

THE QUADRILATERAL FAMILY – Definitions, Properties Chart,
Family Tree, and Venn Diagram

Name: _____

Date: _____ Period: _____

Use the textbook (page 306 and chapter 6) to write the definitions.

Parallelogram: _____

Rhombus: _____

Rectangle: _____

Square: _____

Trapezoid: _____

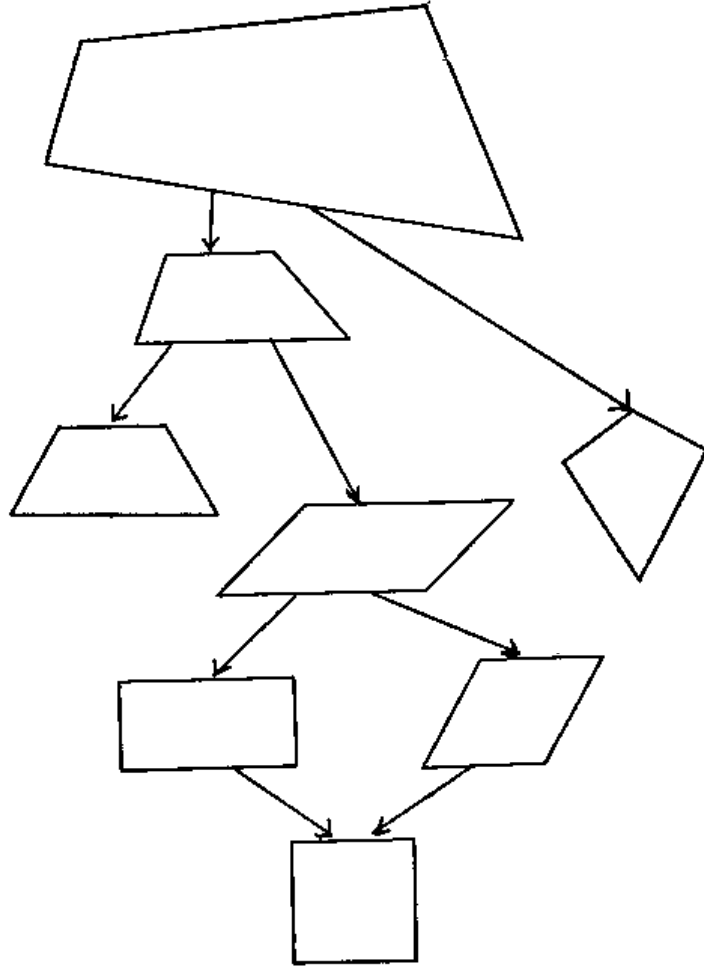
Isosceles Trapezoid: _____

Kite: _____

Place a checkmark in the column if the characteristic is always true for each quadrilateral name. Answer the question/directions for the last 3 rows.

	Property	Parallelogram	Rectangle	Rhombus	Square	Trapezoid	Isos Trap	Kite
Parallel sides	Both pairs of opposite sides \parallel							
	Exactly 1 pair of opposite sides \parallel							
Congruent sides	All sides \cong							
	Both pairs of opposite sides \cong							
	2 pairs of adjacent sides \cong (but the pairs are not \cong to each other)							
	Exactly 1 pair of opposite sides \cong							
Supplementary angles	All pairs of consecutive angles suppl							
	Exactly 2 pairs of consecutive angles suppl							
Congruent angles	All angles 90° (all sides \perp)							
	Both pairs of opposite angles \cong							
	Exactly 1 pair of opposite angles \cong							
	2 pairs of adjacent angles \cong (but the pairs are not \cong to each other)							
Diagonals	Diagonals bisect each other							
	Diagonals are \cong							
	Diagonals are \perp							
	Diagonals bisect opposite angles							
	Exactly 1 diagonal bisects the other diagonal							
	Exactly 1 diagonal bisects opposite angles							
Symmetry	How many lines of symmetry?							
	What degree angle of rotational symmetry?							
Drawing	Sketch the quadrilateral:							

The Quadrilateral Family Tree



Directions:

In each of the figures above, write the name of the quadrilateral which corresponds to it. Each of the following should be used exactly once: PARALLELOGRAM, KITE, SQUARE, QUADRILATERAL, TRAPEZOID, RECTANGLE, ISOSCELES TRAPEZOID, and RHOMBUS.

Explanation:

