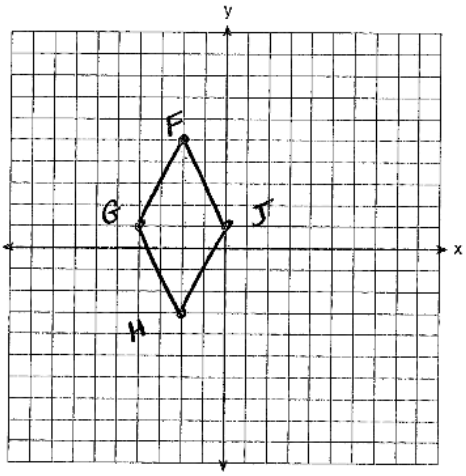
Name: Key Geometry

HW 11-3: Coordinate Proofs with Parallelograms

1. Given: Quadrilateral FGHJ with vertices F(-2, 5), G(-4, 1), H(-2, -3) and J(0, 1)



Prove: Quadrilateral FGHJ is a parallelogram

G-SLOPES

Show: $\overline{GF} \parallel \overline{HJ}$, $\overline{GH} \parallel \overline{FJ}$ Use: $m = \frac{\Delta y}{\Delta x}$

Math:

m of $\overline{GF} = \frac{4}{2} = \frac{2}{1}$ } same slope → ||

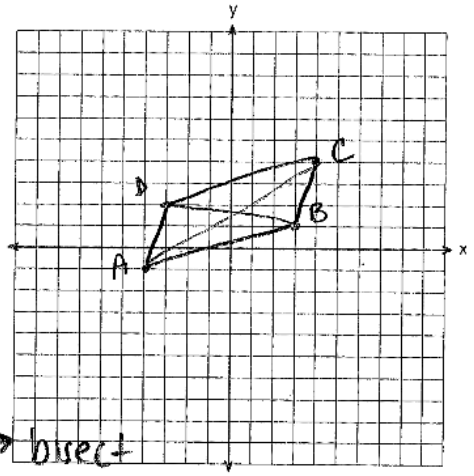
m of $\overline{HJ} = \frac{4}{2} = \frac{2}{1}$ }

m of $\overline{GH} = -\frac{4}{2} = -2$ } same slope → ||

m of $\overline{FJ} = -\frac{4}{2} = -2$ }

Summary: since both pairs of opp sides are ||, FGHJ is a □

2. Prove the a quadrilateral with vertices A(-4, -1), B(3, 1), C(4, 4) and D(-3, 2) is a parallelogram.



Show: diag. bisect (same midpoint)

Use: $\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

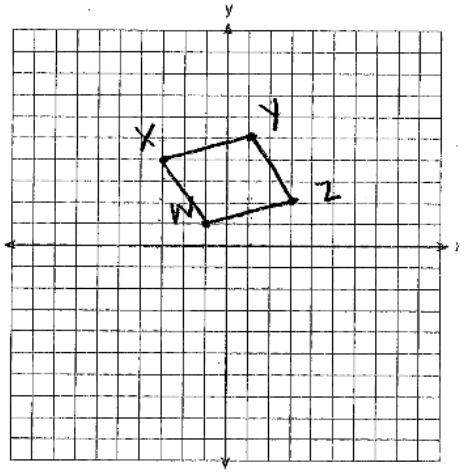
math:

DB: $\left(\frac{-3+3}{2}, \frac{2+1}{2}\right) = \left(0, \frac{3}{2}\right)$ } same mdpt → bisect

AC: $\left(\frac{-4+4}{2}, \frac{-1+4}{2}\right) = \left(0, \frac{3}{2}\right)$ }

Summary: since the diagonals have the same mdpt, they bisect. Since diagonals bisect, ABCD is a □.

3. Prove that a quadrilateral with vertices W(-1, 1), X(-3, 4), Y(1, 5) and Z(3, 2) is a parallelogram.



Show: $\overline{XY} \parallel \overline{WZ}$
$\overline{XW} \parallel \overline{YZ}$

Use: $m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$

Math:

m of $\overline{XY} = \frac{1}{4}$
m of $\overline{WZ} = \frac{1}{4}$ } same slope → ||

m of $\overline{XW} = -\frac{3}{2}$
m of $\overline{YZ} = -\frac{3}{2}$ } same slope → ||

Summary:
Since both pairs of opp sides are ||, WXYZ is a □.

Lesson 4: The Rhombus

A **rhombus** is a parallelogram with 4 congruent sides.

