

## Polygon Unit Test Review 2016 Schmidt

**Directions:** You must show all work for all problems below. For the problems where you have a quadrilateral and use their properties, justify the set up, and provide the geometry. (Some may not have the information to do everything i.e. if no points are there, you cannot show the geometry). Failure to do so will result in a zero.

1. Find the sum of the measures of the interior angles of a convex 39-gon.

$$S = 180(39-2)$$

$$S = 6,660^\circ$$

$$S = 180(n-2)$$

2. Find the sum of the measures of the interior angles of a convex 26-gon.

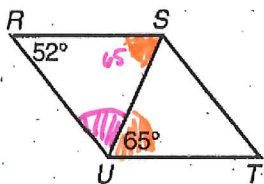
$$S = 180(26-2)$$

$$S = 4,320^\circ$$

3. Fill in the following table:

Number of Sides	Name of Polygon
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon
11	undecagon
12	dodecagon
n	n-gon 36-gon

4. For parallelogram  $RSTU$ , find  $m\angle RSU$  and  $m\angle RUS$ .



$$m\angle RSU = 65^\circ$$

$$m\angle RUS = 63^\circ$$

Geometry:

Justify:

Geometry:

Justify:

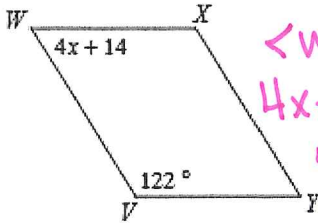
$$\angle RSU = \angle SUT$$

|| lines form  
 $\cong$  alt. int.  $\angle$ s

$$\begin{aligned} \angle R + \angle RSU + \angle RUS &= 180 \\ 52 + 65 + \angle RUS &= 180 \quad \Delta \text{ sum} \\ 117 + \angle RUS &= 180 \\ \angle RUS &= 63^\circ \end{aligned}$$

5. Solve for the missing angle or variable for the following PARALLELOGRAMS.

a.) Find x.



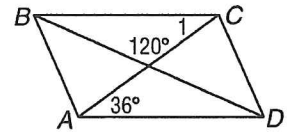
Geometry:

$$\begin{aligned} \angle W + \angle V &= 180 \\ 4x + 14 + 122 &= 180 \\ 4x + 136 &= 180 \\ 4x &= 44 \\ \boxed{x} &= 11 \end{aligned}$$

Justify:

con. int  $\angle$ s  
of a para  
are suppl.

b) Find m $\angle$ .



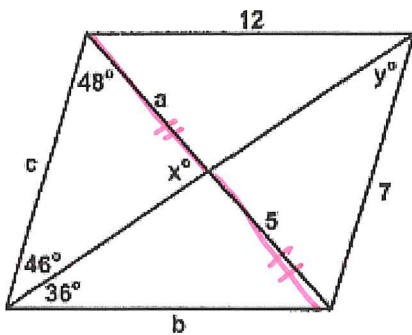
Geometry:

$$\begin{aligned} \angle 1 &= \angle CAD \\ \angle 1 &= 36^\circ \end{aligned}$$

Justify:

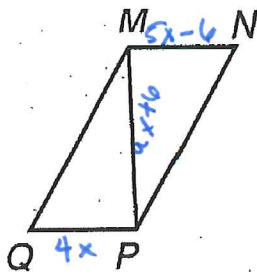
// lines form  
 $\cong$  alt. int  $\angle$ s

c) Find all variables.



$a = 5$  diags of a para bisect each other.  
 $b = 12$  op. sides of a para are  $\cong$   
 $c = 7$  op. sides of a para are  $\cong$   
 $x = 86^\circ$  by  $\Delta$  sum thm  
 $y = 46^\circ$  // lines form  $\cong$  alt. int  $\angle$ s.

6. Find x so that the quadrilateral is a parallelogram. Then find the side length of MP, QP, and MN.



Geometry:

$$\begin{aligned} MN &= QP \\ 5x - 6 &= 4x \\ -6 &= -1x \\ \boxed{6} &= x \end{aligned}$$

Justify:

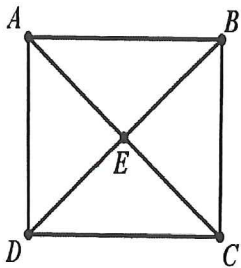
op. sides of a  
Para are  $\cong$

$$\begin{aligned} MP &= 9x + 6 \\ QP &= 4x \\ MN &= 5x - 6 \end{aligned}$$

$$MP = 9(6) + 6 = 60, \quad QP = 4(6) = 24, \quad MN = 5(6) - 6 = 24$$

x = 6    MP = 60    QP = 24    MN = 24

7. ABCD is a square. If  $AC = 16$  and  $BD = 2x + 4$ , find  $x$ .



Geometry:

