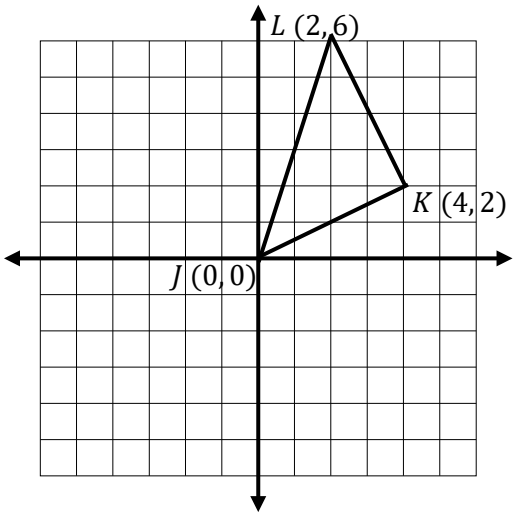
Math 2 Unit 4 Worksheet 1A **Name:**_____
Midsegments of Triangles **Date:**_____ **Per:**_____

Theorem: The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.

[1-2] Prove the midsegment triangle theorem using coordinate geometry.

1. Using ΔJKL answer the following questions.



   a. Find the coordinate of the midpoint of $\overline{JL}$. Label it point M.
   ***Midpoint formula** $\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

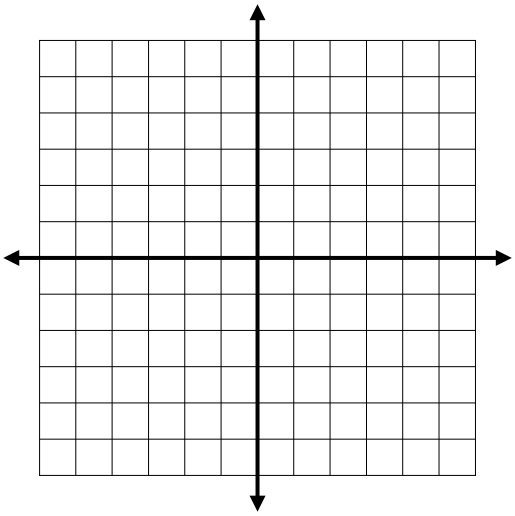
   b. Find the coordinate of the midpoint of $\overline{JK}$. Label it point N.

   c. Find the slopes of $\overline{MN}$ and $\overline{LK}$ using the slope formula $\frac{y_2-y_1}{x_2-x_1}$. Justify mathematically why they are parallel.

   d. Using the distance formula, $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ find the length of $\overline{MN}$ and the length of $\overline{LK}$.

   e. The length of $\overline{MN}$ is _____ the length of $\overline{LK}$. From your work in part d, **explain** mathematically why this is true.

2. The coordinates of the vertices of a triangle are:
   $A\,(-2,3)$ $B\,(6,1)$ $C\,(4,5)$
   Plot and label the points on the graph.



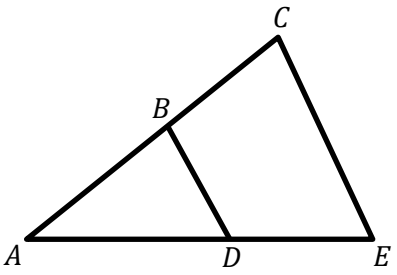
   a. Find the coordinate of the midpoint of $\overline{AC}$. Label it point D.

   b. Find the coordinate of the midpoint of $\overline{CB}$. Label it point E.

   c. Mathematically show that $\overline{DE}$ is parallel to $\overline{AB}$.

   d. Mathematically show that the length of $\overline{DE}$ is half the length of $\overline{AB}$.

3. B is the midpoint of $\overline{AC}$, D is the midpoint of $\overline{AE}$.
   $m\angle ADB = 70^{\circ},\ m\angle C = 60^{\circ}, BD = 12$



   a. Find CE

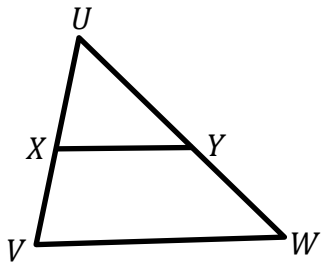
   b. Find $m\angle E$

   c. Find $m\angle ABD$

   d. Find $m\angle A$

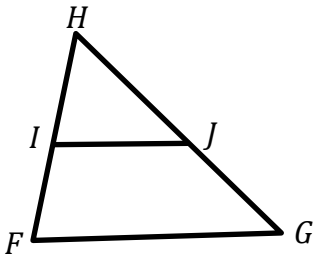
Math 2 Unit 4 Worksheet 1B **Name:**_____
Midsegments of Triangles **Date:**_____ **Per:**_____

[1-4] Use the diagram. X is the midpoint of UV. Y is the midpoint of UW.