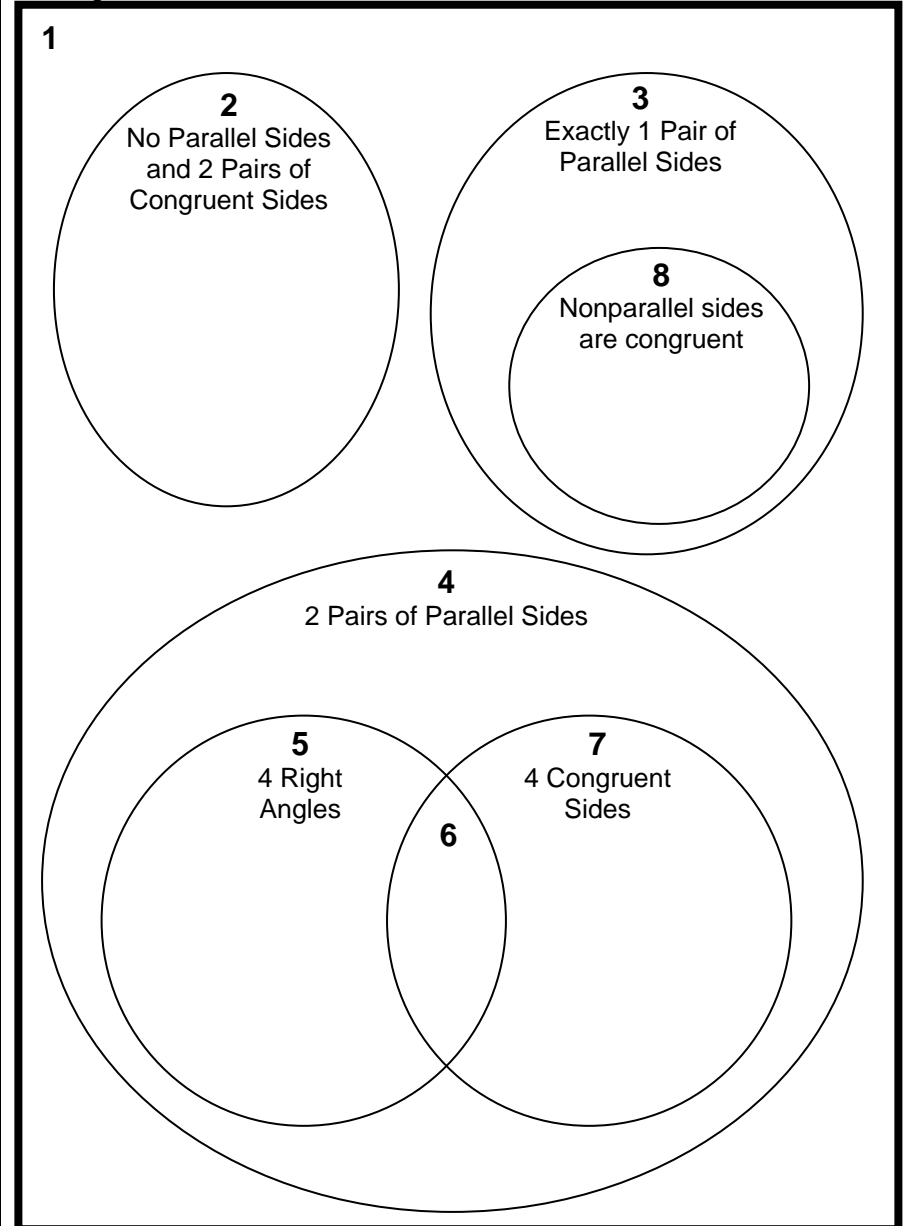
Following the arrows: The properties of each figure are also properties of the figure which follows it (passing on "genes" to the "children").
Reversing the arrows: Every figure is also the one which precedes it (shares the "last name" of the "parent").

Extension:

Label each figure with markings (congruency marks, parallel, right angles, etc.) that correspond with its definition.

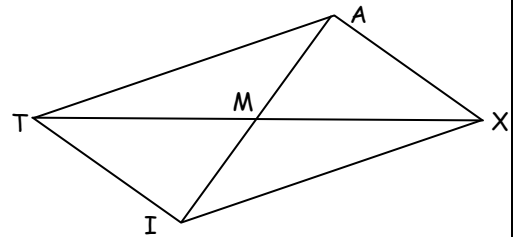
The Quadrilateral Venn Diagram

Write the names of the quadrilaterals that correspond with sections #1-8. Overlapping circles create sections that have the properties of both circles. Also, a circle that is completely inside a larger circle has all the properties of the larger circle.

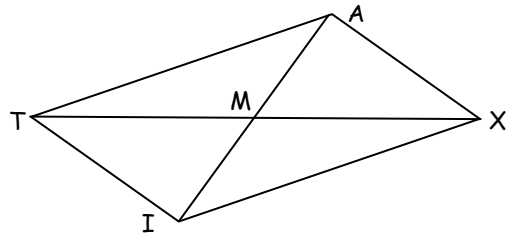


(1-5) Given parallelogram TAXI, solve for x , y , and/or z . Also, state what property of the parallelogram that you are using (example: opposite sides are congruent)

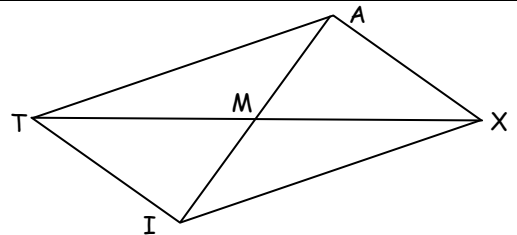
1. $AX = 3y$; $TI = 2y + 10$



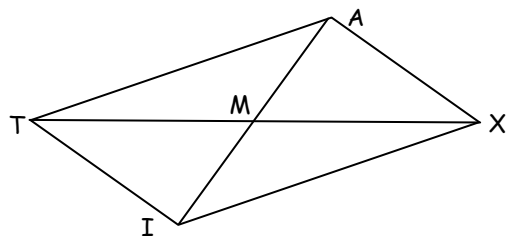
2. $m\angle TAX = 2y - 5$; $m\angle TIX = 3y - 20$



