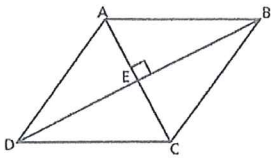
# Rhombi Notes

Key

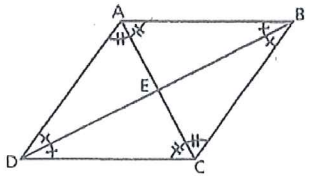
A rhombus is a special parallelogram with four congruent sides. Because a rhombus is a parallelogram, it has all of the properties of a parallelogram along with the following NEW properties.

1. (NEW)




The diagonals are perpendicular to each other.
$\overline{AC} \perp \overline{BD}$

2. (NEW)

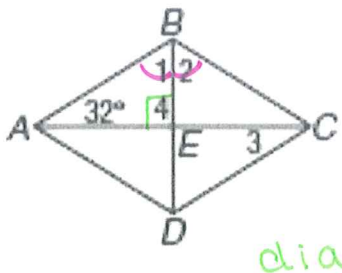



Each diagonal bisects a pair of opposite angles.
$\angle EDC \cong \angle ABE \cong \angle EBC \cong \angle ADE$
$\angle DCE \cong \angle ECB \cong \angle DAE \cong \angle EAB$

**Properties of Parallelograms**

- Opposite sides of a parallelogram are congruent
- Opposite angles of a parallelogram are ~~equal~~ $\cong$
- Consecutive angles of a parallelogram are supplementary
- The sum of the angles of a parallelogram are $180(4-2) = 180 \cdot 2 = 360°$
- The diagonals of a parallelogram bisect each other

Example 1.) In rhombus ABCD, m<BAC = 32. Find the measure of each angle.




Δ sum w/ 4+32

m<1 = 58°

diagonals bisect the angles

m<2= 58°

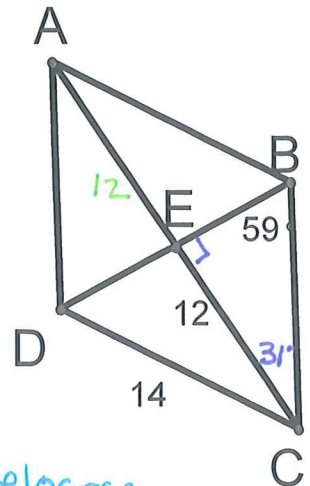
alt. int ∠s are ≅

m<3= 32°

diagonals are ⊥

m<4= 90°

Example 2.) Use *Rhombus* ABCD to solve each problem. List the property that you used to answer the each question.




a. $m\angle BCE$ = 31° Property: Δ Sum

b. $m\angle BEC$ = 90° Property: diagonals are ⊥

c. AC = 24 Property: diagonals bisect each other segment addition

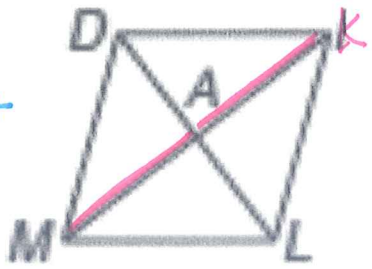
d. $m\angle ABD$ = 59° Property: diagonals bisect the ∠s

e. AD = 14 Property: def of a Rhombus, a parallelogram w/ 4 ≅ sides.

**Properties of Rhombi**

- Opposite sides of a parallelogram are congruent
- Opposite angles of a parallelogram are equal
- Consecutive angles of a parallelogram are supplementary
- The sum of the angles of a parallelogram are $180(4-2) = 180 \cdot 2 = 360°$
- The diagonals of a parallelogram bisect each other
- *Diagonals are perpendicular to each other*
- *Diagonals bisect the angles*

Example 3. Rhombus DKLM with AM = 4x, AK = 5x-3 and DL = 10




a. *find x.* $AM = AK$ (diagonals bisect each other)
Property: $4x = 5x - 3$
$-x = -3$
$x = 3$

b. *AK* = 12 *AM*= 12
Property: diagonals bisect each other.

c. DA= 5 ($DA = \frac{1}{2} DL$)
Property: diags bisect each other

d. m<MAL= 90°
Property: diagonals are ⊥

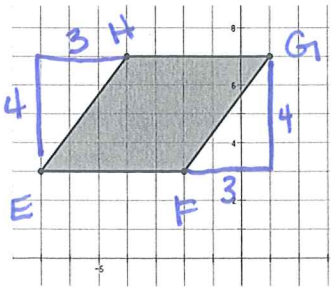
e. What is the value of x if $m\angle KML = (5x + 5)°$ and $m\angle DMK = (7x - 19)°$?

diagonals bisect the angles so $\angle KML \cong \angle DMK$

$5x + 5 = 7x - 19$
$5 = 2x - 19$
$+19 \quad +19$
$24 = 2x$
$x = 12$

Example 4.
Determine whether the figure with vertices E(-7,3), F(-2,3), G(1,7) H(-4,7) is a rhombus.

To be a rhombus, you must test for 4 ≅ Sides




$4^2 + 3^2 = GF^2$
$16 + 9 = GF^2$
$25 = GF^2$
$5 = GF$

$3^2 + 4^2 = HE^2$
$5 = HE$

$HG = 5$
$EF = 5$

$GF = HE = HG = EF$ ∴ all 4 sides are ≅ and HGFE is a Rhombus