1. If $m\angle UXY = 60°$, find $m\angle V$
2. If $m\angle W = 45°$, find $m\angle UYX$
3. If $XY = 50$, find VW
4. If $VW = 110$, find XY

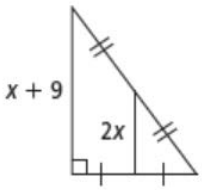
[5-6] Use the diagram. $\overline{IJ}$ is a midsegment of ΔFGH. $IJ = 7$, $FH = 10$, and $GH = 13$. Find the perimeter of each triangle.



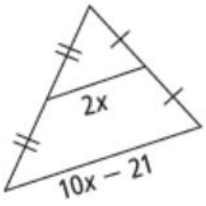
5. ΔIJH
6. ΔFGH

[7-9] Find the value of the x.

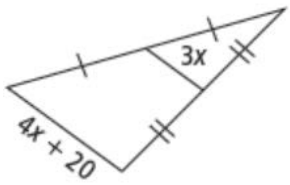
7. $x =$ ____



8. $x =$ ____

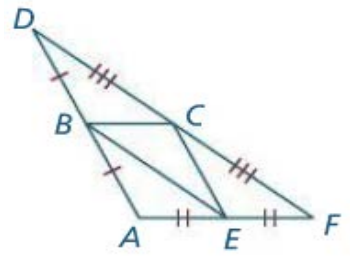


9. $x =$ ____

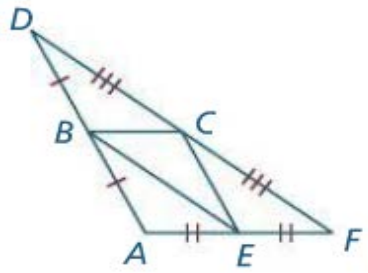


[10-12] Use the given diagram to solve.

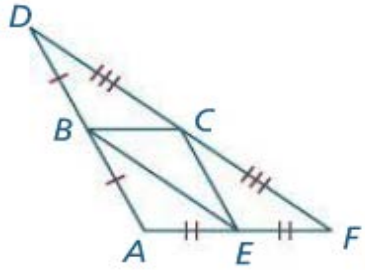
10. If $DF = 24$, $BC = 6$, and $DB = 8$, find the perimeter of ΔADF.



11. If $BE = 2x + 6$ and $DF = 5x + 9$, find DF.

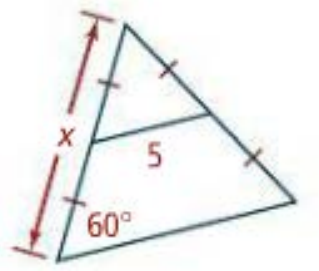


12. If $EC = 3x - 1$ and $AD = 5x + 7$, find EC.

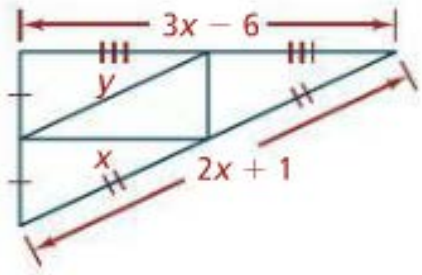


[13-14] Find the value of the variable(s).

13. $x =$ ____

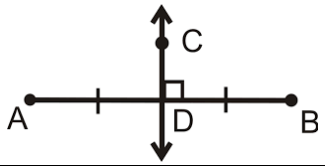
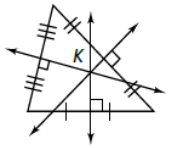


14. $x =$ ____ $y =$ ____



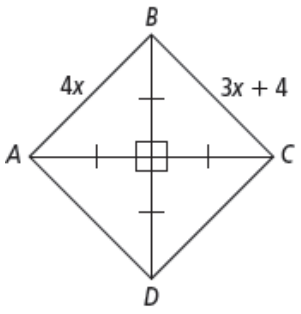
Math 2 Unit 4 Worksheet 2 **Name:**_____
Perpendicular Bisectors **Date:**_____ **Per:**_____

[1-5] Complete the below chart.

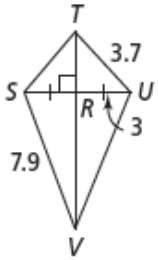
1.		$\overline{CD}$ is a _____ of $\overline{AB}$
2.		Point K is the _____ of the triangle.
3.	Distance Formula	
4.	Midpoint Formula	
5.	Slope Formula	

6. When 3 lines meet all in one point they are called _____. The point where they meet is called the point of _____.
7. Every point on the _____ of a segment is equidistant from the _____ of that segment.

