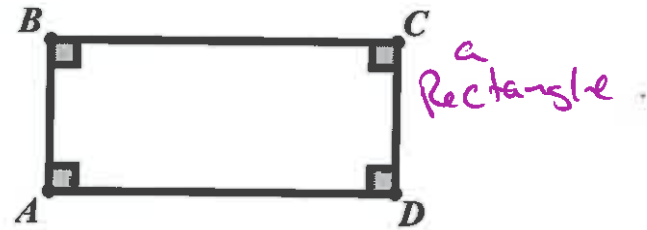
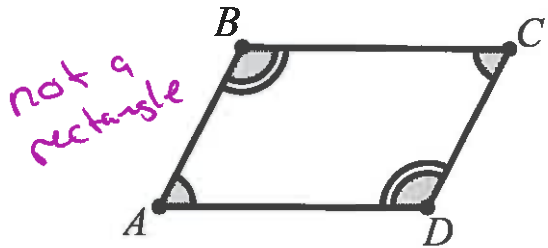


Special Parallelograms

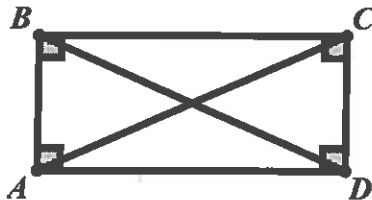
Rectangle: Quadrilateral with 4 \cong \angle 's (4 right \angle 's)

A rectangle has all the properties of a parallelogram.



Diagonals of a Rectangle:

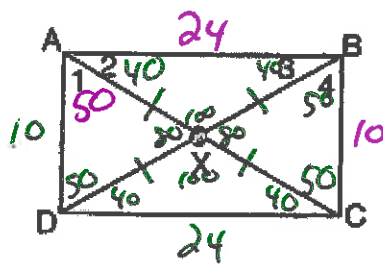
- Bisect each other (because it's a \parallel -gram)
- are \cong .



$\overline{BD} \cong \overline{AC}$

Example:

ABCD is a rectangle. If $AB = 24$, $BC = 10$, and $\angle 1 = 50^\circ$, find the following:



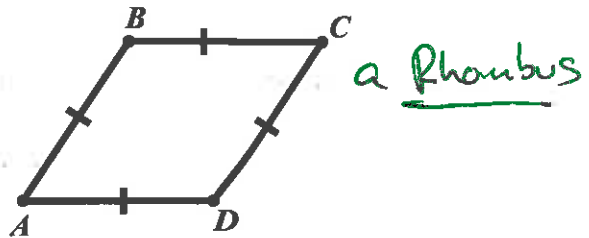
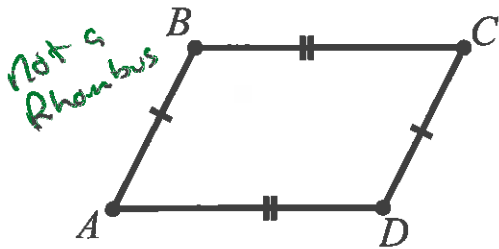
- | | | |
|--------------------------|--------------------------|---|
| a. $CD = \underline{24}$ | d. $BD = \underline{26}$ | g. $\angle DAB = \underline{90^\circ}$ |
| b. $AD = \underline{10}$ | e. $AX = \underline{13}$ | h. $\angle 3 = \underline{40^\circ}$ |
| c. $AC = \underline{26}$ | f. $BX = \underline{13}$ | i. $\angle AXB = \underline{100^\circ}$ |

use
Pythagorean
Theorem

$10^2 + 24^2 = x^2$
 $100 + 576 = x^2$
 $676 = x^2$
 $x = 26 = AC$

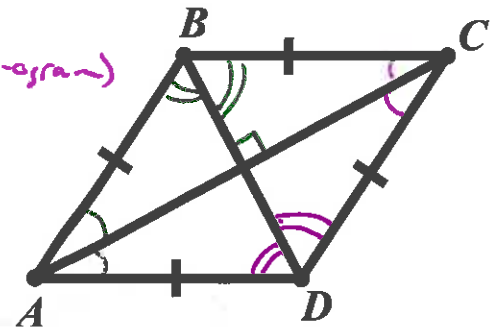
Rhombus: Quadrilateral with 4 \cong sides.

