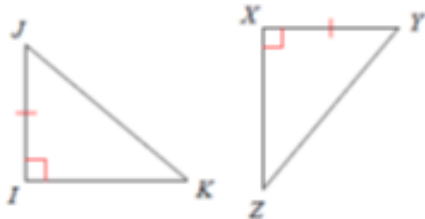


$ASA \cong$ Be careful! The arrows mark parallel sides (not congruent ones)

Day 9 Homework Answers

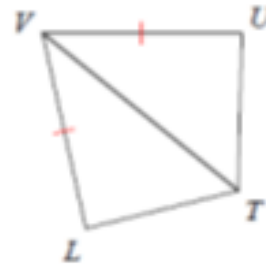
State what additional information is required in order to know that the triangles are congruent for the reason given.

22) SAS



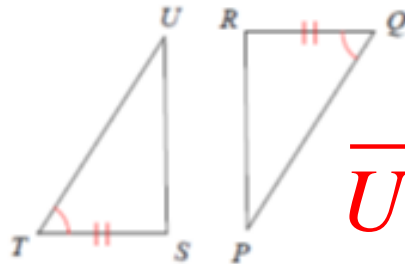
$$\overline{IK} \cong \overline{XZ}$$

28) SSS



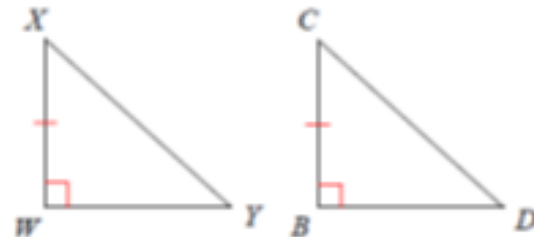
$$\overline{UT} \cong \overline{LT}$$

24) SAS



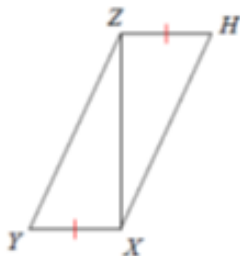
$$\overline{UT} \cong \overline{QP}$$

30) SAS



$$\overline{WY} \cong \overline{BD}$$

26) SSS



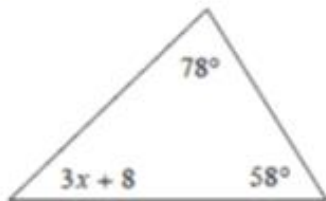
$$\overline{ZY} \cong \overline{HX}$$

Day 9 Homework Answers

Solve for x .

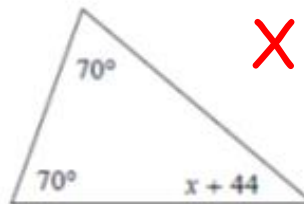
21)

$$x = 12$$



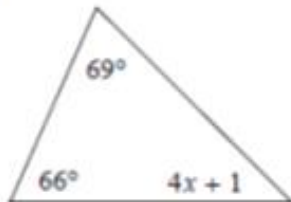
22)

$$x = -4$$



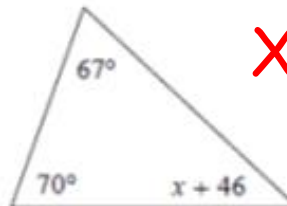
23)

$$x = 11$$



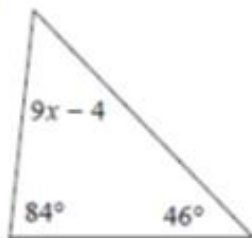
24)

$$x = -3$$



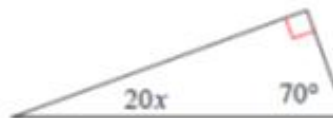
25)

$$x = 6$$



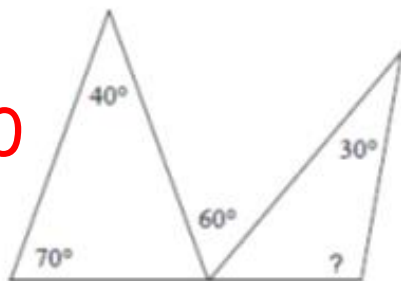
26)

$$x = 1$$



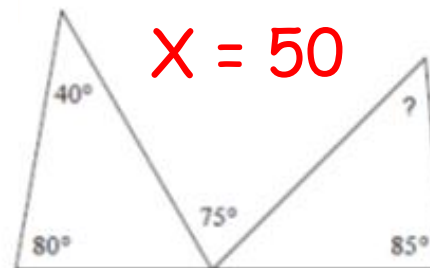
27)