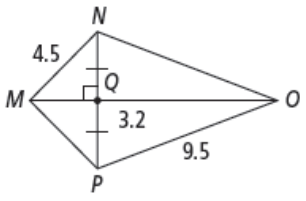
[8-11] Use the figure to the right to answer the set of questions.



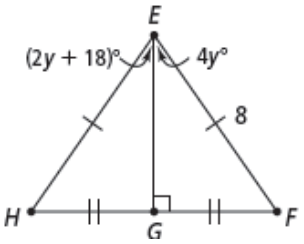
8. a) What is the relationship between $\overline{AC}$ and $\overline{BD}$?
   b) What is the value of x?
   c) Find AB.
   d) Find BC.
9. a) From the information given in the figure, how is $\overline{TV}$ related to $\overline{SU}$?
   b) Find TS.
   c) Find UV.
   d) Find SU.



10. a) $\overline{MO}$ is the perpendicular bisector of _____
    b) Find MP.
    c) Find NO.
    d) Find NP.



11. a) _____ is the perpendicular bisector of segment _____



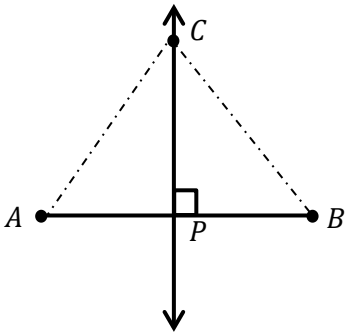
b) What are the lengths of $\overline{EF}$ and $\overline{EH}$?

c) Find the value of y.

d) Find $m\angle GEH$ and $m\angle GEF$.

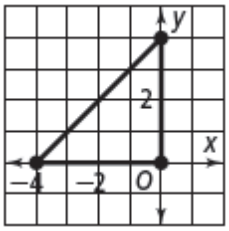
12. Make a two-column proof.

Given: $\overleftrightarrow{CP}$ is a $\perp$ bisector of $\overline{AB}$.
Prove: $\overline{AC} \cong \overline{BC}$

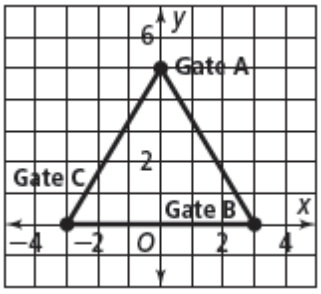


Statement	Reason

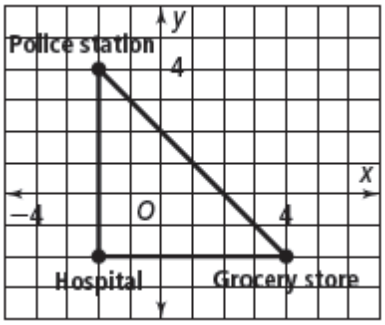
13. Find the circumcenter of the triangle.



14. Where should the farmer place the hay bale so that it is equidistant from the three gates?



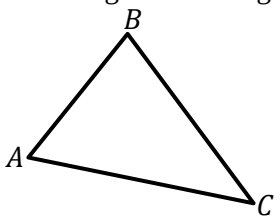
15. Where should the fire station be placed so that it is Equidistant from the grocery store, the hospital, and the police station?



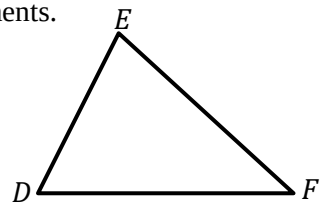
Math 2 Unit 4 Worksheet 3
Angle Bisectors

Name:_____
Date:_____ **Per:**_____

1. a) Draw the angle bisector of $\angle A$.
   b) Mark the diagram showing congruent angles.



2. a) Draw the perpendicular bisector of $\overline{DF}$.
   b) Mark your diagram showing right angles and congruent segments.

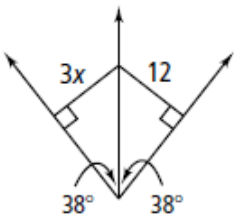


3. If a point is on the _____ of an angle,

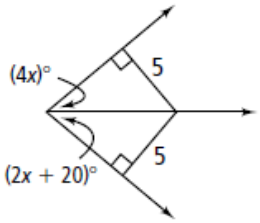
   then the point is _____ from the side of the angle.

[4-5] Find the value of x.

