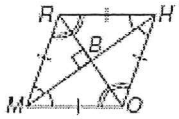
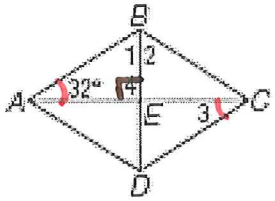
Rhombi and Squares Notes

Properties of Rhombi A **rhombus** is a quadrilateral with four congruent sides. Opposite sides are congruent, so a rhombus is also a parallelogram and has all of the properties of a parallelogram. Rhombi also have the following properties.



The diagonals are perpendicular.	$\overline{MH} \perp \overline{RO}$
Each diagonal bisects a pair of opposite angles.	$\overline{MH}$ bisects $\angle RMO$ and $\angle RHO$. $\overline{RO}$ bisects $\angle MRH$ and $\angle MOH$.
If the diagonals of a parallelogram are perpendicular, then the figure is a rhombus.	If $RHOM$ is a parallelogram and $\overline{RO} \perp \overline{MH}$, then $RHOM$ is a rhombus.

Example In rhombus $ABCD$, $m\angle BAC = 32$. Find the measure of each numbered angle.



$\angle 4 = 90°$ diag. of rhombus are $\perp$

$\angle 1 + 32 + 90 = 180$ $\triangle$ sum Thm

$\angle 1 + 122 = 180$

$\angle 1 = 58°$

$\angle 3 = 32°$ alt. int. $\angle$ are $\cong$

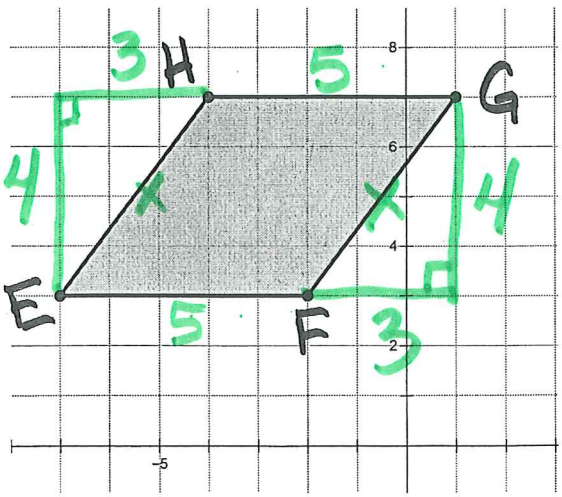
$\angle 1 \cong \angle 2$ diag. bisect the angles

$\angle 2 = 58°$

2. 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 $\cong$ sides

* check distance



HG = 5

EF = 5

HE = 5

FG = 5

HE: $4^2 + 3^2 = x^2$

$16 + 9 = x^2$

$\sqrt{25} = \sqrt{x^2}$

$x = 5$

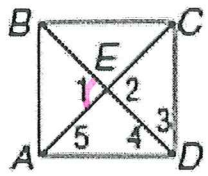
FG: $4^2 + 3^2 = x^2$

FG = 5

Since all 4 sides $\cong$, we have a rhombus.

Properties of Squares A square has all the properties of a rhombus and all the properties of a rectangle.

Example Find the measure of each numbered angle of square *ABCD*.

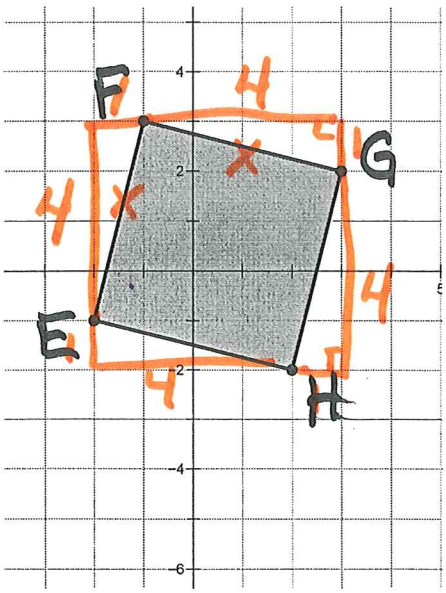


$\angle 1 = 90°$ diag. in a square are ⊥
$\angle 2 = 90°$

$\angle 3 = 45°$
$\angle 4 = 45°$
$\angle 5 = 45°$
} all 4 angles are 90° and diag. bisect those angles

2. Determine whether the figure with vertices E(-2,-1), F(-1,3), G(3,2), and H(2,-2) is a square.

To be a square, you must test for 4 right angles and 4 ≅ sides



Distance:

FG: $4^2+1^2=x^2$
$16+1=x^2$
$\sqrt{17}=\sqrt{x^2}$
$FG=\sqrt{17}$

FE: $4^2+1^2=x^2$
$FE=\sqrt{17}$

GH: $4^2+1^2=x^2$
$GH=\sqrt{17}$

EH: $4^2+1^2=x^2$
$EH=\sqrt{17}$

∴ all ≅ sides

Slopes:

$EH=-\frac{1}{4}$
$GH=\frac{4}{1}=4$
$FG=-\frac{1}{4}$
$FE=\frac{4}{1}=4$

∴ 4 right angles

We have a Square!