$$x = 100$$



28)

$$x = 50$$



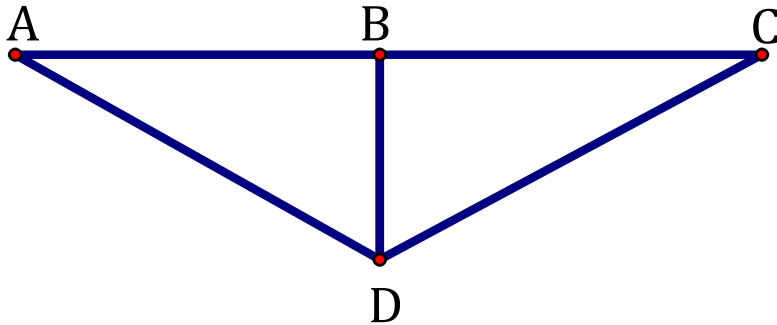
Day 9 Homework Answers

29) Find the values of x and y given

$\angle ABD \cong \angle CBD$, B is midpoint of \overline{AC} ,

$$m\angle A = x + 5y + 72, m\angle DBC = 120 + 8x - 3y,$$

$$m\angle C = 76 - x, \text{ and } m\angle BDC = 11.$$



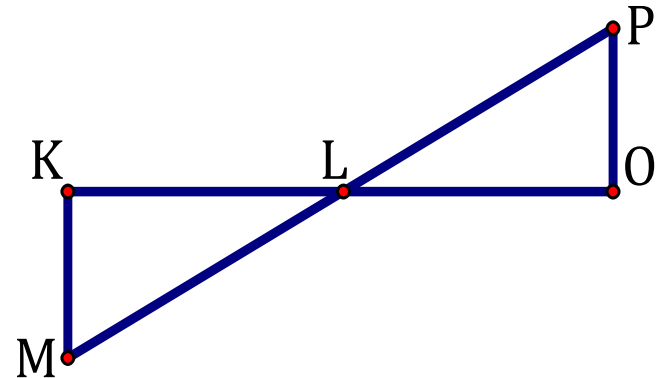
$$x = -3$$

$$y = 2$$

30) Solve given L is the midpoint of

\overline{KO} and \overline{MP} , $ML = 14x + 2y$, $KL = x - 5y$,

$LP = 10$, and $LO = 11$. $x = 1$ $y = -2$



Tonight's Homework

- **Packet p. 31-32 Even**
- **Packet p. 33-34 Odd**
- **STUDY FOR QUIZ TOMORROW!!**





Notes: Midsegments and Isosceles Triangles

Isosceles and Equilateral Triangles

Isosceles triangles are commonly found in the real world in buildings and bridges.

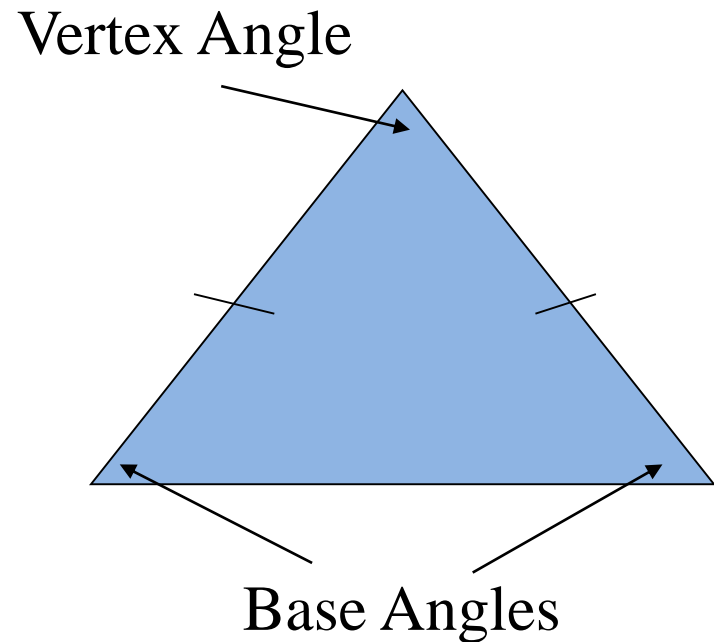
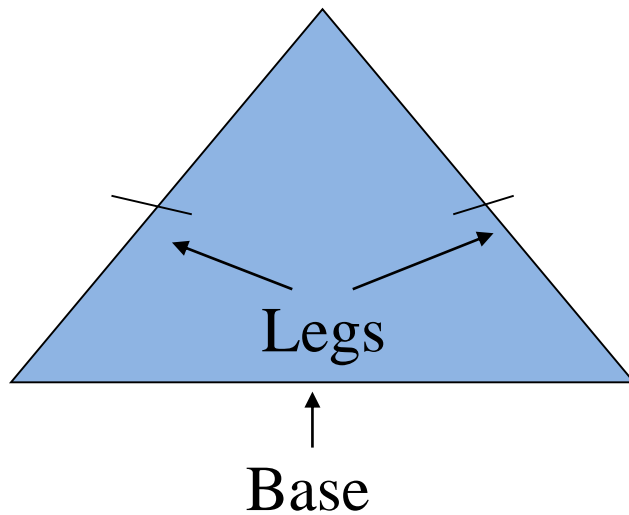