Justify:

$$AC \cong BD$$

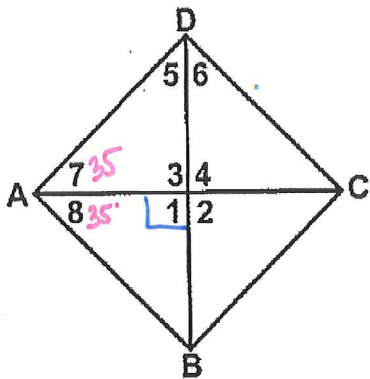
$$16 = 2x + 4$$

$$\begin{array}{r} -4 \\ \hline 12 = 2x \\ \boxed{6 = x} \end{array}$$

diags of squares are  $\cong$

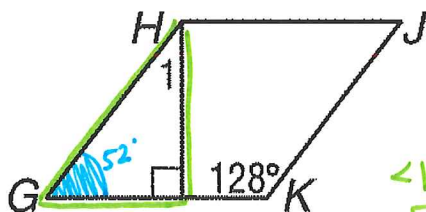
8. Rhombus Practice:

a.) For rhombus ABCD,  $m\angle 8 = 35$ , find the  $m\angle 1, m\angle 2, m\angle 3, m\angle 4, m\angle 5, m\angle 6,$  and  $m\angle 7$ .



- $m\angle 1 = 90^\circ$  Because: diags of a Rhombus are  $\perp$  to each other
- $m\angle 2 = 90^\circ$  Because: same
- $m\angle 3 = 90^\circ$  Because: " "
- $m\angle 4 = 90^\circ$  Because: " "
- $m\angle 5 = 55^\circ$  Because:  $\Delta$  sum after finding  $\angle 7$ .
- $m\angle 6 = 55^\circ$  Because: diags of a Rhombus bisect the angles.
- $m\angle 7 = 35^\circ$  Because: diags of a Rhombus bisect the angles

b.) For rhombus GHJK, find  $m\angle 1$



$\angle G + \angle K = 180^\circ$  Con. int  $\angle$ s are suppl.

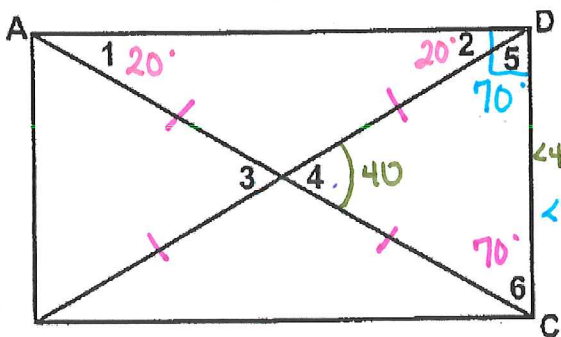
$\angle G + 128 = 180$

$\angle G = 52^\circ$

$\angle 1 + 52 + 90 = 180$   $\Delta$  Sum

$\angle 1 = 38^\circ$

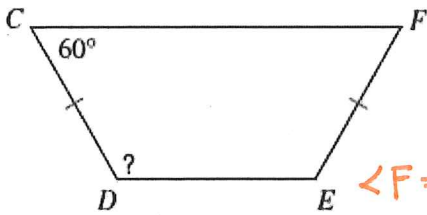
9. ABCD is a rectangle. If  $m\angle 1 = 20$ , find the  $m\angle 2, m\angle 3, m\angle 4, m\angle 5,$  and  $m\angle 6$ .



- $m\angle 2 = 20^\circ$  Because: base  $\angle$ s of an isosceles  $\Delta$  are  $\cong$
- $m\angle 3 = 40^\circ$  Because: Vertical  $\angle$ s are  $\cong$
- $m\angle 4 = 40^\circ$  Because:  $\Delta$  Sum
- $m\angle 5 = 70^\circ$  Because: def of Rectangle: 4 Right  $\angle$ s
- $m\angle 6 = 70^\circ$  Because: base angles of isosceles  $\Delta$ s are  $\cong$