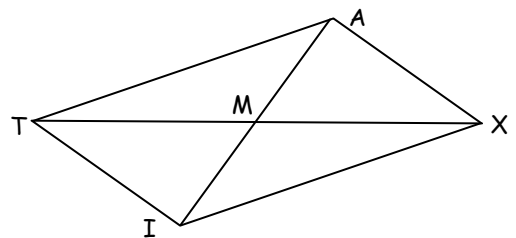
3. $AM = 2x^2 + 2x - 15$; $IM = x^2 + 10x + 5$



4. $AT = 7y + z$; $XI = y + 28$; $TI = y + z$; $AX = 5$

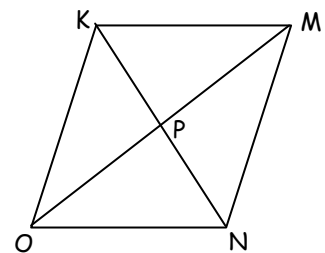


5. $m\angle TIX = 2z + y$; $m\angle TAX = z + 20$; $m\angle ATI = z - y$

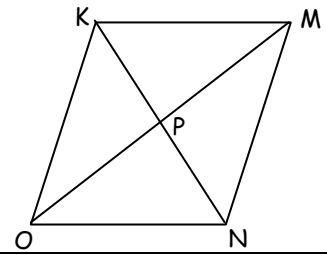


In problems 6 and 7, find x and y so the KMNO is a parallelogram.

6. $KM = x + y$; $ON = 3x - 4y$; $m\angle MKN = x + 5$; $m\angle KNO = 2x - 10$

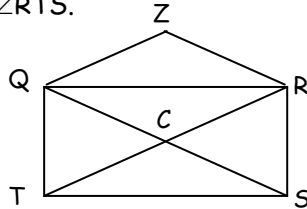


7. $m\angle KOM = 6y + 1$; $m\angle KMO = 3x + 2$; $m\angle MON = 2x + 8$; $m\angle OMN = 4y + 7$

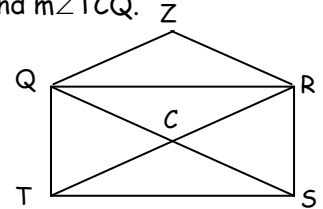


In the diagram for problems 8-11, QRST is a rectangle and QZRC is a parallelogram.

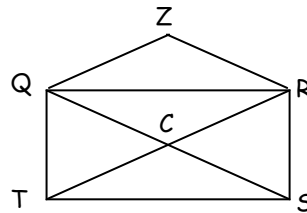
8. If $m\angle RCS = 35$, find $m\angle RTS$.



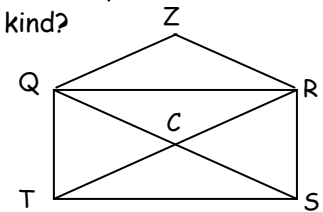
9. If $m\angle QRT = m\angle TRS$, find $m\angle TCQ$.



10. If $RT = x^2$ and $QC = 4x - 6$, what is the value of x ?



11. $RZ = 6x$, $ZQ = 3x + 2y$, and $CS = 14 - x$. Find the values of x and y . Is QZRC a "special" parallelogram? If so, what kind?



Use rhombus ABCD for problems 12-17

12. If $m\angle BAF = 28$, $m\angle ACD = \underline{\hspace{2cm}}$.

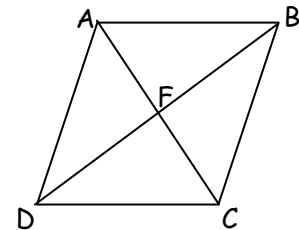
13. If $m\angle AFB = 16x + 6$, $x = \underline{\hspace{2cm}}$.

14. If $m\angle ACD = 34$, $m\angle ABC = \underline{\hspace{2cm}}$.

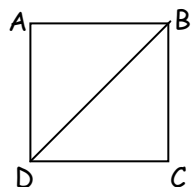
15. If $m\angle BFC = 120 - 4x$, $x = \underline{\hspace{2cm}}$.

16. If $m\angle BAC = 4x + 6$ and $m\angle ACD = 12x - 18$, $x = \underline{\hspace{2cm}}$.

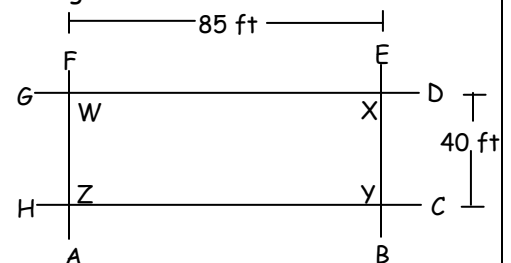
17. If $m\angle DCB = x^2 - 6$ and $m\angle DAC = 5x + 9$, $x = \underline{\hspace{2cm}}$



18. ABCD is a square. $AB = 5x + 2y$, $AD = 3x - y$, and $BC = 11$. Find x and y .



19. A contractor is measuring for the foundation of a building that is to be 85 ft by 40 ft. Stakes and string are placed as shown. The outside corners of the building will be at the points where the strings cross. He then measures and finds $WY = 93$ ft and $XZ = 94$ ft. Is WXYZ a rectangle? If not, which way should stakes E and F be moved to make WXYZ a rectangle?