The congruent sides of an isosceles triangle are its **legs**.

The third side is the **base**.

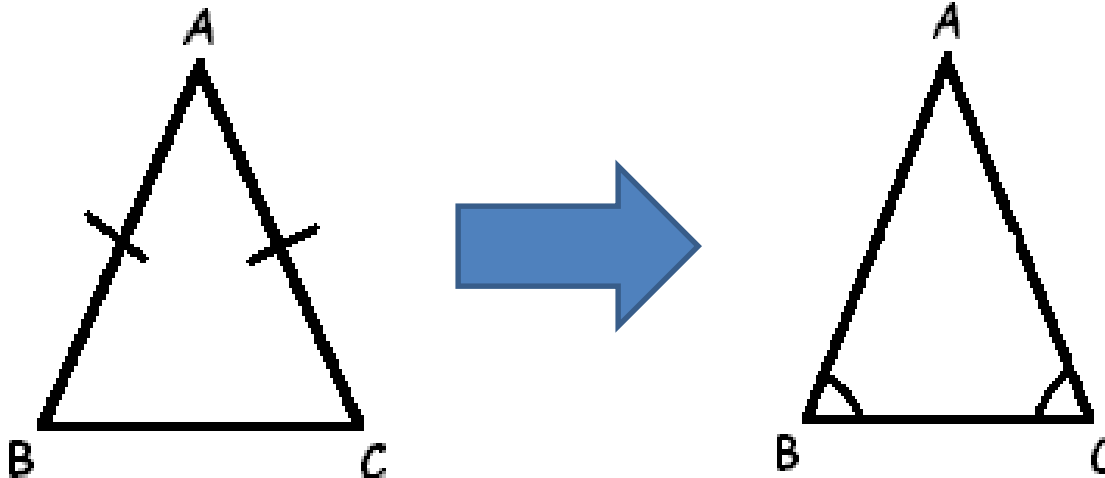
The two congruent sides form the **vertex angle**.

The other two angles are the **base angles**.



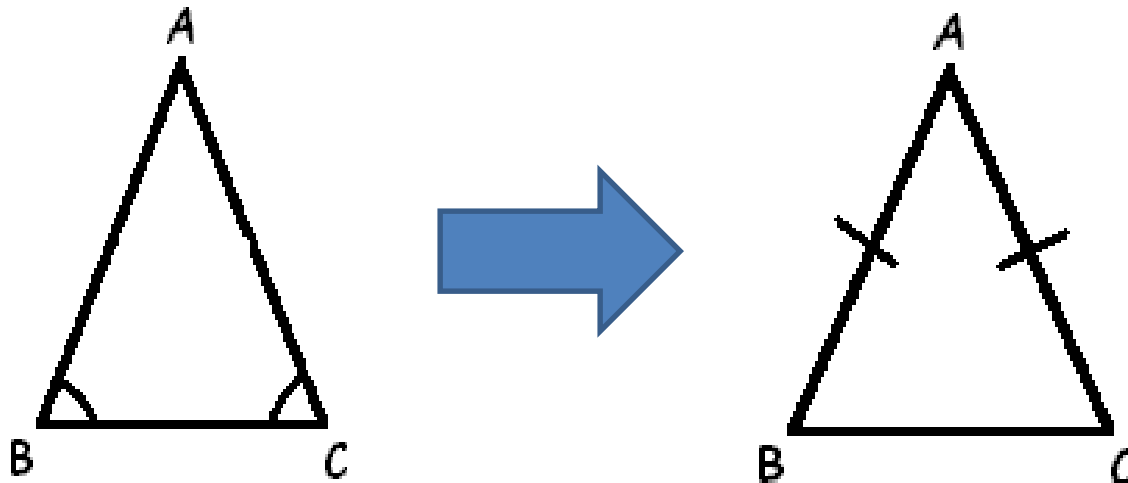
Isosceles Triangle Theorem

- If two sides of a triangle are congruent, then the angles opposite those sides are congruent.
- Ex. If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$.



