Name: Key Date:
Geometry Band:

Unit 8: Polygons & Quadrilaterals Study Guide

polygon interior angle sum $= (n-2)180$

polygon exterior angle $= \frac{360}{n}$

LT#1: Find the sum of the measures of the interior angles of a polygon.
LT#2: Find the sum of the measures of the exterior angles of a polygon.

Find the measure of an interior angle and an exterior angle of each regular polygon.

1. hexagon $n=6$

$(6-2)180$
$4(180)$
$720°$

$\frac{360}{6} = 60°$

2. 16-gon $n=16$

$(16-2)180$
$14(180)$
$2520°$

$\frac{360}{16} = 22.5°$

3. Pentagon $n=5$

$(5-2)180$
$3(180)$
$540°$

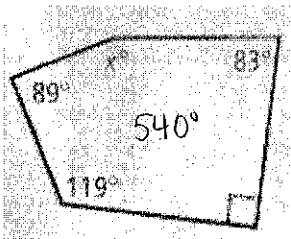
$\frac{360}{5} = 72°$

4. What is the sum of the exterior angles for each polygon in #1-3?

360°

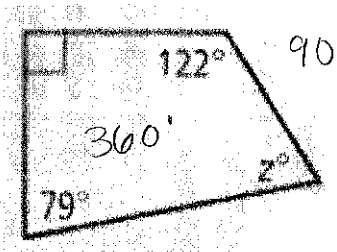
Find the measure of the missing angle.

5.



$x+83+90+119+89=540$
$x+381=540$
$x=159°$

6.

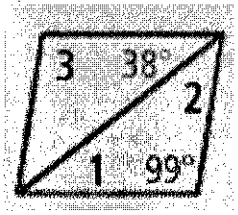


$90+122+x+79=360$
$x+291=360$
$x=69°$

LT#3: Use relationships among sides and angles of parallelograms.
LT#4: Use relationships among diagonals of parallelograms.

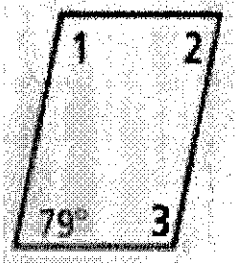
Find the measures of the numbered angles for each parallelogram.

7.



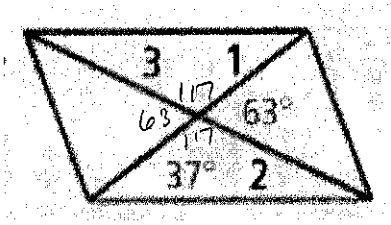
$m\angle 1 = 38°$
$m\angle 2 = 43°$
$m\angle 3 = 99°$

8.



$m\angle 1 = 101°$
$m\angle 2 = 79°$
$m\angle 3 = 101°$

9.

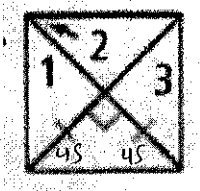


$m\angle 1 = 37°$

$m\angle 2 = 26°$

$m\angle 3 = 26°$

10.



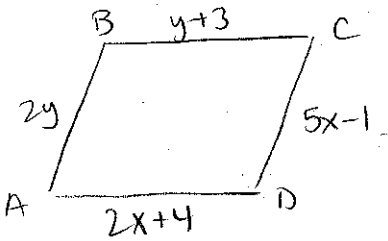
$m\angle 1 = 45°$

$m\angle 2 = 45°$

$m\angle 3 = 45°$

Find the values of x and y in parallelogram $ABCD$.

11. $AB = 2y, BC = y + 3, CD = 5x - 1, DA = 2x + 4$



$2y = 5x - 1$

$y + 3 = 2x + 4 \Rightarrow y = 2x + 1$

$2(2x+1) = 5x - 1$

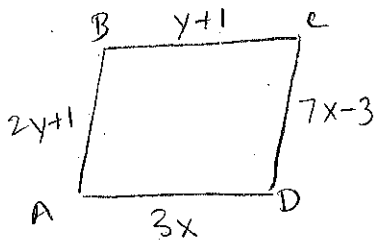
$4x + 2 = 5x - 1$

$\boxed{3 = x}$

$y = 2(3) + 1$

$\boxed{y = 7}$

12. $AB = 2y + 1, BC = y + 1, CD = 7x - 3, DA = 3x$



$3x = y + 1 \Rightarrow y = 3x - 1$

$7x - 3 = 2y + 1$

$7x - 3 = 2(3x - 1) + 1$

$7x - 3 = 6x - 2 + 1$

$\boxed{x = 2}$

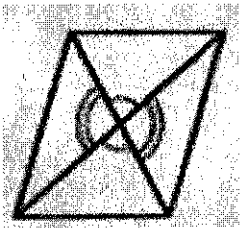
$y = 3(2) - 1$

$\boxed{y = 5}$

LT#5: Determine whether a quadrilateral is a parallelogram.