This is the order the order to find the  $\angle$ s in

10. For isosceles trapezoid  $CDEF$ , find  $m\angle F$ ,  $m\angle E$ ,  $m\angle D$ , and  $EF$ .

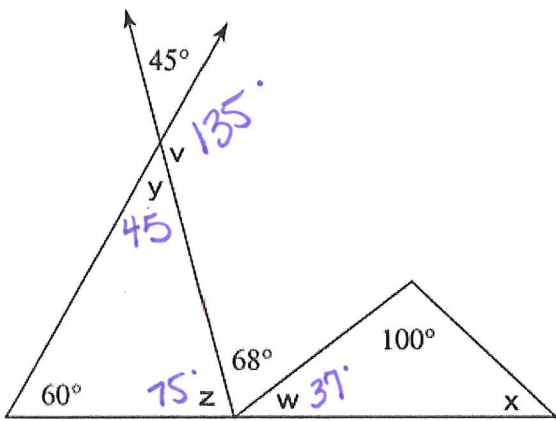


$m\angle F = \underline{\hspace{2cm}}$        $m\angle D = \underline{\hspace{2cm}}$

$m\angle E = \underline{\hspace{2cm}}$        $EF = \underline{\hspace{2cm}}$

$\angle F = 60^\circ$  base  $\angle$ s of isosceles trapezoids are  $\cong$   
 $\angle D = 120^\circ$  because con. int  $\angle$ s are suppl.  
 $\angle E = 120^\circ$  because base  $\angle$ s of isosceles traps are  $\cong$ .  
 $CD = EF$  legs are  $\cong$  def of isosceles trapezoids.

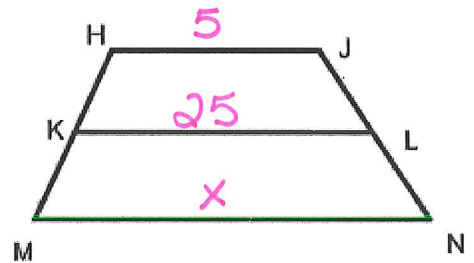
11. Find all of the missing angles.



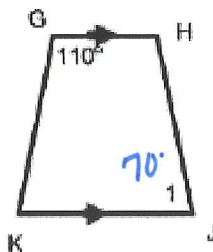
$v = \underline{135^\circ}$        $w = \underline{37^\circ}$        $x = \underline{43^\circ}$        $y = \underline{45^\circ}$        $z = \underline{75^\circ}$

12.  $LK$  is the midsegment of trapezoid  $HJNM$ . Find  $MN$  if  $HJ = 5$  and  $LK = 25$ .

$KL = \frac{1}{2}(HJ + MN)$        $x = 45$   
 $25 = \frac{1}{2}(5 + x)$        $MN = 45$   
 $25 = 2.5 + .5x$   
 $\frac{22.5}{.5} = \frac{.5x}{.5}$



13. For isosceles trapezoid  $GHJK$ , find  $\angle 1$ .



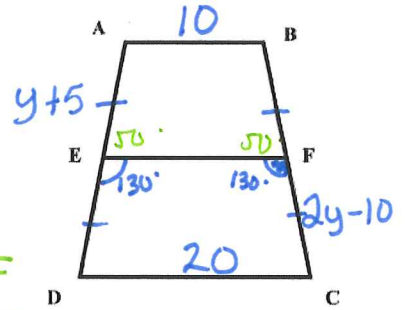
$\angle 1 = 70^\circ$

14. Given isosceles trapezoid ABCD, EF is the midsegment. Find EF, AD, and  $m\angle AEF$  if  $AB=10$ ,  $CD=20$ ,  $AE=y+5$ ,  $FC=2y-10$ , and  $m\angle EFC=130^\circ$

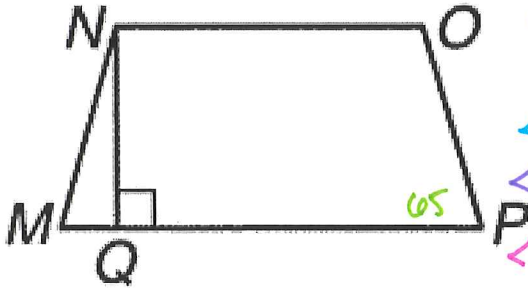
EF = 15  
 AD = 40  
 $m\angle AEF =$  $50^\circ$

$EF = \frac{1}{2}(10+20)$   
 $\boxed{AE = FC}$   
 $y+5 = 2y-10$   
 $5 = y-10$   
 $\boxed{15=y}$

$AE = 15+5$   
 $AE = 20$   
 so  $\boxed{AD = 40}$   
 $\angle BFE \cong \angle AEF$   
 $50 = \angle AEF$

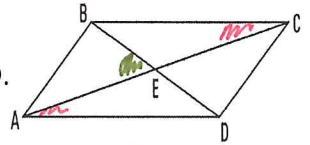


15. For isosceles trapezoid MNOP, find  $m\angle M$ ,  $m\angle O$ ,  $m\angle QNO$  and  $m\angle MNQ$  if  $\angle P = 65^\circ$ .