Converse of the Isosceles Triangle Theorem

- If two angles of a triangle are congruent, then the sides opposite those angles are congruent.
- Ex. If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$.



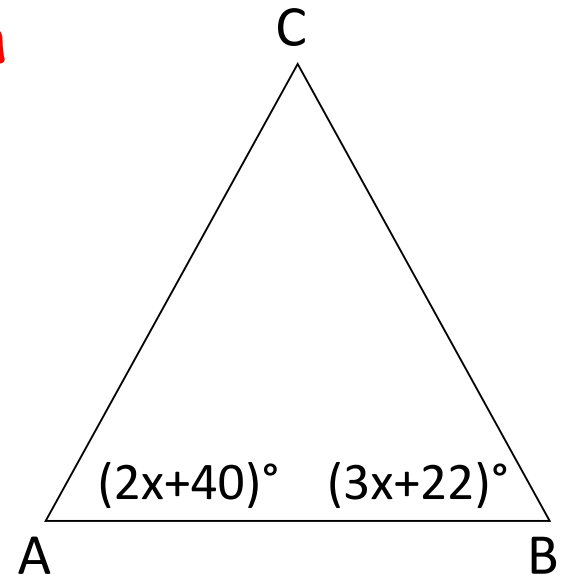
Example: Triangle ABC is isosceles with vertex C. What is the value of x? What is the measure of each angle?

Since triangle ABC is isosceles with vertex C, its' base angles, Angle A and Angle B, are congruent.

$$\begin{aligned}2x + 40 &= 3x + 22 \\18 &= x\end{aligned}$$

$$\begin{aligned}m\angle A &= 2x + 40 = 2(18) + 40 \\&= 76\end{aligned}$$

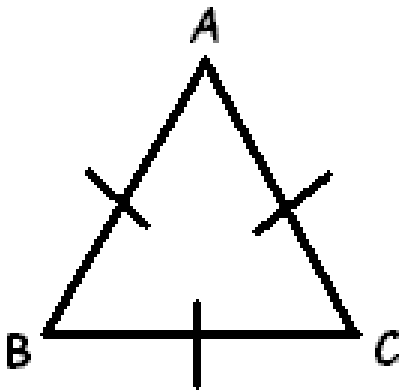
$$\begin{aligned}m\angle B &= 3x + 22 = 3(18) + 22 \\&= 76\end{aligned}$$



Corollary to Isosceles Triangle Theorem:

If a triangle is equilateral, then the triangle is equiangular.

Ex. If $\overline{AB} \cong \overline{BC} \cong \overline{CA}$, then
 $\underline{\text{Angle A} \cong \text{Angle B} \cong \text{Angle C}}$.



Example: Given triangle ABC, what is the measure of angle A?

60°

How would you define the **midpoint** of a segment?

A midpoint is a point that divides a segment into two congruent segments.

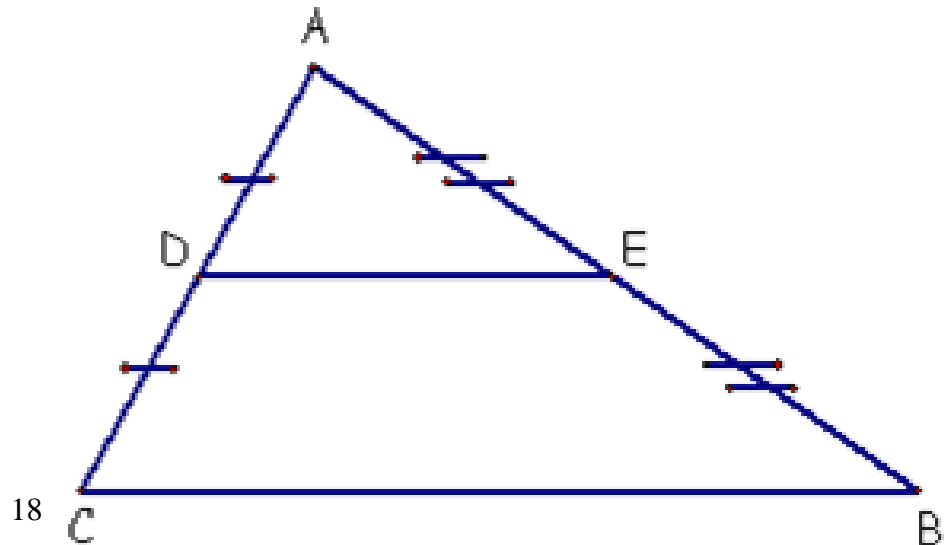
Midsegment of a triangle (the triangle doesn't have to be isosceles or equilateral):

