5.1 Properties of Parallelograms Guided Notes

(1) A parallelogram is a quad w/ 2 pairs of parallel sides. Symbol: ▱

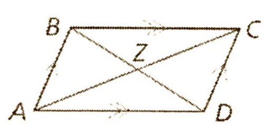
use slope formula to see if sides are ∥. $\frac{y_2-y_1}{x_2-x_1}$

Theorem 6-2-1 Properties of Parallelograms

THEOREM	HYPOTHESIS	CONCLUSION
(2) If a quadrilateral is a parallelogram, then its opposite sides are congruent. (▱ → opp. sides ≅)		$\overline{AB} \cong \overline{CD}$ $\overline{BC} \cong \overline{DA}$

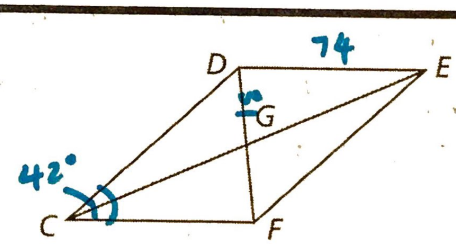
Distance Form: $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Theorems Properties of Parallelograms

THEOREM	HYPOTHESIS	CONCLUSION
(3) **6-2-2** If a quadrilateral is a parallelogram, then its opposite angles are congruent. (▱ → opp. ∡ ≅)		$\angle A \cong \angle C$ $\angle B \cong \angle D$
(4) **6-2-3** If a quadrilateral is a parallelogram, then its consecutive angles are supplementary. (▱ → cons. ∡ supp.)		$m\angle A + m\angle B = 180°$ $m\angle B + m\angle C = 180°$ $m\angle C + m\angle D = 180°$ $m\angle D + m\angle A = 180°$
(5) **6-2-4** If a quadrilateral is a parallelogram, then its diagonals bisect each other. (▱ → diags. bisect each other)		$\overline{AZ} \cong \overline{CZ}$ $\overline{BZ} \cong \overline{DZ}$

midpoint Form. $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Example: In ▱*CDEF*, *DE* = 74 mm, *DG* = 31 mm, &m∠*FCD* = 42°.



1) Find CF. $\boxed{74}$ (opposite side of DE) ≅

2) Find m∠EFC. $\boxed{138°}$ (consecutive ∠'s are supp)

Example: *WXYZ* is a parallelogram.

4) Find YZ.

$6a+10 = 8a-4$
$\quad +4 \qquad +4$

$6a+14 = 8a$
$-6a \qquad -6a$

$14 = 2a$

$a=7$

$\boxed{52}$

5) Find m∠*Z*.

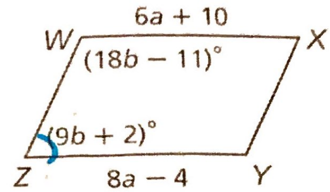
$\underbrace{9b+2+18b}-11 = 180$

$27b-9 = 180$
$\quad +9 \quad +9$

$27b = 189$

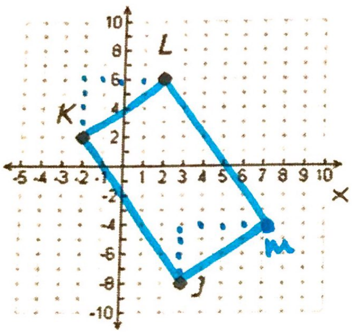
$b=7$

$\boxed{m\angle Z = 65^\circ}$



Example: Three vertices of ▱*JKLM* are *J*(3, −8), *K*(−2, 2), and *L*(2, 6). Find the coordinates of vertex *M*.

5)



up 4
rt 4 (from K to L)

count up 4, rt 4 from J to find M.

$\boxed{(7,-4)}$

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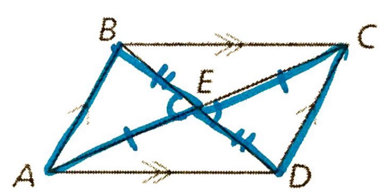
6) Write a two-column proof.

Given: ABCD is a parallelogram.

Prove: $\Delta AEB \cong \Delta CED$



Statement	Reason
① ABCD is ▱	① Given
② $\overline{BE} \cong \overline{ED}$, $\overline{AE} \cong \overline{EC}$	② ▱ → diagonals bisect
③ $\angle BEA \cong \angle CED$	③ vertical ∠s.
④ $\Delta AEB \cong \Delta CED$	④ SAS ≅