$\angle M = 65^\circ$  base  $\angle$ s of isosceles traps are  $\cong$   
 $\angle O = 115^\circ$  con. int  $\angle$ s of trap. are suppl.  
 $\angle QNO = 90^\circ$  con. int  $\angle$ s are suppl.  
 $\angle MNQ = 25^\circ$   $\Delta$  sum

16. Write geometric statement along with the correct justification for parallelogram ABCD.



- a.)  $AB \cong CD$  because: op. sides of a para are  $\cong$
- b.)  $\angle ABC \cong \angle CDA$  because: op.  $\angle$ s of a para are  $\cong$
- c.)  $EA \cong EC$  because: diags of a para bisect each other
- d.)  $BC \parallel AD$  because: Def of para: op. sides are  $\parallel$
- e.)  $\angle BAD \cong \angle BCD$  because: op.  $\angle$ s of a para are  $\cong$
- f.)  $\angle BEA \cong \angle CED$  because: vertical  $\angle$ s are  $\cong$
- g.)  $\angle BCA \cong \angle DAC$  because:  $\parallel$  lines form  $\cong$  alt. int.  $\angle$ s.
- h.)  $\angle BCD + \angle ADC = 180$  because: con. int  $\angle$ s of a para are suppl.

17. Use rhombus PLAN to write the correct geometric statement (if needed) and justification.

a.)  $AL \cong PL$  because: def of rhombus: 4  $\cong$  sides.

b.)  $\angle NEA = 90$  because: diags of a Rhombus are  $\perp$  to each other.

c.)  $EA \cong PE$  because: diags of a Rhombus bisect each other

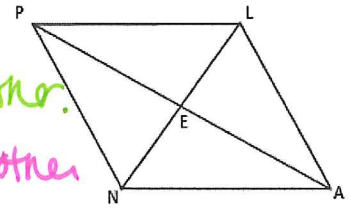
d.)  $NA \parallel PL$  because: a Rhombus is a parallelogram: op. sides are  $\parallel$

e.)  $\angle NPE \cong \angle LPE$  because: diags of a Rhombus bisect the angles.

f.)  $\angle PLA \cong \angle PNA$  because: op.  $\angle$ s of a Rhombus are  $\cong$

g.)  $\angle LNA \cong \angle PNL$  because: diags of a Rhombus bisect the  $\angle$ s.

h.)  $\angle LEA = 90$  because: diags of a Rhombus are  $\perp$



18. Use rectangle RECT to write the correct geometric statement (if needed) and justification.

a.)  $RC \cong TE$  because: diags of a Rect. are  $\cong$

b.)  $\angle TCE = 90$  because: def of Rect: all  $\hat{R}$  Right  $\angle$ s

c.)  $EA \cong AT$  because: diags of a Rect. bisect each other (there are segs. that EA is  $\cong$  to!)

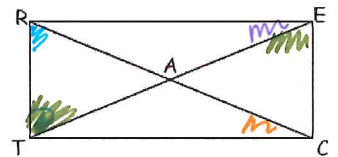
d.)  $RE \parallel TC$  because: a rectangle is a para, op. sides are  $\parallel$ .

e.)  $\angle TRA \cong \angle RTA$  because: base  $\angle$ s of isosceles  $\Delta$ s are  $\cong$

f.)  $\angle RAE \cong \angle CTE$  because:  $\parallel$  lines form  $\cong$  alt. int.  $\angle$ s. vertical  $\angle$ s are  $\cong$

g.)  $\angle RTE \cong \angle TES$  because:  $\parallel$  lines form  $\cong$  alt. int.  $\angle$ s

h.)  $\angle TCR + \angle ECR = 90$  because: def of Rectangle: all  $\hat{R}$  Right  $\angle$ s.



19. ABCD is a quadrilateral with the following information. Determine if ABCD is a parallelogram, rhombus, rectangle and/or square.