A midsegment of a triangle is a segment connecting the midpoints of 2 sides. It measures **half** the length of the other side and is **parallel** to the other side.

\overline{DE} is a midsegment of $\triangle ABC$

$$DE = \frac{1}{2} CB$$

and $\overline{DE} \parallel \overline{CB}$



Example 1: In triangle ABC , M , J , and K are midpoints

$$AB = \underline{30}$$

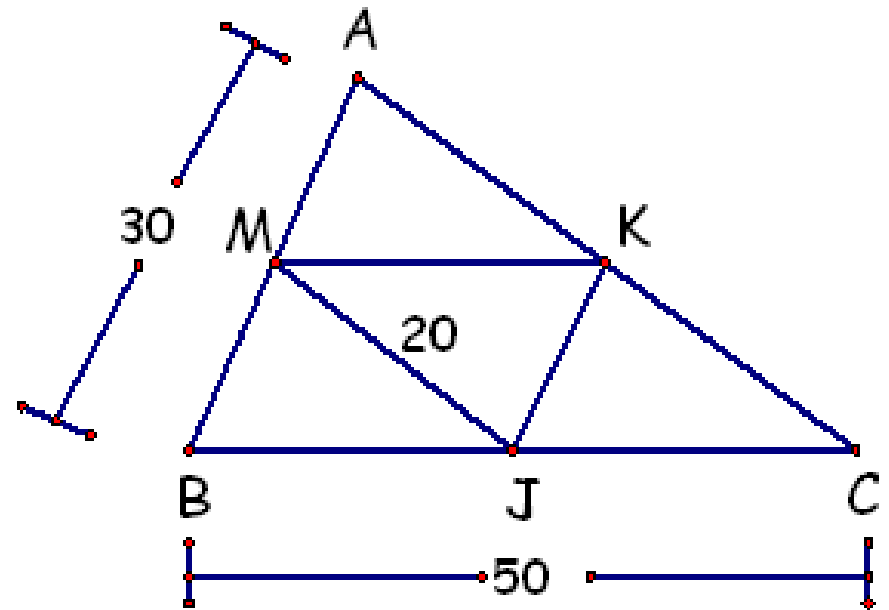
$$KJ = \underline{15}$$

$$BC = \underline{50}$$

$$MK = \underline{25}$$

$$AC = \underline{40}$$

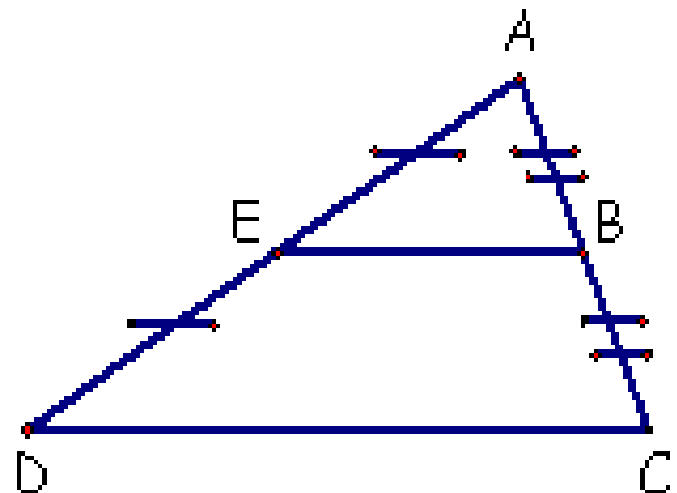
$$MJ = \underline{20}$$



Example 2: $AB = 10$, $CD = 18$

$$BC = \underline{10}$$