4. $x =$ _____

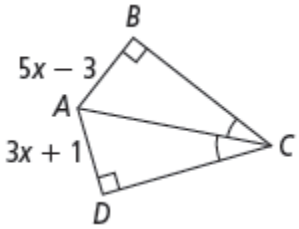


5. $x =$ _____

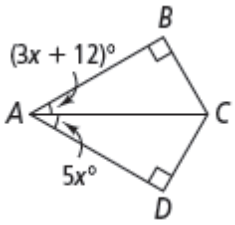


[6-7] Find the indicated values of the variables and measures.

6. $x =$ _____
   $BA =$ _____
   $DA =$_____



7. $x =$ _____
   $\angle BAC =$ _____
   $\angle DAC =$_____



[8-13] Use the figure to the right to answer the following questions.

8. How far is M from $\overline{KL}$?

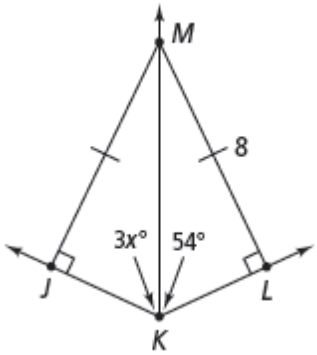
9. How far is M from $\overline{JK}$?

10. How is $\overline{KM}$ related to $\angle JKL$?

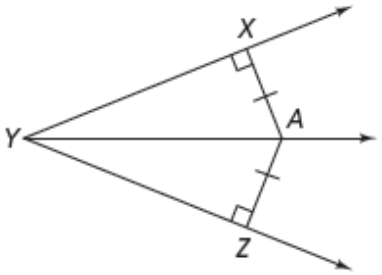
11. Find the value of x.

12. Find $\angle MKJ$.

13. Find $\angle JMK$ and $\angle LMK$.



14. Is A on the angle bisector of $\angle XYZ$? Explain.

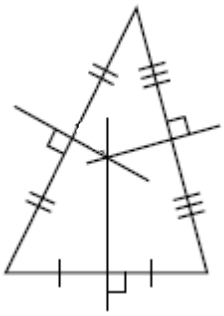


[15-16] Use the figure on the right to answer the following questions.

15. a) Point of concurrency is called _____.
Incenter / Circumcenter

b) This is the center of the _____.
Inscribed Circle / Circumscribed Circle

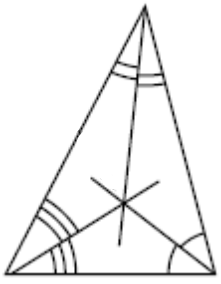
c) Use a compass to sketch the circle.



16. a) Point of concurrency is called _____.
Incenter / Circumcenter

b) This is the center of the _____.
Inscribed Circle / Circumscribed Circle

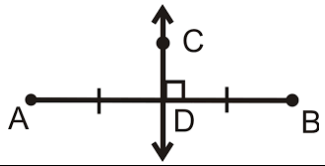
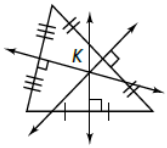
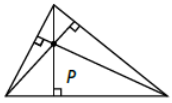
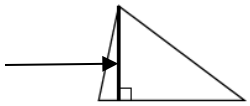
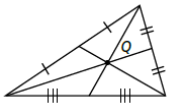
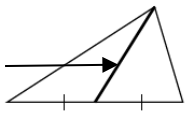
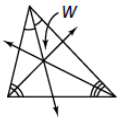
c) Use a compass to sketch the circle.



Math 2 Unit 4 Worksheet 4
Medians & Altitudes

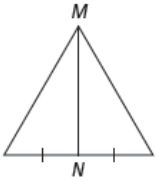
Name:_____
Date:_____ **Per:**_____

[1-10] Complete the below chart.

1.		$\overline{CD}$ is a _____ of $\overline{AB}$
2.		Point K is the _____ of the triangle.
3.		Point P is the _____ of the triangle.
4.		The segment shown is an _____.
5.		Point Q is the _____ of the triangle.
6.		The segment shown is a _____.
7.		Point W is the _____ of the triangle.
8.	Distance Formula	
9.	Midpoint Formula	
10.	Slope Formula	

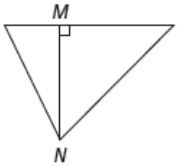
[11-13] Is $\overline{MN}$ a *median*, an *altitude*, or *neither*? Explain.

11. _____



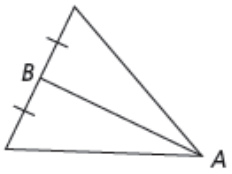
12. _____

13. _____

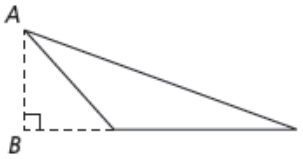


[14-17] Is $\overline{AB}$ a *median*, an *altitude*, or *neither*? Explain.