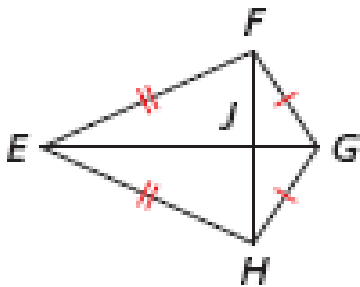


Geometry WS - Trapezoids and Kites

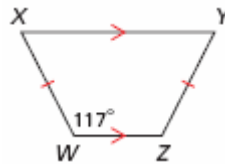
Identify the quadrilateral based on the given information in the diagram or description. Given information includes right angle symbols, congruent segment marks, congruent angle marks, and parallel marks.

Do NOT assume that pictures are drawn to scale.

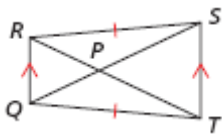
_____ 1. In kite EFGH, $m\angle FEJ = 25^\circ$,
and $m\angle FGJ = 57^\circ$. Find each measure.
 $m\angle GFJ =$ _____
 $m\angle JFE =$ _____
 $m\angle GHE =$ _____



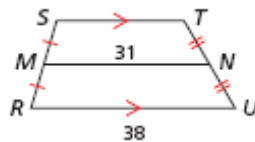
_____ 2. Find $m\angle Y$



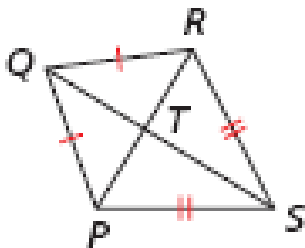
_____ 3. $RT = 24$ and $QP = 10$. Find PS .



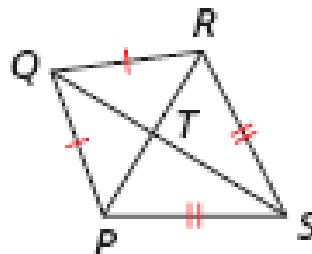
_____ 4. Find ST .



_____ 5. In kite PQRS, $m\angle QRT = 45^\circ$,
and $m\angle RST = 30^\circ$. If $RT = 7$, find the perimeter
of the kite.



_____ 6. In kite PQRS, $m\angle QRT = 40^\circ$ and
 $m\angle RST = 35^\circ$. If $RT = 7$, find the perimeter of
the kite.

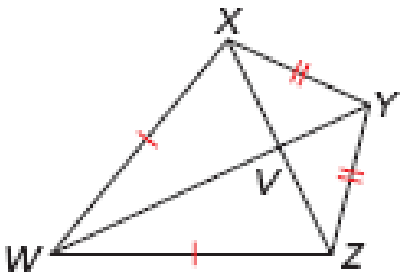


_____ 7. In kite WXYZ, $m\angle WXY = 104^\circ$, and $m\angle VYZ = 49^\circ$. Find each measure.


$m\angle VZY =$ _____

$m\angle VXW =$ _____

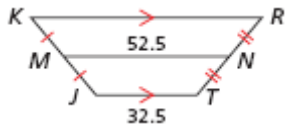
$m\angle XWZ =$ _____



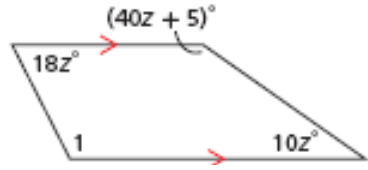
_____ 8. Find $m\angle A$



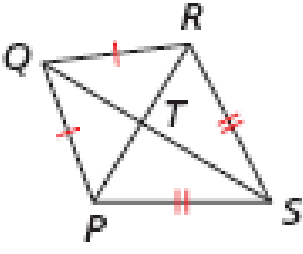
_____ 9. Find KR.



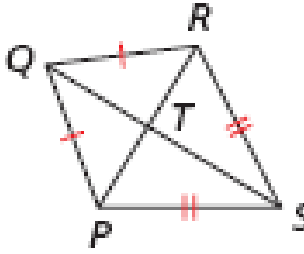
_____ 10. Find $m\angle 1$.



_____ 11. In kite PQRS, $m\angle QRT = 45^\circ$, and $m\angle RST = 30^\circ$. If $QR = 8$, find the perimeter of the kite.



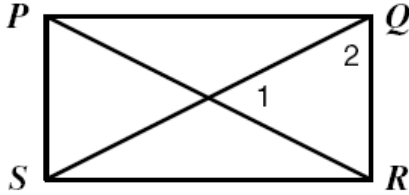
_____ 12. In kite PQRS, $m\angle QRT = 40^\circ$, and $m\angle RST = 35^\circ$. If $QT = 7$, find the perimeter of the kite.



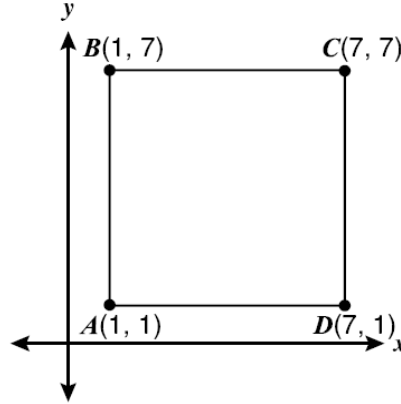
Geometry WS -Quadrilateral Word Problems

Solve each problem. Round segment lengths to the nearest tenth and angle measures to the nearest degree.