Slope AB =  $-1/5$       Slope DC =  $-1/5$       Slope DA =  $3/2$       Slope BC =  $3/2$

AB =  $\sqrt{26}$       DC =  $\sqrt{26}$       DA =  $\sqrt{13}$       BC =  $\sqrt{13}$

ABCD IS a parallelogram because op. sides are parallel (same slope)

ABCD IS NOT a rhombus because all sides are not  $\cong$

ABCD IS NOT a rectangle because it doesn't have 4 right  $\angle$ s ( $\perp$  slopes)

ABCD IS NOT a square because it does not have 4  $\cong$  sides or right  $\angle$ s

(is or is not)

20. ABCD is a quadrilateral with the following information. Determine if ABCD is a parallelogram, rhombus, rectangle and/or square.

Slope AB =  $-3$       Slope DC =  $-3$       Slope DA =  $1/3$       Slope BC =  $1/3$

AB =  $2\sqrt{10}$       DC =  $2\sqrt{10}$       DA =  $2\sqrt{10}$       BC =  $2\sqrt{10}$

ABCD IS a parallelogram because op. sides are parallel (same slope)

ABCD IS a rhombus because all 4 sides are  $\cong$  (= distance)

ABCD IS a rectangle because it has 4 right  $\angle$ s ( $\perp$  slopes)

ABCD IS a square because it has 4  $\cong$  sides and 4 Right  $\angle$ s  
(= distance)      ( $\perp$  slopes)

(is or is not)

21. ABCD is a quadrilateral with the following information. Determine if ABCD is a parallelogram, rhombus, rectangle and/or square.

Slope AB =  $\frac{4}{3}$       Slope DC =  $\frac{4}{3}$       Slope DA = undefined      Slope BC = undefined

AB = 5      DC = 5      DA = 5      BC = 5

ABCD IS a parallelogram because op. sides are parallel (same slope)

ABCD IS a rhombus because it has 4  $\cong$  sides (= distance)

ABCD IS NOT a rectangle because it does not have 4 right  $\angle$ 's ( $\perp$  slopes)

ABCD IS NOT a square because it has 4  $\cong$  sides but not 4 Right  $\angle$ 's (= distance)

(is or is not)

22. ABCD is a quadrilateral with the following information. Determine if ABCD is a parallelogram, rhombus, rectangle and/or square.

Slope AB = -2      Slope DC = -2      Slope DA =  $\frac{1}{2}$       Slope BC =  $\frac{1}{2}$

AB =  $2\sqrt{13}$       DC =  $2\sqrt{13}$       DA =  $2\sqrt{5}$       BC =  $2\sqrt{5}$       P =  $4\sqrt{13} + 4\sqrt{5}$

ABCD IS a parallelogram because op. sides are parallel (same slope)

ABCD IS NOT a rhombus because all sides are not  $\cong$  ( $\neq$  distance)

ABCD IS a rectangle because it has all Right  $\angle$ 's ( $\perp$  slopes)

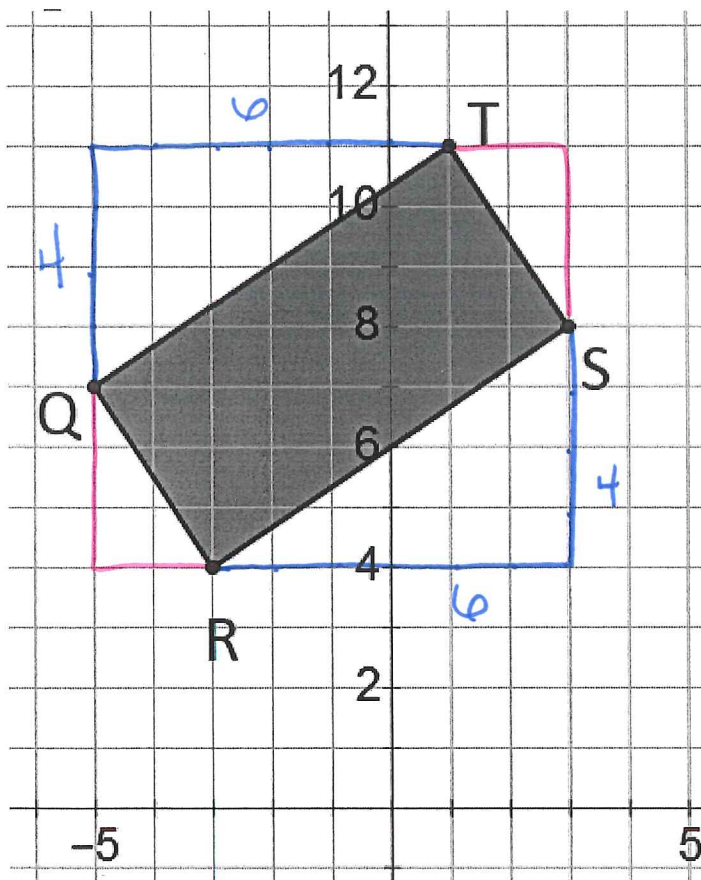
ABCD IS NOT a square because it only has 4 right  $\angle$  but not = sides