Properties you need to know about the rhombus:

A rhombus is a polygon with 4 sides and 4 angles.
The sum of the interior angles is 360°.
The sum of the exterior angles is 360°.

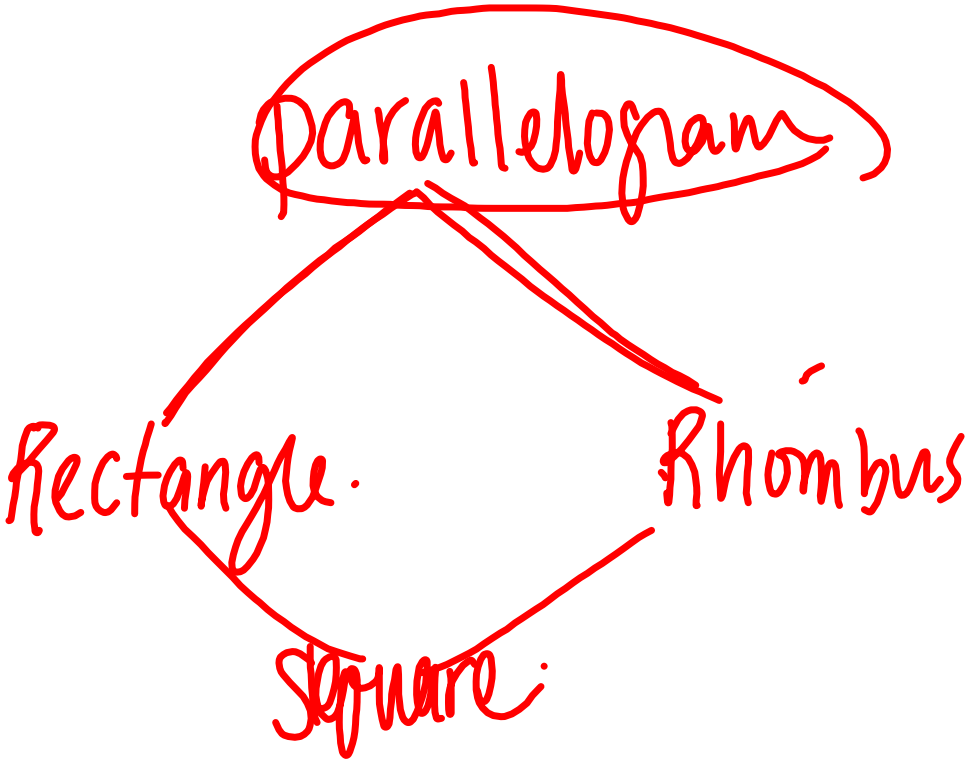
} [The Quadrilateral Properties]

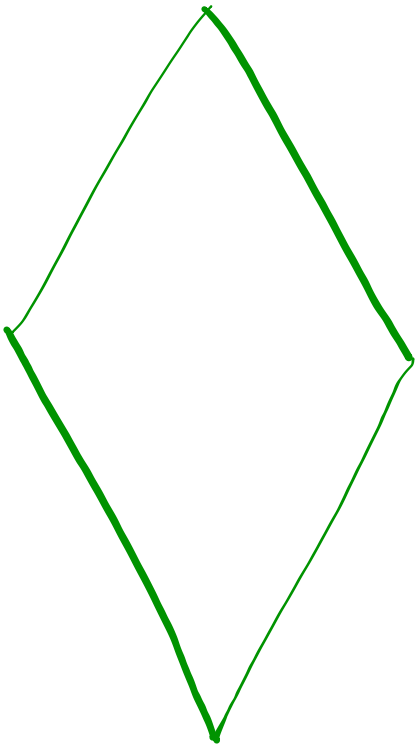
Opposite sides are parallel.
Opposite sides are congruent.
Opposite angles are congruent.
Consecutive angles are supplementary.
The diagonals bisect each other.
The diagonal divides the parallelogram into 2 congruent triangles

} [The Parallelogram Properties]

Rhombus

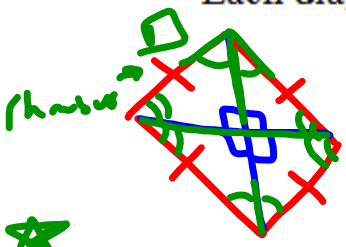
1) rhombus → 


Parallelogram
Rectangle.
Rhombus
Square.