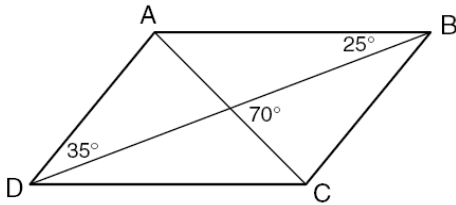
_____ 1. In rectangle PQRS, $m\angle 1 = 50^\circ$. What is $m\angle 2$?



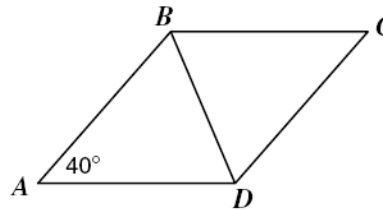
_____ 2. What are the coordinates of the intersection of the diagonals of this quadrilateral?



_____ 7. In parallelogram ABCD, what is $m\angle BDC$?

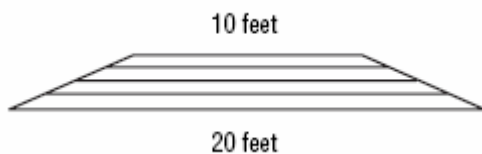


_____ 8. ABCD is a rhombus. What is $m\angle CBD$?

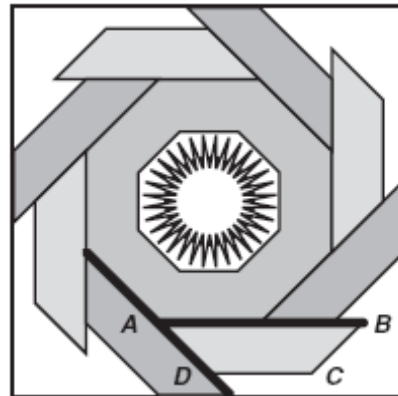


_____ 18. A riser is designed to elevate a speaker. The riser consists of four trapezoidal sections that can be stacked on top of the other to produce trapezoids of varying heights. All of the stages have the same height. If all risers are used, the width of the top of the riser is 10 feet.

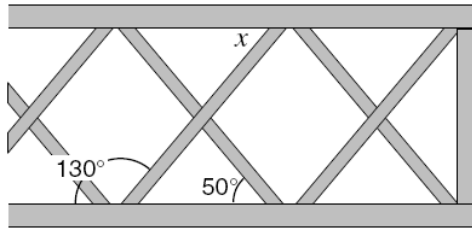
- a) If only the bottom two risers are used, what is the width of the top of the resulting riser?
- b) What would be the width of the top of the resulting riser if the bottom three risers are used?



_____ 19. In the design, eight isosceles trapezoids surround a regular octagon. What is the measure of $\angle B$ in trapezoid ABCD?



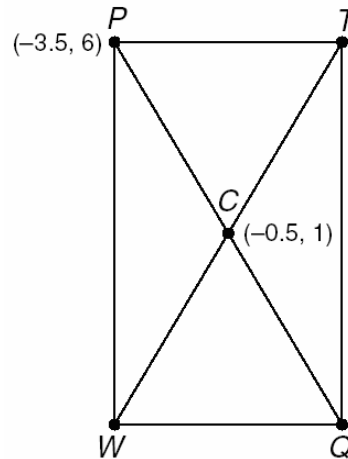
_____ 11. George used a decorative fencing to enclose his deck. Using the information on the diagram and assuming the top and bottom are parallel, what is the measure of angle x ?



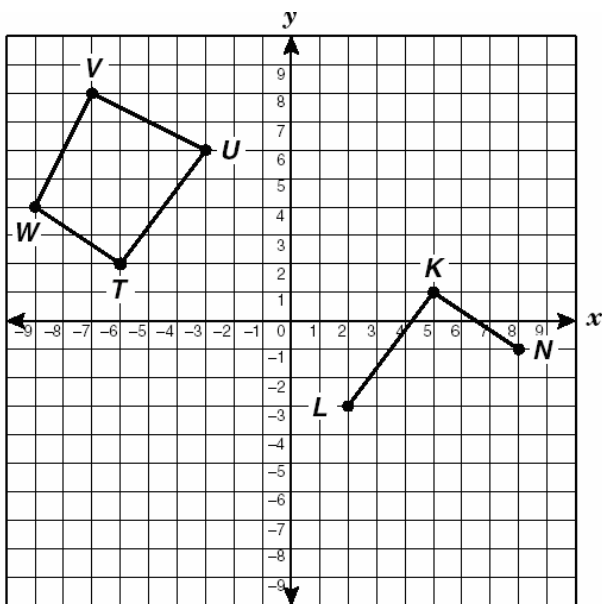
_____ 13. A contractor has been hired to pour a rectangular concrete patio. How can he be sure that the frame in which he will pour concrete is rectangular if he only has a tape measure and no protractor?

_____ 22. Suppose $MNOP$ is a parallelogram, but not a rectangle. If you choose two interior angles at random, what is the probability that they would be congruent?