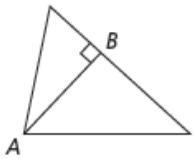
14. _____



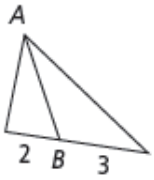
15. _____



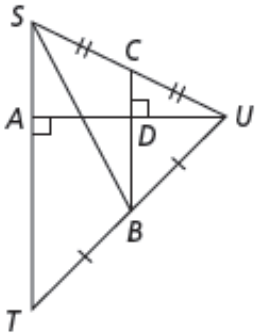
16. _____



17. _____



[18-21] Name each Segment.



18. A median in ΔSTU _____
19. An altitude in ΔSTU _____
20. A median in ΔSBU _____
21. An altitude in ΔCBU _____

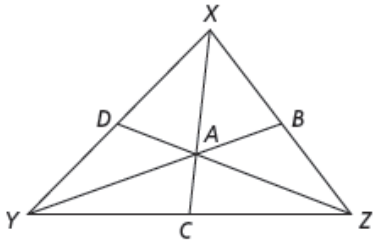
[22-24] In ΔXYZ, A is the centroid.

22. If $DZ = 12$, find ZA, AD, and describe the relationship between ZA and DZ.

    ZA = _____

    AD = _____

    ZA = _____ of DZ



23. If $AB = 6$, find BY and AY.

    BY = _____

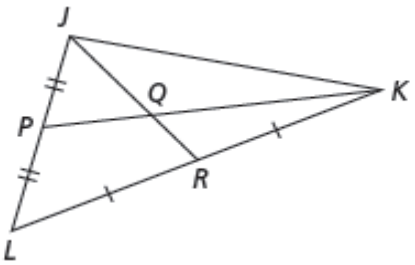
    AY = _____

24. If $AC = 3$, find CX and AX.

    CX = _____

    AX = _____

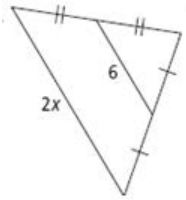
25. Q is the centroid of ΔJKL. $PK = 9x + 21y$.
    Write an expression to represent PQ and QK.



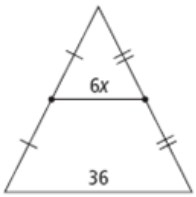
Review

[26-30] Find the value of x.

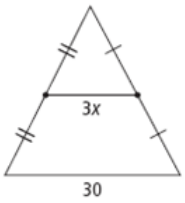
26. $x =$ _____



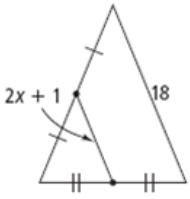
27. $x =$ _____



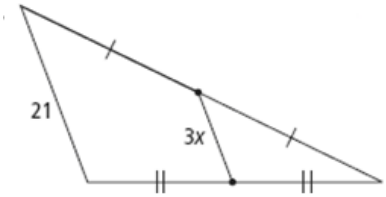
28. $x =$ _____



29. $x =$ _____



30. $x =$ _____

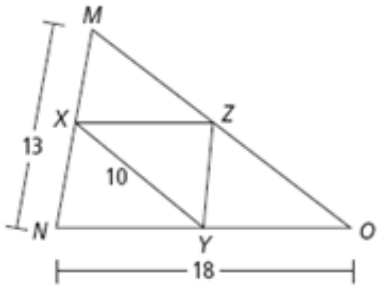


[31-33] X is the midpoint of $\overline{MN}$. Y is the midpoint of $\overline{ON}$. Z is the midpoint of $\overline{MO}$

31. Find XZ.

32. If $XY = 10$, find MO.

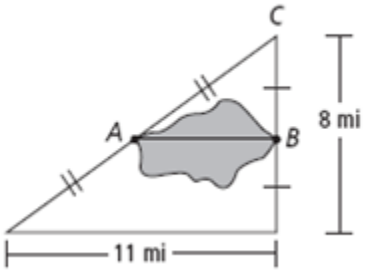
33. If $m\angle M$ is 64°, find $m\angle XYZ$.



[34-35] Use the diagram to answer the questions.

34. What is the distance across the lake?

35. Is it a shorter distance from A to B or from B to C? Explain.



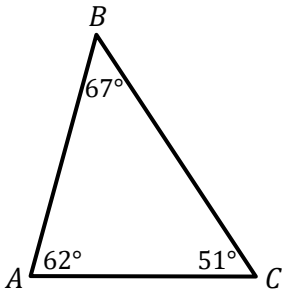
Math 2 Unit 4 Worksheet 6 **Name:**_____
Inequalities in One and Two Triangles **Date:**_____ **Per:**_____

[1-6] List the sides and the angles in order from smallest to largest.

1.