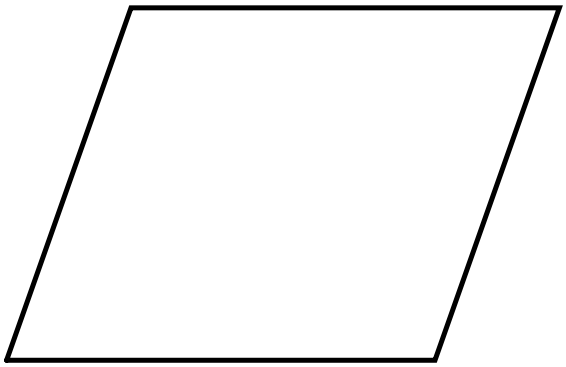
Additional Properties

- All four sides are congruent.
- The diagonals are perpendicular. ⊥ → R+ ∠'s
- Each diagonal bisects the pairs of opposite angles.

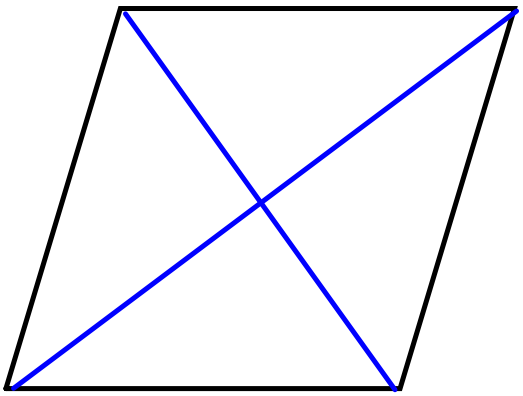


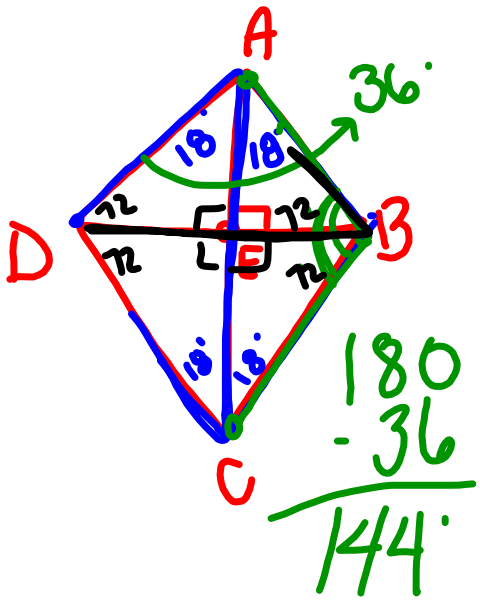
2) rhombus → consecutive sides ≅ (4 ≅ sides)
3) rhombus → ⊥ diagonals
4) rhombus → diagonals bisect opposite ∠'s

x 1: $ABCD$ is a rhombus. If $AB = (13x - 505)$ and $CD = (2x - 76)$, find the value of and the perimeter of rhombus $ABCD$.



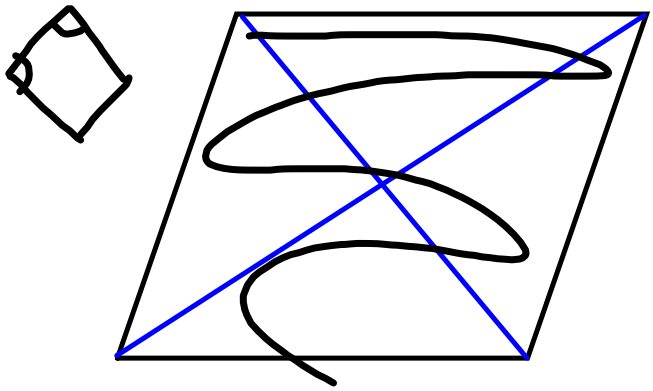
Ex 2: In rhombus $ABCD$, the diagonals intersect at E. If $m\angle DAC = 18°$, find $m\angle ABC$.

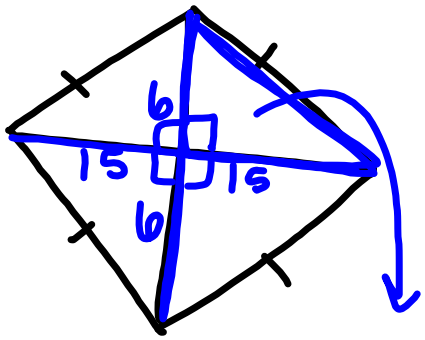


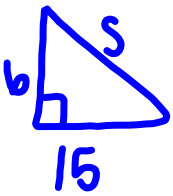


4 ≅ sides

Ex 3: In simplest radical form, find the perimeter of a rhombus with diagonals of length 12 cm and 30 cm.