A rhombus has all the properties of a parallelogram.



Diagonals of a Rhombus:

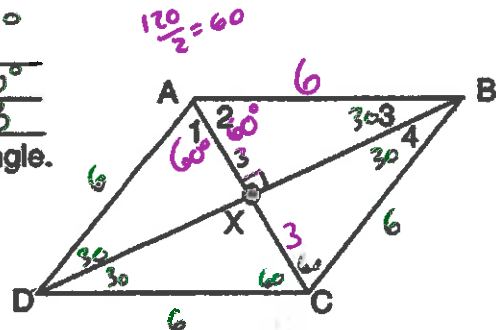
1. Bisect each other (because it's a ||-gram)
2. are \perp
3. Bisect the angles.



Example:

ABCD is a rhombus. If $AB = 6$, $XC = 3$, and $\angle DAB = 120^\circ$, find the following:

- | | | |
|---|--|--------------------------------------|
| a. $BC = \underline{6}$ | d. $\angle AXB = \underline{90^\circ}$ | g. $\angle 3 = \underline{30^\circ}$ |
| b. $\angle ADC = \underline{60^\circ}$ | e. $\angle 1 = \underline{60^\circ}$ | h. $\angle 4 = \underline{30^\circ}$ |
| c. $\angle DCB = \underline{120^\circ}$ | f. $\angle 2 = \underline{60^\circ}$ | i. $AX = \underline{3}$ |
| j. $\triangle ABC$ is an <u>Isosceles</u> triangle. | | |

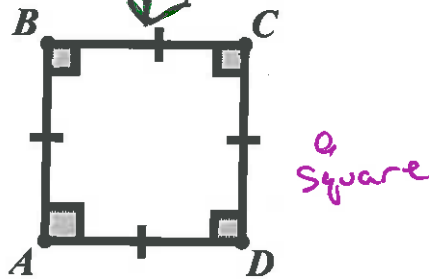
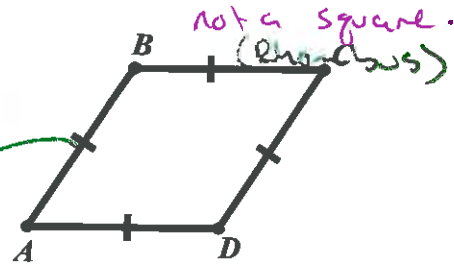
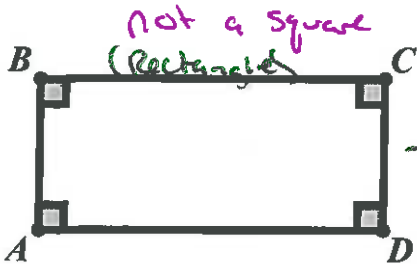


Square: Quadrilateral with 4 \cong sides and 4 \cong angles (rt \angle 's)

A square has all the properties of a Parallelogram.

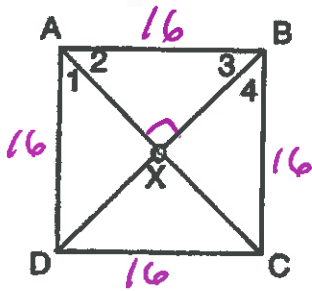
A square has all the properties of a Rectangle.

A square has all the properties of a Rhombus.