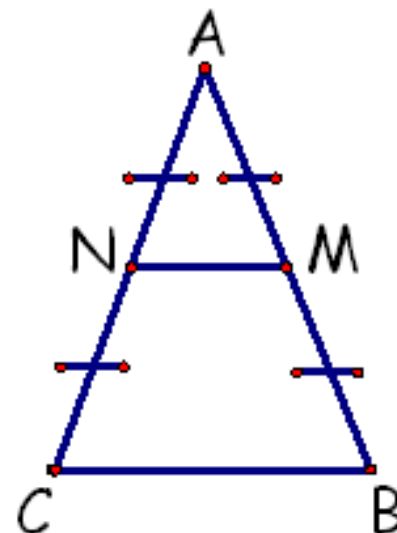
$$EB = \underline{9}$$



Example 3: Given $m\angle A = 42^\circ$,

Find $m\angle AMN =$ 69

$m\angle ANM =$ 69

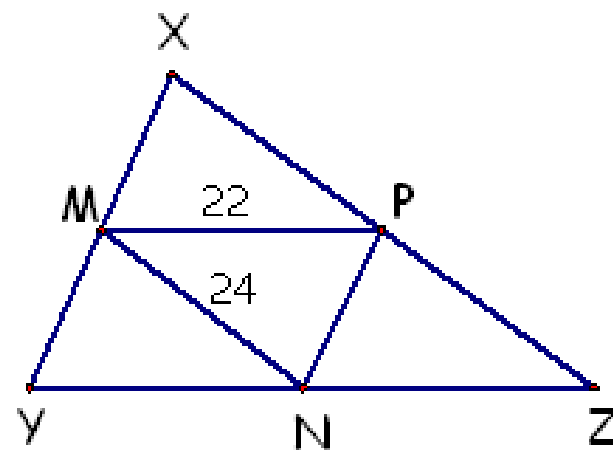


Example 4: In $\triangle XYZ$, M, N, and P are midpoints.

The perimeter of $\triangle MNP$ is 60. Find XY and YZ .

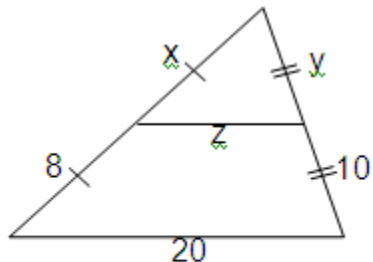
$XY = 28$

$YZ = 44$

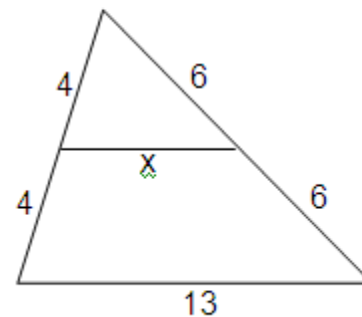


Practice...Directions: Find the values of the variables. You must show all work to receive full credit. Figures are not drawn to scale.

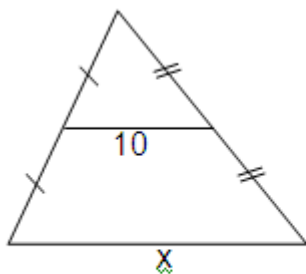
1. $x = \underline{8}$ $y = \underline{10}$ $z = \underline{10}$