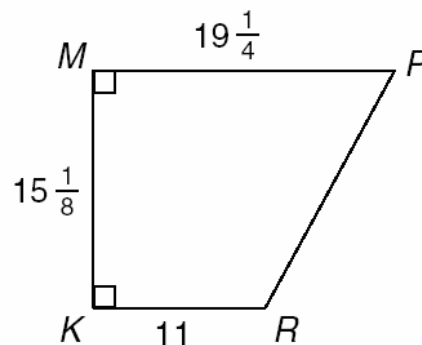
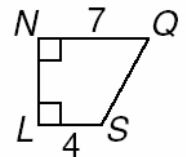
_____ 24. The midpoint of rectangle $PTQW$ is $(-0.5, 1)$. The coordinates of P are $(-3.5, 6)$. What are the coordinates of Q ?



_____ 25. At what coordinate point should M be placed so that quadrilateral $TUVW$ is congruent to quadrilateral $KLMN$?



_____ 26. Trapezoids $LNQS$ and $KMPR$ are similar. What is the perimeter of $LNQS$ to the nearest tenth?



Quadrilaterals: Classifying on the Coordinate Plane and Linear Equations (from textbook page 308 # 13-18)

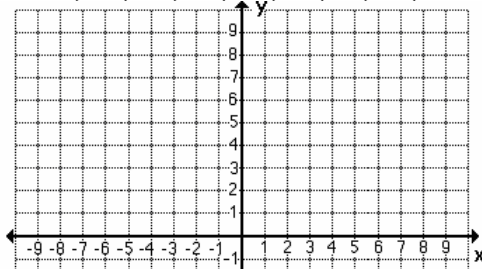
Name: _____

Date: _____ Period: _____

Determine the most precise name for each quadrilateral. Justify your answer with the following steps:

- a. Plot the points and connect them
- b. Make a conjecture (an educated guess)
- c. Write down the WTP (what to prove) using the definitions on pg 306
- d. Show work to prove the WTP
 - a. To prove parallel sides, calculate their _____ (or count _____ over _____) and see if they are _____.
 - b. To prove right angles, show the sides are _____ by calculating their _____ and seeing if they are _____.
 - c. To prove congruent sides, use the _____ (or make a right triangle along the grid and use the _____ Theorem).

13. A(3, 5), B(7, 6), C(6, 2), D(2, 1)



Conjecture: _____

WTP: Opposite _____ are _____ (since it's also a _____)

AND _____ sides

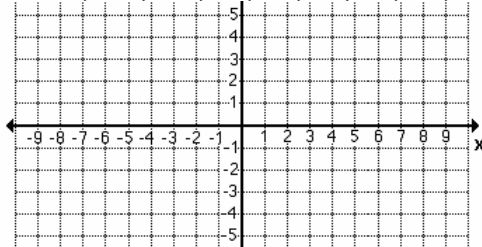
AND does not have _____ angles (since it's not a _____)

Work:

Find the equation of line \overline{AD}

and the perpendicular bisector of \overline{AD}

14. W(-1, 1), X(0, 2), Y(1, 1), Z(0, -2)



Conjecture: _____

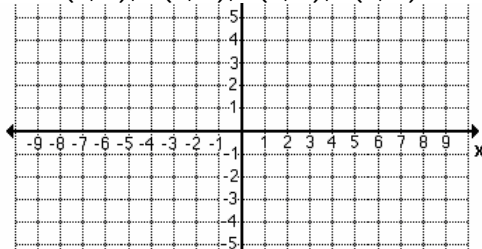
WTP: _____

Work:

Find the equation of the diagonal \overline{WY}

and the diagonal \overline{XZ}

15. J(2, 1), K(5, 4), L(7, 2), M(2, -3)



Conjecture: _____

WTP: _____

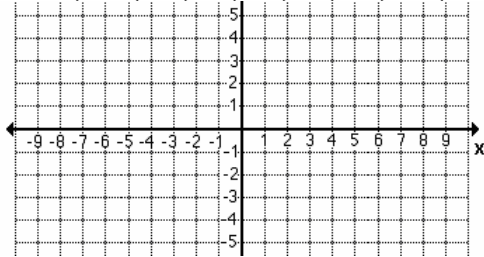
AND does not have _____

Work:

Name the bases

and find the equation of the midsegment.

16. $R(-2, -3)$, $S(4, 0)$, $T(3, 2)$, $V(-3, -1)$



Find the equation of the line from V to the midpoint of \overline{RS} .

Conjecture: _____

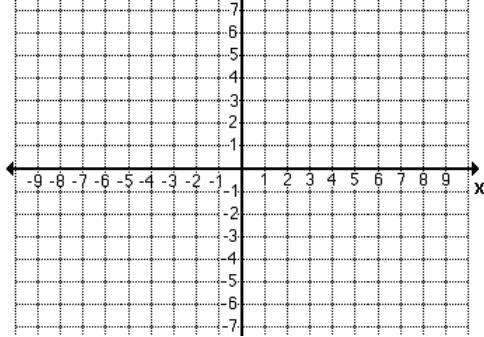
WTP: _____

AND _____

AND does not have _____

Work:

17. $N(-6, -4)$, $P(-3, 1)$, $Q(0, 2)$, $R(-3, 5)$



Find T so that $NTQR$ is a parallelogram.

Then find the equations of the lines \overline{NT} and \overline{TQ} .