Sides: _____

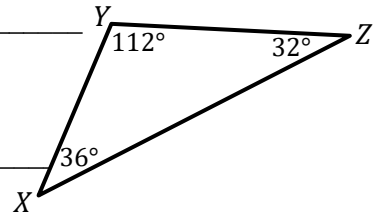
Angles: _____



2.

Sides: _____

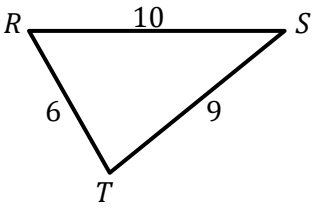
Angles: _____



3.

Sides: _____

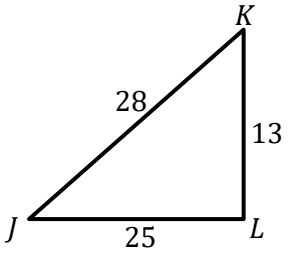
Angles: _____



4.

Sides: _____

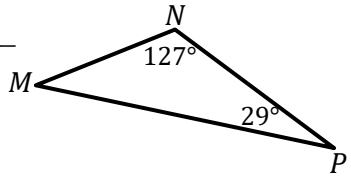
Angles: _____



5.

Sides: _____

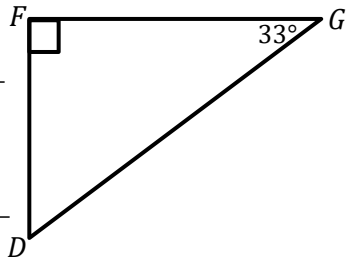
Angles: _____



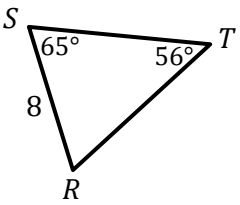
6.

Sides: _____

Angles: _____



7. Multiple Choice: In ΔRST, Which is a possible side length for ST?



(A) 7 (B) 8

(C) 9 (D) Cannot be determined

[8-11] Is it possible to construct a triangle with the given side lengths? If not, explain why not.

8. 6, 7, 11

9. 3, 6, 9

10. 28, 34, 39

11. 35, 120, 125

12. Multiple Choice: Which group of side lengths can be used to construct a triangle?
    a) 3yd., 4ft., 5yd. b) 3 yd., 5 ft., 8 ft. c) 11 in., 16 in., 27 in. d) 2ft., 11 in., 12 in.

[13-18] Describe the possible lengths of the third side of the triangle given the lengths of the other 2 sides.

13. 5 inches, 12 inches

14. 3 meters, 4 meters

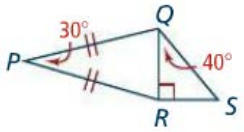
15. 12 feet, 18 feet

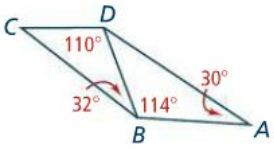
16. 10 yards, 23 yards

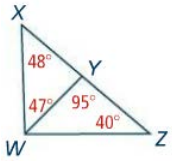
17. 2 feet, 40 inches

18. 25 meters, 25 meters

[19-21] Determine which segment is the **shortest** in each diagram.

19. 

20. 

21. 

22. Describe your process for determining which segment is the shortest when you have two triangles with a shared side. _____

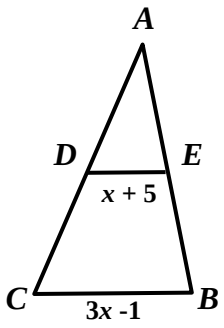
_____

_____

_____

Math 2 Unit 4 **Name:**_____
Review Worksheet **Date:**_____ **Per:**_____

[1-2] Use the figure to the right to answer the questions.

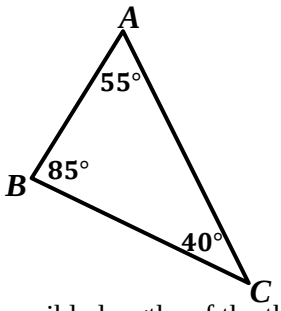


1. $\overline{DE}$ is a midsegment of ΔABC. If $DE = x + 5$ and $CB = 3x - 1$, find the value of x.

2. $\overline{DE}$ is a midsegment of ΔABC. If $AD = 15$ and $AE = 14$, find the value of AB.