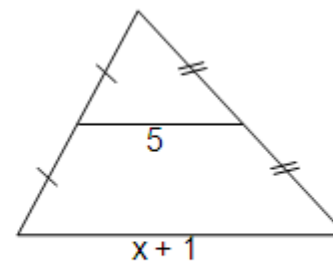
2. $x = \underline{6.5}$



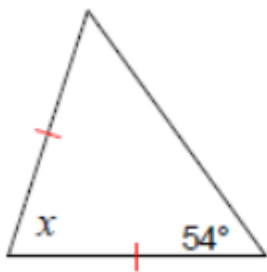
3. $x = \underline{20}$



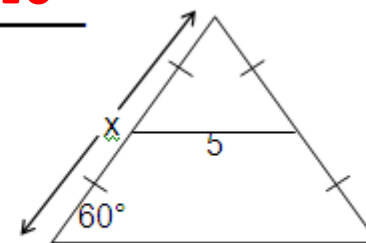
4. $x = \underline{9}$



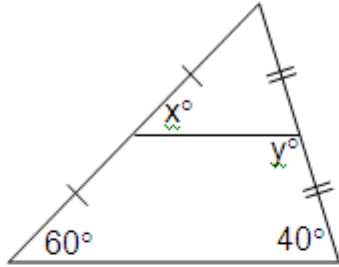
5. $x = \underline{72}$



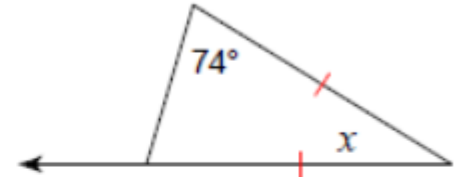
6. $x = \underline{10}$



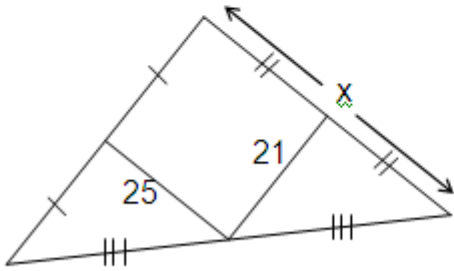
7. $x = \underline{60}$ $y = \underline{140}$



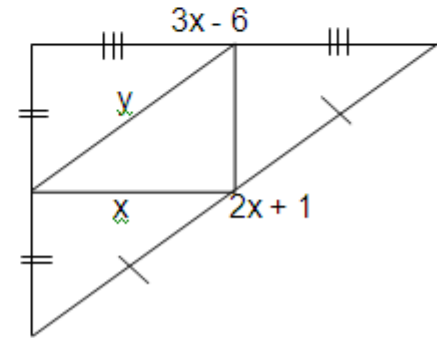
8. $x = \underline{32}$



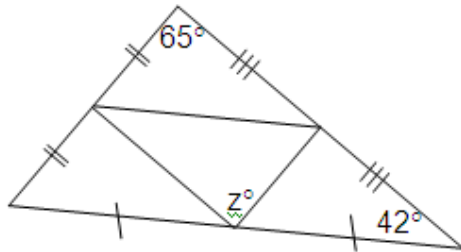
9. $x = \underline{50}$



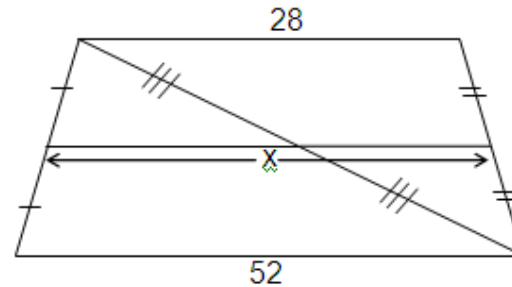
10. $x = \underline{6}$ $y = \underline{6.5}$



11. $z = \underline{65}$

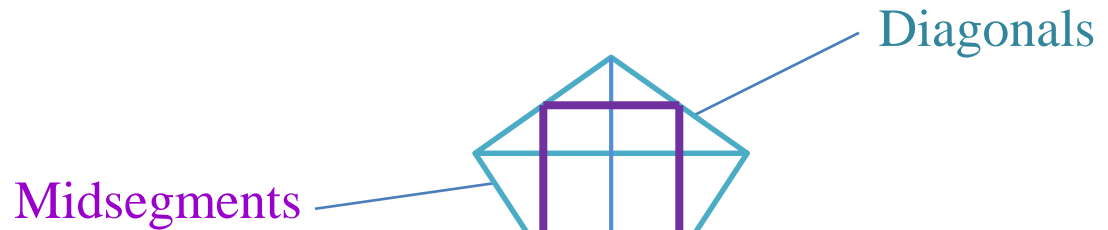


12. $x = \underline{40}$



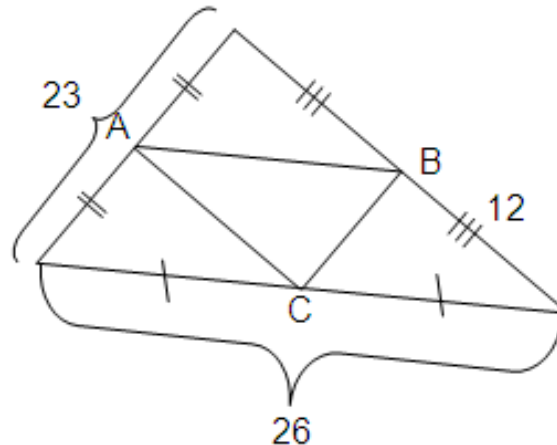
13. Sadie is designing a kite. The diagonals measure 28 in and 48 in. She wants to decorate the mid-segments of the triangles formed by the diagonals with purple ribbon. How much ribbon must she purchase? Draw a picture! (Hint: Do you remember which sides are congruent on a kite?)