Conjecture: _____

WTP: Does not have _____

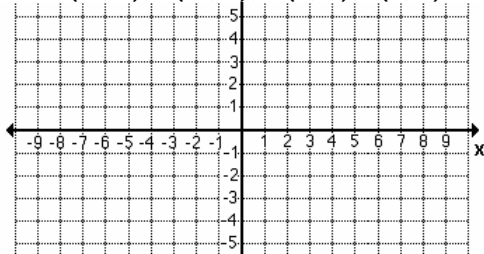
(since it's not a _____ or a _____)

AND does not have _____

(since it's not a _____).

Work: OMIT ☺

18. $E(-3, 1)$, $F(-7, -3)$, $G(6, -3)$, $H(2, 1)$



Find the equation of the altitude from E to \overline{FG}

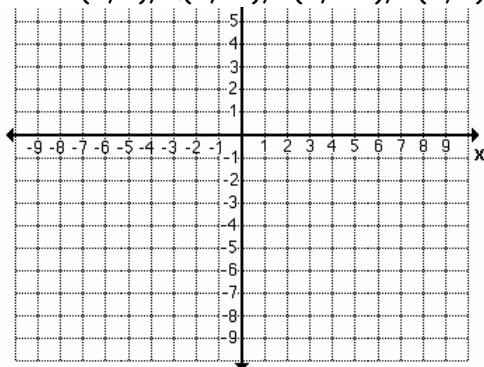
Conjecture: _____

WTP: _____

AND _____

Work:

91. $W(5, 4)$, $X(3, -6)$, $Y(0, -10)$, $Z(2, 0)$



Find the equation of the altitude from X to \overline{YZ}

Conjecture: _____

WTP: _____

AND does not have _____

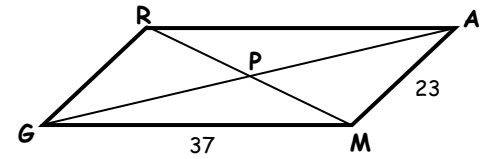
AND does not have _____

Work:

Find each of the following values.

Use parallelogram GRAM for problems 1-4.

_____ 1. $GA = 3x - 10$ and $GP = x + 20$. Find x .



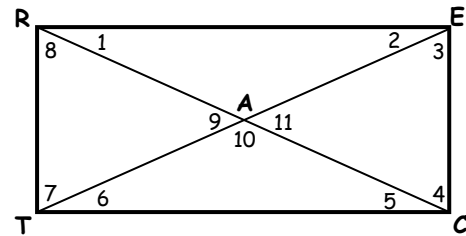
_____ 2. $m\angle GMR = 37^\circ$ and $m\angle AMG = 95^\circ$, find $m\angle GRM$.

_____ 3. $m\angle RGM = 75^\circ$, find $m\angle GMA$.

$x =$ _____ 4. $RA = 2x + y$, $GR = 3x - y$, find x and y .
 $y =$ _____

Use rectangle RECT for problems 5-8.

_____ 5. If $TA = 3x - 7$ and $AC = 2x + 2$, find x .



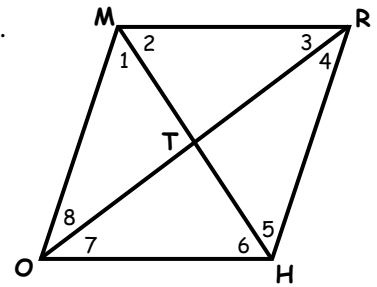
_____ 6. If $m\angle 2 = 33^\circ$, find $m\angle 11$.

_____ 7. If $RT = 2x + 5$ and $EC = 4x - 11$, find x .

_____ 8. If $m\angle 1 = x^2 - 4$ and $m\angle 8 = x + 52$, find x .

Use rhombus RHOM for problems 9-11.

x = _____ 9. If $MO = 24$, $MR = 4x + 2y + 2$, and $RH = 5x - y + 14$, find x and y .
 y = _____

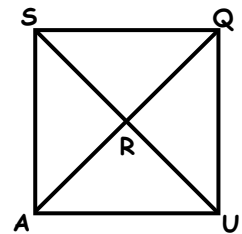


_____ 10. If $RO = 24$ and $MH = 10$, find MR .

_____ 11. If $m\angle 7 = 39^\circ$, find $m\angle 2$.

Use square SQUA for problems 12-14.

_____ 12. If $AU = x^2 + 2$ and $SA = 5x - 4$, find x .



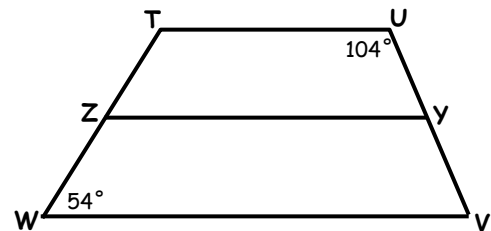
_____ 13. If $m\angle ARS = 6x$, find x .

_____ 14. If $m\angle QAU = 3x - 12$, find x .

Use trapezoid TUVW with midsegment ZY for problems 15-17.