3. Multiple Choice: Which group of side lengths can be used to construct a triangle? Show work.
   a) 5 in, 8 in, 15 in b) 10 cm, 12 cm, 20 cm c) 15 in, 10 in, 25 in d) 18 cm, 2 cm, 15 cm

4. List the order from shortest to longest side in triangle ΔABC.



5. The lengths of two sides of a triangle are 41 and 23. What are the possible lengths of the third side?

6. Match the line with the correct description.

1. Perpendicular Bisector_____	a. From a midpoint to the opposite vertex
2. Angle Bisector_____	b. Bisects an angle
3. Median_____	c. Perpendicular to a side and goes through the opposite vertex
4. Altitude_____	d. Perpendicular line through the midpoint of a side

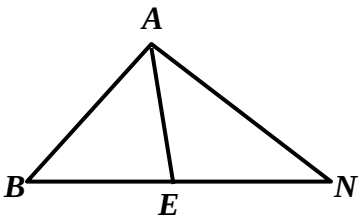
7. $\overline{AE}$ is a **median** in ΔBAN. Are the below statements True or False?

   a. $\overline{AB} \cong \overline{AN}$ _____

   b. $\angle B \cong \angle N$ _____

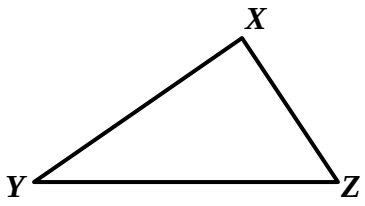
   c. $\overline{BE} \cong \overline{EN}$ _____

   d. $\angle BAE \cong \angle NAE$_____

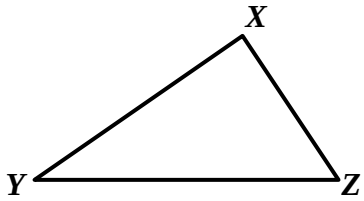


[8-11] Use the given triangles to draw a segment showing the following:

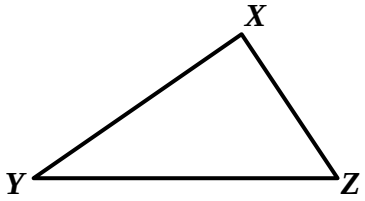
8. Altitude



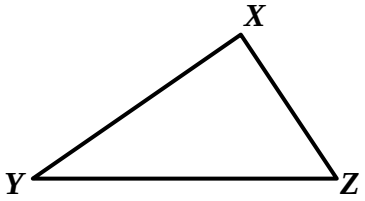
9. Angle Bisector



10. Perpendicular Bisector



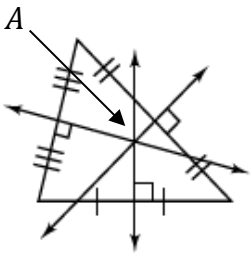
11. Median

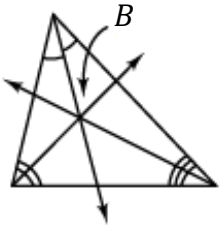


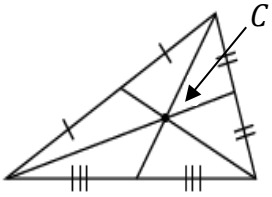
12. What is the name of the intersecting lines in the triangle? What is the name of the point of concurrency?