Example:

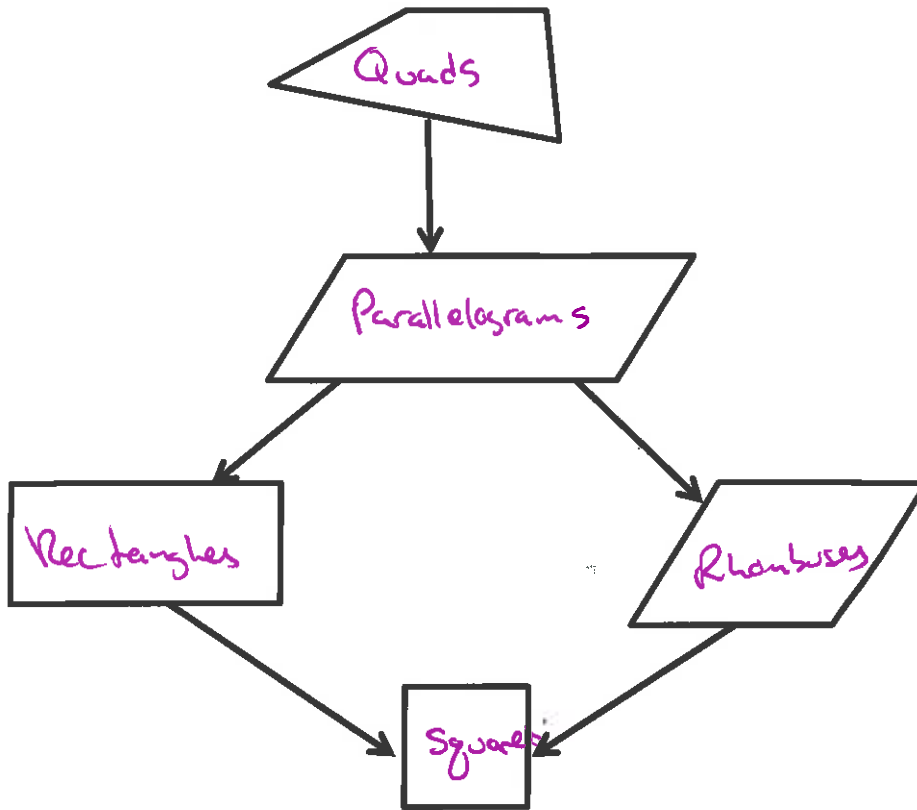
ABCD is a square. If $AB = 16$ and $AC = 16\sqrt{2}$, find the following:



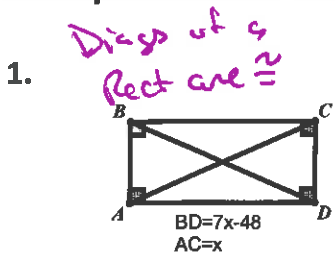
- a. $BC = \underline{16}$
- b. $BD = \underline{16\sqrt{2}}$
- c. $AD = \underline{16}$
- d. $\angle 1 = \underline{45^\circ}$

- e. $\angle = \underline{45^\circ}$
- f. $\angle AXB = \underline{90^\circ}$
- g. $\angle BXC = \underline{90^\circ}$
- h. $\angle 4 = \underline{45^\circ}$

Summary: Quadrilateral Family Tree



Examples: Find the value of x in each special parallelogram.

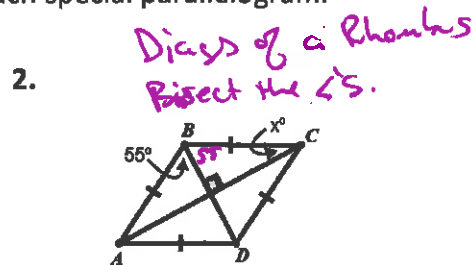


$$BD = AC$$

$$7x - 48 = x$$

$$6x = 48$$

$$x = 8$$

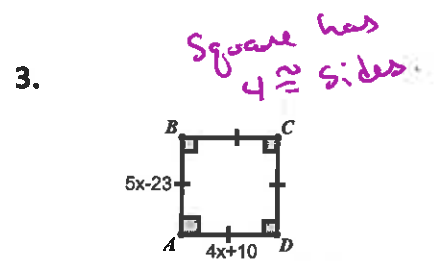


$$m\angle ABD \cong m\angle CBD$$

$$55 + 90 + x = 180$$

$$145 + x = 180$$

$$x = 35$$



$$AB = AD$$

$$5x - 23 = 4x + 10$$

$$x = 33$$