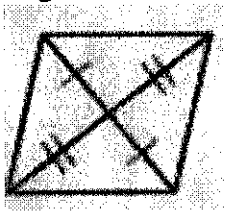
Determine whether the quadrilateral must be a parallelogram.

13.



Not a ▱ because vertical ∠'s do not prove that the opp. sides are ∥.

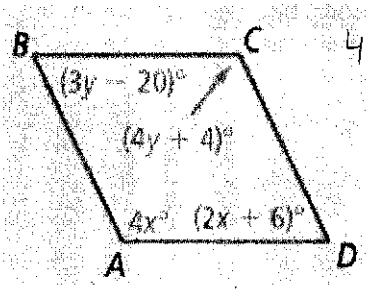
14.



▱ because diagonals bisect each other.

Find the values of the variables for which $ABCD$ must be a parallelogram.

15.



$4x+2x+6=180$

$6x+6=180$

$6x=174$

$\boxed{x=29}$

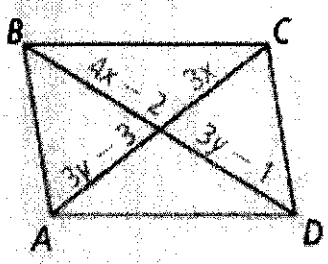
$3y-20+4y+4=180$

$7y-16=180$

$7y=196$

$\boxed{y=28}$

16.



$4x-2=3y-1$

$3y-3=3x \Rightarrow x=y-1$

$4(y-1)-2=3y-1$

$4y-4-2=3y-1$

$\boxed{y=5}$

$x=5-1$

$\boxed{x=4}$

LT#6: Define and classify special types of parallelograms.

Determine whether each statement is *always, sometimes,* or *never* true.

17. A rhombus is a square.

Sometimes true.

18. A square is a rectangle.

Always true.

19. A rhombus is a rectangle.

Sometimes true.
(ex: square)

20. The diagonals of a parallelogram are perpendicular.

Sometimes true
(ex: rhombus, square)

21. The diagonals of a parallelogram are congruent.

Sometimes true
(ex: square, rectangle)

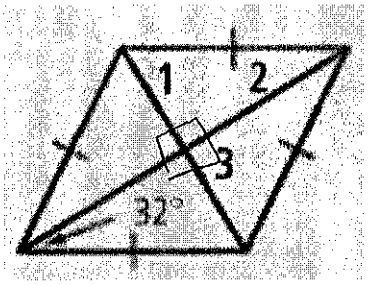
22. Opposite angles of a parallelogram are congruent.

Always true

LT#7: Use properties of diagonals of rhombuses and rectangles.

Find the measures of the numbered angles in each special parallelogram.

23.



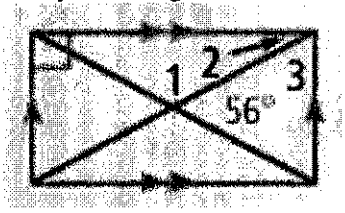
rhombus

$m\angle 1=58°$

$m\angle 2=32°$

$m\angle 3=90°$

24.



rectangle

$m\angle 1=124°$

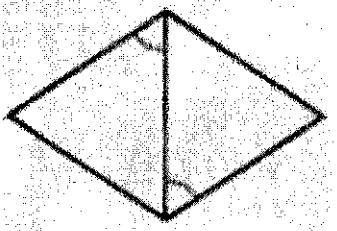
$m\angle 2=28°$

$m\angle 3=62°$

LT#8: Determine whether a parallelogram is a rhombus or rectangle.

Can you conclude that the parallelogram is a rhombus, rectangle, or square? Explain.

25.



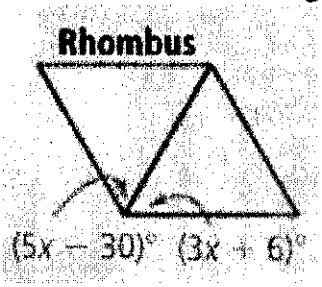
NO, because only one pair of opp. sides are ||.

26.

Square; all sides ≅ and all ∠'s.

For what value of x is the figure the given parallelogram? Justify your answer.

27.

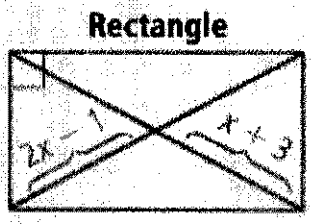


$5x - 3 = 3x + 6$ because diagonals bisect angles.

$2x = 9$

$x = \frac{9}{2}$

28.