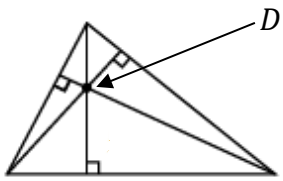
A._____&_____ B._____&_____

C._____&_____ D._____&_____



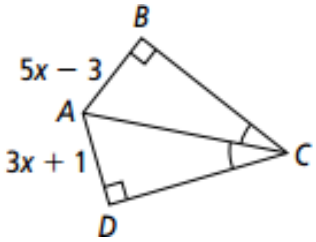






13. Find $\overline{AD}$

$\overline{AD} =$ _____

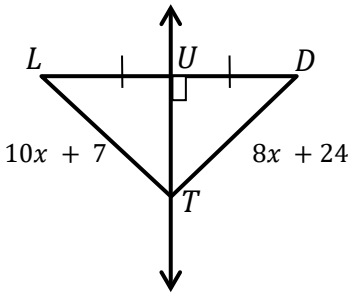


14. Find x, LT and DT

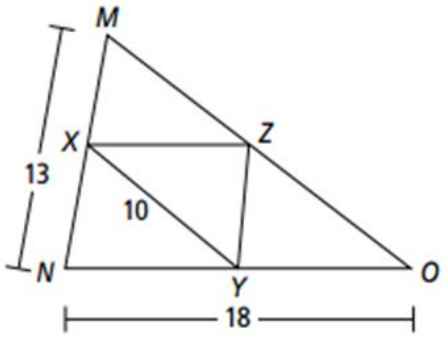
$x =$ _____

$LT =$ _____

$DT =$ _____



15. X is the midpoint of $\overline{MN}$. Y is the midpoint of $\overline{ON}$. Z is the midpoint of $\overline{MO}$

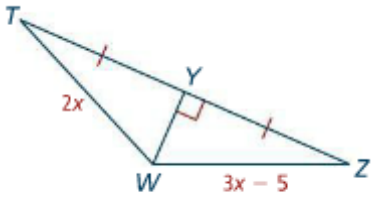


Find $XZ =$ _____

If $XY = 10$, find MO.
$MO =$ _____

If $NO = 18$, and $MN = 13$ find MX.
$MX =$ _____

16. Using the figure to the right, find x, TW and WZ

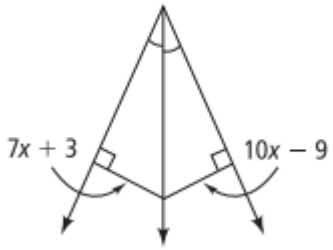


$x =$ _____

$TW =$ _____

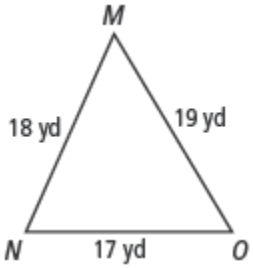
$WZ =$ _____

17. Using the figure to the right, find the value of x.

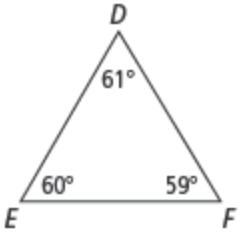


$x =$ _____

18. Which is the smallest angle in ΔMNO?

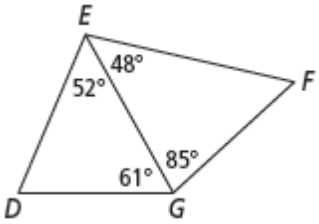


19. Order the sides of ΔDEF from shortest to longest.

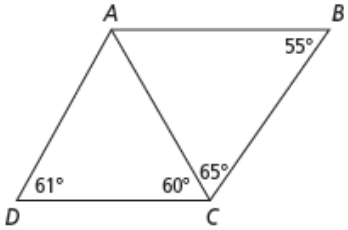


20. Which segment in each figure would be the shortest?

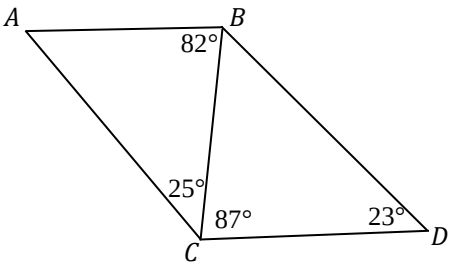
a) _____



b) _____

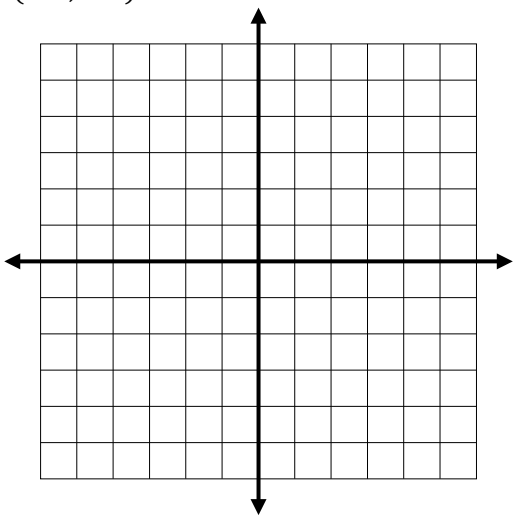


c) _____



21. Two sides of a triangle are 5 inches and 10 inches long. What is the range of possible lengths for the third side?

22. The coordinates of the vertices of a triangle are $A\ (-2, 3\ )$, $B\ (0, -5\ )$, $C\ (-4, -1\ )$.



a) Plot and label the above points on the graph.

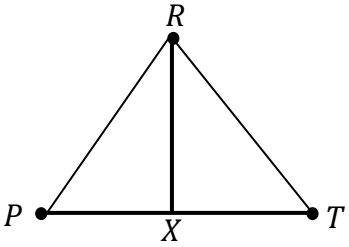
b) Find and label the points on the graph for, the coordinates of D, the midpoint of $\overline{AC}$,
coordinates of E, the midpoint of $\overline{CB}$,
coordinates of F, the midpoint of $\overline{AB}$

c) Using slopes show that each midsegments is parallel to a side.

d) Using distance formulas show that each midsegment is half the side length.

23. Make a two-column proof.

Given: $\overline{RP} \cong \overline{RT}$
$\overline{RX}$ is a median
Prove: $\angle PRX \cong \angle TRX$



Statement	Reason