(is or is not)



23.  
19

19. Classify  $QRST$  with vertices  $Q(-5, 7)$ ,  $R(-3, 4)$ ,  $S(3, 8)$ , and  $T(1, 11)$ . SHOW ALL WORK!!!! Show all distances, all slopes, find the area and perimeter of the figure.



$$\text{slope } QT = \frac{4}{6} = \frac{2}{3}$$

$$\text{slope } RS = \frac{4}{6} = \frac{2}{3}$$

$QT \parallel RS$

$$\text{slope } TS = -\frac{3}{2}$$

$$\text{slope } QR = -\frac{3}{2}$$

$TS \parallel QR$

\* so slopes are  $\parallel$ !

But are they  $\perp$ ? \* means do we have op. recip slopes?

$\frac{2}{3}$  and  $-\frac{3}{2}$  are op. recip!!

\* so we have Right  $\angle$ s!

$$QT: 4^2 + 6^2 = QT^2$$

$$\sqrt{52} = QT$$

$$QR: 3^2 + 2^2 = QR^2$$

$$\sqrt{13} = QR$$

$$RS: 4^2 + 6^2 = RS^2$$

$$\sqrt{52} = RS$$

$$TS: 3^2 + 2^2 = TS^2$$

$$\sqrt{13} = TS$$

$QT \cong RS$   $\leftarrow$  but these are not  $\cong$  to each other  $\rightarrow$   $QR \cong TS$

$QRST$  IS a parallelogram because op. sides are parallel

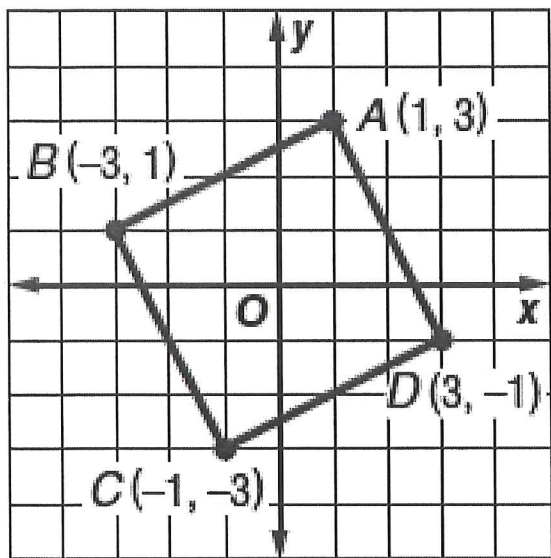
$QRST$  IS NOT a rhombus because all 4 sides are not =.

$QRST$  IS a rectangle because it has 4 right angles ( $\perp$  slopes)

$QRST$  IS NOT a square because it has 4 right  $\angle$ s but not 4  $\cong$  sides.

$$P = 2\sqrt{52} + 2\sqrt{13}$$

20. Classify  $ABCD$  SHOW ALL WORK!!!! Show all distances, all slopes, find the area and perimeter of the figure.



$$\text{Slope } BC = \frac{-4}{2} = -2$$

$$\text{Slope } AD = \frac{-4}{2} = -2$$

$$\text{Slope } AB = \frac{2}{4} = \frac{1}{2}$$

$$\text{Slope } CD = \frac{2}{4} = \frac{1}{2}$$

$$AB = 2\sqrt{5}, BC = 2\sqrt{5}$$

$$AD = 2\sqrt{5}, CD = 2\sqrt{5}$$

$$\boxed{\sqrt{20}}$$

$$\textcircled{-1}$$



Students must show work for distance.

$$\boxed{P = 8\sqrt{5}}$$

ABCD IS a parallelogram because op. sides are // (same slope)

ABCD IS a rhombus because all 4 sides are  $\cong$  (= distance)

ABCD IS a rectangle because all 4 right  $\angle$ s ( $\perp$  slopes)

ABCD IS a square because all 4 sides  $\cong$  and all 4 right  $\angle$ s  
(= distance) ( $\perp$  slopes)