$2x - 1 = x + 3$

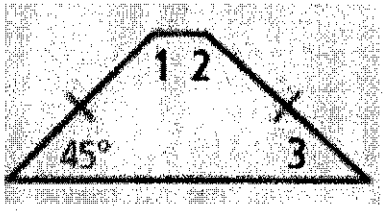
$x = 4$

because diag. are ≅

LT#9: Verify and use properties of trapezoids and kites.

Find the measures of the numbered angles in each isosceles trapezoid.

29.



$m\angle 1 = 135°$

$m\angle 2 = 135°$

$m\angle 3 = 45°$

30.

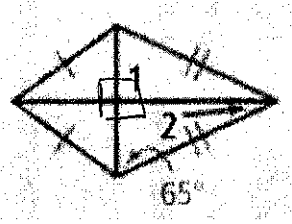
$m\angle 1 = 80°$

$m\angle 2 = 100°$

$m\angle 3 = 100°$

Find the measures of the numbered angles in each kite.

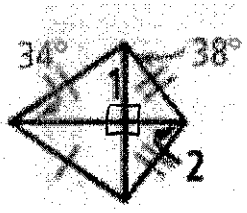
31.



$m\angle 1 = 90°$

$m\angle 2 = 25°$

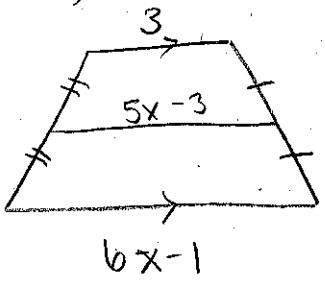
32.



$m\angle 1 = 56°$

$m\angle 2 = 52°$

33. A trapezoid has base lengths of $(6x - 1)$ units and 3 units. It midsegment has a length of $(5x - 3)$ units. What is the value of x?



$5x - 3 = \frac{1}{2}(3 + 6x - 1)$

$10x - 6 = 6x + 2$

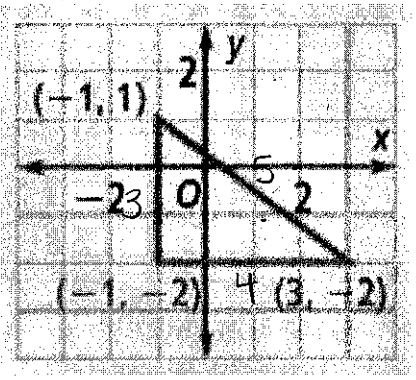
$4x = 8$

$x = 2$

LT#10: Classify polygons in the coordinate plane.

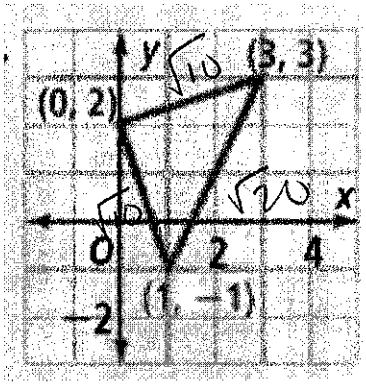
Determine whether ΔABC is *scalene, isosceles,* or *equilateral.*

34.



scalene right triangle

35.



isosceles

$d = \sqrt{(0-1)^2 + (2-(-1))^2}$

$= \sqrt{1+9} = \sqrt{10}$

$d = \sqrt{(3-0)^2 + (3-4)^2}$

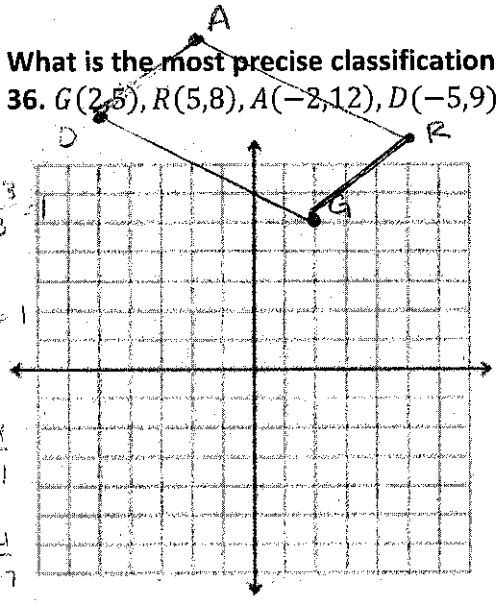
$= \sqrt{9+1} = \sqrt{10}$

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

$= \sqrt{4+16} = \sqrt{20}$

What is the most precise classification of the quadrilateral?