$a^2+b^2=c^2$

$6^2+15^2=c^2$

$36+225=c^2$

$\sqrt{261}=\sqrt{c^2}$

$\sqrt{9}\sqrt{29}=c$

$3\sqrt{29}=s$

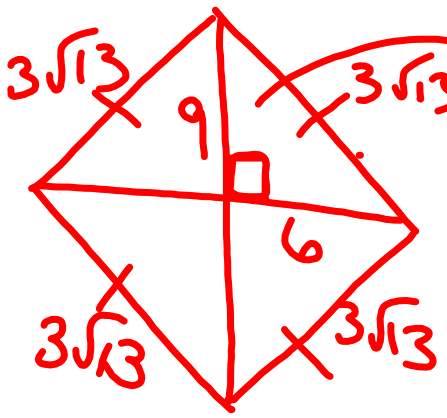
4 (9, 16 ....

$P=4s$

$=4(3\sqrt{29})$

$P=12\sqrt{29}$

Ex 4: In simplest radical form, find the perimeter of a rhombus with diagonals 12 in and 18 in.



$6^2+9^2=c^2$

$36+81=c^2$

$\sqrt{117}=\sqrt{c^2}$

$\sqrt{9}\sqrt{13}=c$

$\boxed{3\sqrt{13}=s}$

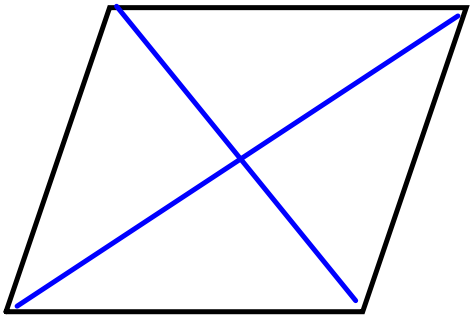
$P=4s$

$=4(3\sqrt{13})$

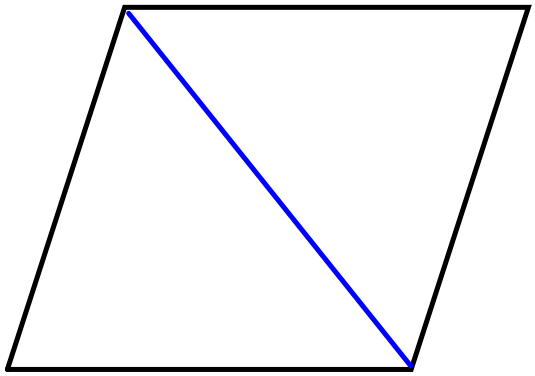
$P=12\sqrt{13}$

4, 9, 16, 25, ...

Ex 5: In simplest radical form, find the perimeter of a rhombus with diagonals 12 in and 28 in.

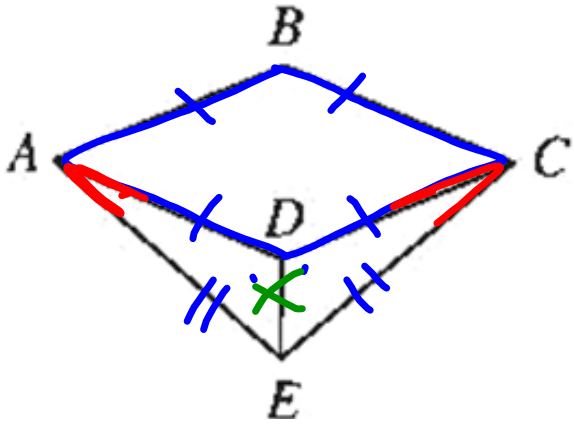


Ex 6: In rhombus $RSTW$, $m\angle RST = 96°$. Find $m\angle SRT$.



Ex 7: Given: $ABCD$ is a rhombus $\overline{AE} \cong \overline{CE}$

Prove: $\angle ADE \cong \angle CDE$ CPCTC



Statements	Reasons
1. ABCD is a Rhombus AE ≅ CE (S)	1. Given
2. DE ≅ DE (S)	2. Reflexive
3. AD ≅ CD (S)	3. Rhombus → 4 ≅ sides
4. △ADE ≅ △CDE	4. SSS
5. ∠ADE ≅ ∠CDE	5 CPCTC

HW 11-4

Homework Packet 11-4