76 in.



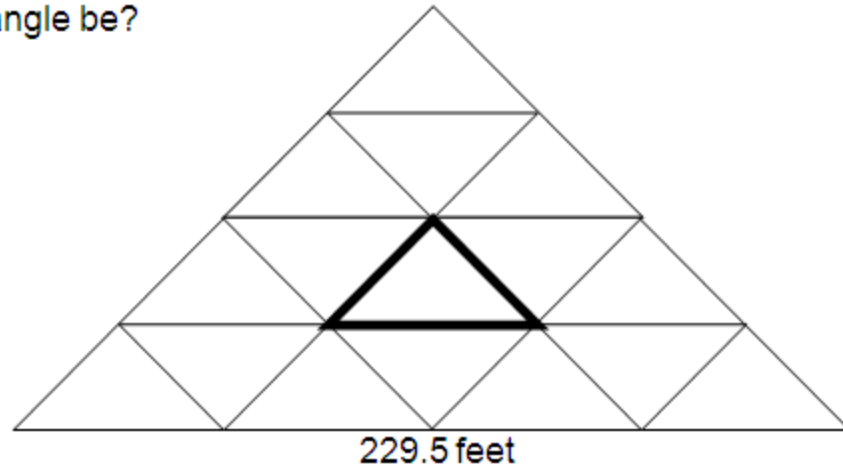
14. Find the perimeter of $\triangle ABC$.

36.5



15. One side of the Rock and Roll Hall of Fame is an isosceles triangle made up of smaller triangles based on mid-segments. The length of the base of the building is 229.5 feet. What would the base of the bold triangle be?

57.375 ft.



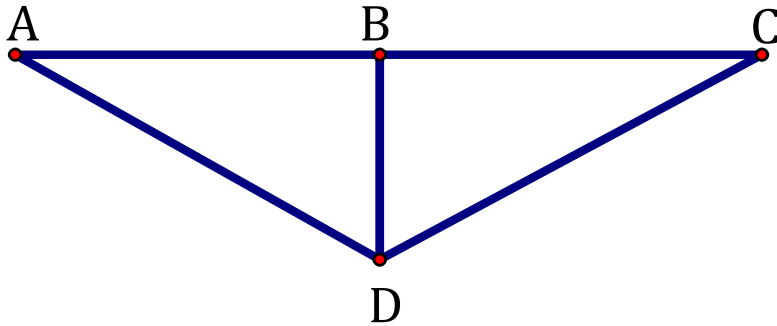
A couple we may want to discuss from the Day 9 HW, if we haven't yet!

29) Find the values of x and y given

$\angle ABD \cong \angle CBD$, B is midpoint of \overline{AC} ,

$$m\angle A = x + 5y + 72, m\angle DBC = 120 + 8x - 3y,$$

$$m\angle C = 76 - x, \text{ and } m\angle BDC = 11.$$



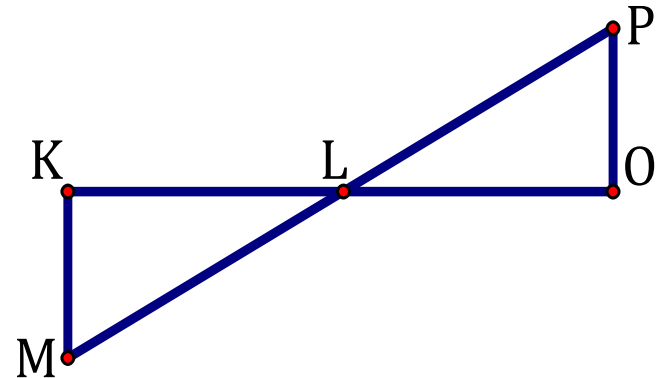
$$x = -3$$

$$y = 2$$

30) Solve given L is the midpoint of

\overline{KO} and \overline{MP} , $ML = 14x + 2y$, $KL = x - 5y$,

$$LP = 10, \text{ and } LO = 11. \quad x = 1 \quad y = -2$$



Homework

- **Packet p. 31-32 Even**
- **Packet p. 33-34 Odd**
- **STUDY FOR QUIZ TOMORROW!!**