36. $G(2,5), R(5,8), A(-2,12), D(-5,9)$



$m_{AD} = \frac{12-9}{-2-5} = \frac{3}{3} = 1$

$m_{RG} = \frac{8-5}{5-2} = \frac{3}{3} = 1$

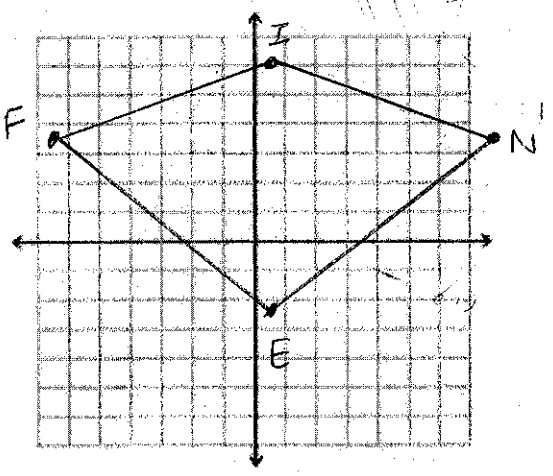
$m_{AR} = \frac{12-8}{-2-5} = \frac{4}{-7}$

$m_{DG} = \frac{9-5}{-5-2} = \frac{4}{-7}$

parallelogram because

opp. sides ∥

37. $F(-13,7), I(1,12), N(1,5), E(1,-5)$



kite because 2 pairs of consecutive sides ≅,

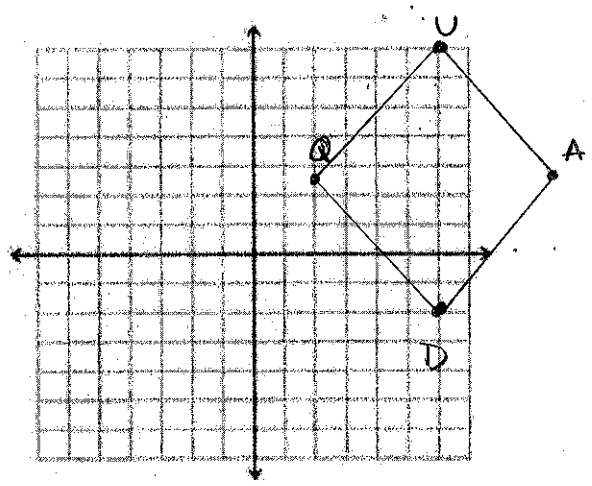
$d_{FI} = \sqrt{(-13-1)^2+(7-12)^2} = \sqrt{196+25} = \sqrt{221}$

$d_{IN} = \sqrt{(1-1)^2+(12-7)^2} = \sqrt{196+25} = \sqrt{221}$

$d_{FE} = \sqrt{(-13-1)^2+(7-(-5))^2} = \sqrt{196+144} = \sqrt{340}$

$d_{EN} = \sqrt{(1-1)^2+(7-(-5))^2} = \sqrt{196+144} = \sqrt{340}$

38. $Q(4,5), U(12,14), A(20,5), D(12,-4)$



rhombus because

all sides ≅

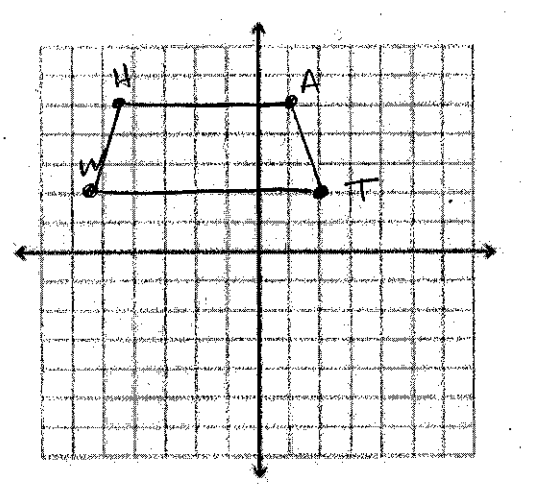
$d_{QU} = \sqrt{(4-12)^2+(5-14)^2} = \sqrt{64+81} = \sqrt{145}$

$d_{UA} = \sqrt{(12-20)^2+(14-5)^2} = \sqrt{64+81} = \sqrt{145}$

$d_{QD} = \sqrt{(4-12)^2+(5-(-4))^2} = \sqrt{64+81} = \sqrt{145}$

$d_{DA} = \sqrt{(12-20)^2+(-4-5)^2} = \sqrt{64+81} = \sqrt{145}$

39. $W(-11,4), H(-9,10), A(2,10), T(4,4)$



isosceles trapezoid because

one pair of opp. sides ∥ & one pair of opp. sides ≅

$m_{HA} = \frac{10-10}{-9-2} = \frac{0}{-11} = 0$

$m_{WT} = \frac{4-4}{-11-4} = \frac{0}{-15} = 0$

$d_{WH} = \sqrt{(-11-(-9))^2+(4-10)^2} = \sqrt{4+36} = \sqrt{40}$

$d_{AT} = \sqrt{(2-4)^2+(10-4)^2} = \sqrt{4+36} = \sqrt{40}$