_____ 15. $m\angle V$

_____ 16. $TU = 15$, $WV = 33$, find ZY .



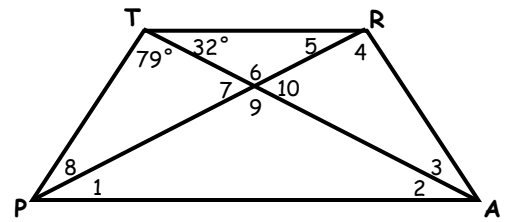
_____ 17. $TU = x - 12$, $ZY = x + 15$, and $WV = 3x - 8$. Find x .

Use isosceles trapezoid TRAP for problems 18-20.

_____18. Find $m\angle 1$.

_____19. Find $m\angle 7$.

_____20. Find $m\angle 3$.

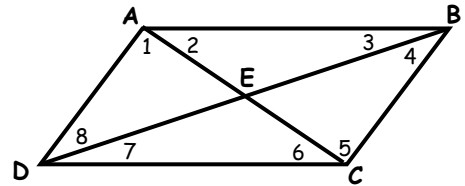


In problems 21-23, if there is enough information to state that the quadrilateral is a parallelogram give the reason. Write none if there is not enough information to state that the quadrilateral is a parallelogram.

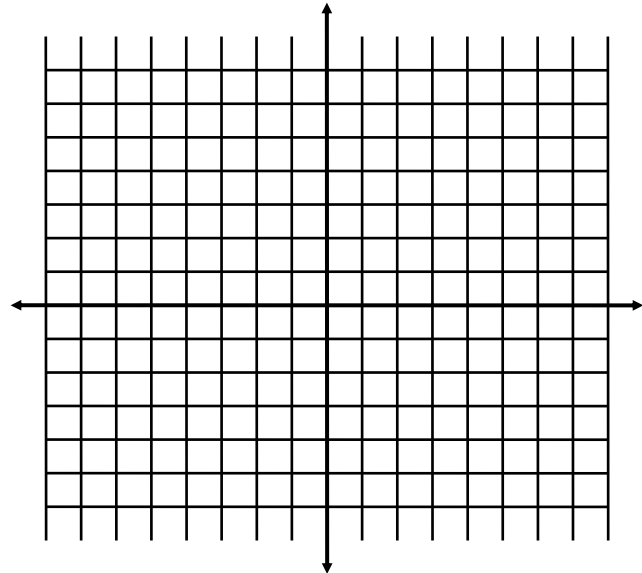
21. E is the midpoint of \overline{AC} and \overline{BD} .

22. $\angle 2 \cong \angle 6$ and $\angle 3 \cong \angle 7$

23. $\angle 8 \cong \angle 4$ and $\overline{AD} \cong \overline{BC}$



27. Find the coordinates of the 3 possible points for the missing vertex in a parallelogram if three of the vertices are $A(-2, -1)$, $B(-1, 3)$, and $C(4, 1)$



24. The coordinates of the vertices of quadrilateral ABCD are $A(-4, -2)$, $B(-1, 3)$, $C(4, 0)$, and $D(1, -5)$. Determine whether ABCD is a parallelogram, a rectangle, a rhombus, or a square. Explain why or why not. Show work to support the explanations.

25. The coordinates of the vertices of quadrilateral PQRS are $P(4, 4)$, $Q(1, 2)$, $R(2, -2)$, and $S(5, 0)$. Determine whether PQRS is a parallelogram, a rectangle, a rhombus, or a square. Explain why or why not. Show work to support the explanations.

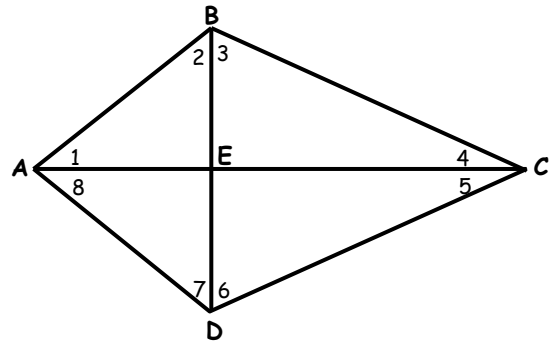
26. The coordinates of the vertices of quadrilateral WXYZ are $W(5, 0)$, $X(6, -8)$, $Y(-1, -4)$, and $Z(-2, 4)$. Determine whether WXYZ is a parallelogram, a rectangle, a rhombus, or a square. Explain why or why not. Show work to support the explanations.

28. Given ABCD is a kite and $m\angle BCD = 50^\circ$, $m\angle 2 = 40^\circ$, and $ED = 6$, find:

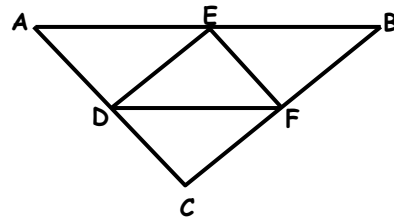
$m\angle 8 =$ _____

$m\angle ADC =$ _____

$BD =$ _____



29. $\triangle ABC$ has midpoints D, E, and F. If the perimeter of $\triangle DEF$ is 23, then find the perimeter of $\triangle ABC$.



30. KITE is a kite. M, N, O, and P are midpoints.

$m\angle KMN = 30^\circ$

$m\angle KIT = 100^\circ$

Find: $m\angle 1 =$ _____

$m\angle 2 =$ _____

$m\angle 3 =$ _____

$m\angle 4 =$ _____

