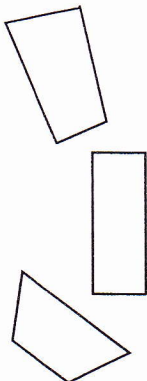
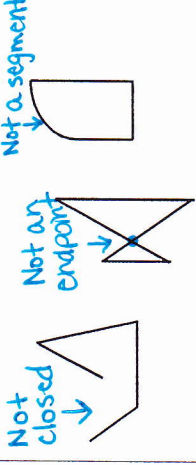


NOTES 7.2 & 7.3: PARALLELOGRAMS

Objective: _____

QUADRILATERALS: A closed figure formed by 4 segments intersecting at their endpoints

Quadrilaterals	Not Quadrilaterals
	 <p>Not closed</p> <p>Not an endpoint</p> <p>Not a segment</p>

PARALLELOGRAM: A quadrilateral in which opposite sides are parallel

EXAMPLE 1:

a) The parallelogram at the right has four vertices. They are:

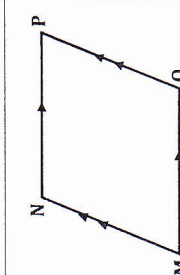
M, N, Q, & P

b) It would be NAMED: □MNPQ

c) The OPPOSITE SIDES of □MNPQ are: $\overline{MN} \nparallel \overline{QP}$; $\overline{NP} \nparallel \overline{MQ}$

d) The OPPOSITE ANGLES of □MNPQ are: $\angle N \ncong \angle Q$; $\angle M \ncong \angle P$

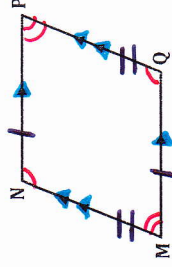
e) The CONSECUTIVE ANGLES of □MNPQ are: $\angle N \ncong \angle P$; $\angle P \ncong \angle Q$; $\angle Q \ncong \angle M$; $\angle M \ncong \angle N$



Using □MNPQ, what conjectures can you make about the following:

a) OPPOSITE SIDES

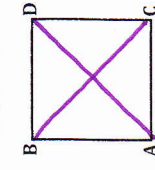
- Parallel
 - Congruent
- b) OPPOSITE ANGLES
- Congruent
- c) CONSECUTIVE ANGLES
- Supplementary



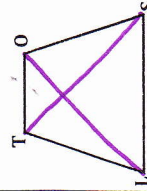
When polygons have more than three sides, they have diagonals.

DIAGONALS: A segment joining the opposite vertices in a polygon

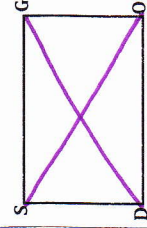
EXAMPLE 2: Name the following.



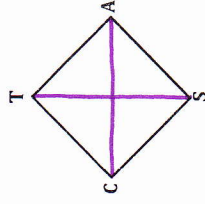
Vertices: A, B, C, D
 Name: □ABDC
 Opposite Vertices: A & D ; B & C
 Diagonals: AC & BD



Vertices: T, O, L, S
 Name: □LTOS
 Opposite Vertices: L & O ; T & S
 Diagonals: TS & OL



Vertices: S, D, E, O
 Name: □DSGO
 Opposite Vertices: S & O ; D & E
 Diagonals: DO & SE



Vertices: C, A, T, S
 Name: □CTAS
 Opposite Vertices: C & A ; T & S
 Diagonals: CA & TS

Notes 7.2 & 7.3 (Continued)

BISECT: To cut into equal parts

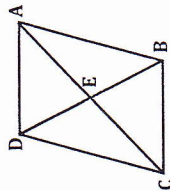
* Diagonals of a parallelogram bisect each other.

Thus, parallelograms have five properties. They are:

- 1) Opposite sides are parallel
- 2) Opposite sides are congruent
- 3) Opposite angles are congruent
- 4) Consecutive angles are supplementary
- 5) Diagonals bisect each other

EXAMPLE 3:

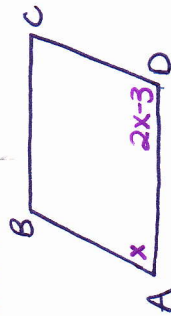
Complete each statement regarding the parallelogram below.



- a) Name the parallelogram: ▭ABCD
- b) $\overline{AB} \parallel$ \overline{DC}
- c) $\overline{DA} \cong$ \overline{CB}
- d) $\angle CDA \cong$ $\angle ABC$
- e) $\overline{DE} \cong$ \overline{EB}

EXAMPLE 4:

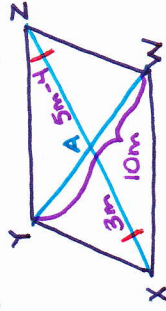
If ABCD is a parallelogram, $m\angle A = x^\circ$, and $m\angle D = (2x - 3)^\circ$, find the value of 'x'.



Consecutive \angle s are supplementary!
 $x + 2x - 3 = 180$
 $3x = 183$
 $x = 61$

EXAMPLE 5:

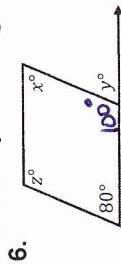
XYZW is a parallelogram with diagonals \overline{XZ} and \overline{YW} that intersect at point A. If $XA = 3m$, $ZA = 5m - 4$, and $YW = 10m$, find 'm'.



Diagonals bisect each other!
 $XA = ZA$
 $3m = 5m - 4$
 $-2m = -4$
 $m = 2$

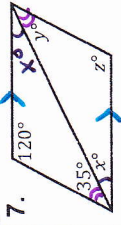
EXAMPLES:

For each parallelogram, find the values of 'x', 'y', and 'z'.



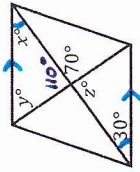
$80 + z = 180$

$x = 80$; $y = 80$; $z = 100$



$35 + 120 + x = 180$
 $155 + x = 180$

$x = 25$; $y = 35$; $z = 120$

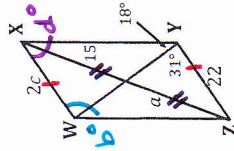


$z + 70 = 180$
 $110 + 30 + y = 180$
 $140 + y = 180$

$x = 30$; $y = 40$; $z = 110$

EXAMPLE 9:

WXYZ is a parallelogram. $m\angle ZWX = b^\circ$ and $m\angle WXY = d^\circ$. Find the values of 'a', 'b', 'c', and 'd'.



$a = 15$
 $b = 49$
 $c = 11$
 $d = 131$

$2c = 22$
 $c = 11$
 $b = 31 + 18$
 $b = 49$
 $49 + d = 180$
 $d = 131$