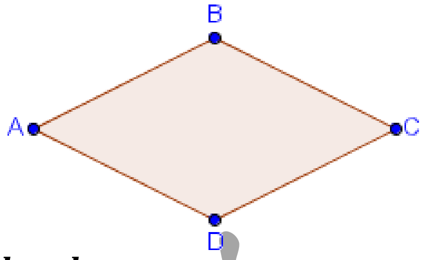
Lycée Des Arts | Mathematics | 8^{th}-Grade
Name: . . . . | "Rhombus" | A.S-4

Definition of a rhombus

Observe the adjacent figure then complete:



$AB = ...cm$ $\quad$ $BC = ...cm$

$CD = ...cm$ $\quad$ $AD = ...cm$

$Hence,\ AB = ... = ... = ... = ...$

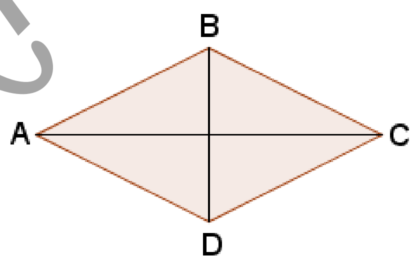
Conclusion: A quadrilateral whose sides are ………. is a ***rhombus***.

Definition: A ***rhombus*** is a quadrilateral with ***four equal sides***.

Properties of a rhombus

I- Diagonals of a Rhombus: Consider the rhombus *ABCD*.

Prove that (AC) is the perpendicular bisector of $[BD]$ and vice versa



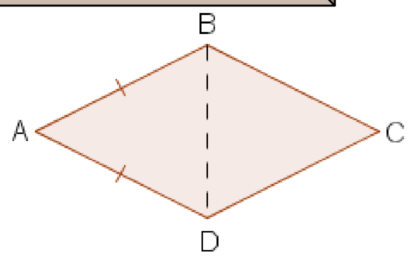
✓ $AB = ...$(Adjacent sides of a rhombus are equal)
Then, *A* is ………….. from both extremities of …………
So, *A* belongs to the perpendicular ....…………….of $[BD]$.

✓ $CB = ...(...)$
Then, *C* is ………….. from ……………………. of $[BD]$
So, *C* belongs to the ……………………………………….
Hence, (*AC*) is the perpendicular ………… of ………..
Similarly, (*BD*) is the ……………………………………

Conclusion: In a rhombus diagonals are …………………….. of each other.

Rule-1 ➜ ***Diagonals of a rhombus are perpendicular bisectors of each other***

II- *Parallelograms having two consecutive sides equal:*



Given the parm *ABCD* such that *AB =AD*.

a. Prove that triangles *ABD* & *BCD* are equal.
In triangles $ABD \,\&\, BCD$ we have:
…………………………………… ……………………….…………………………
…………………………………… ………………………………………………..

b. Prove that *DA* = *DC*
………………………… ………………………… ………………………………

c. Complete: *AB* = *AD* = ….. = …… (……………………….)

Conclusion: A parallelogram with two adjacent sides equal is a ……………

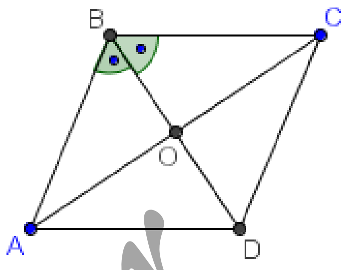
Rule-2 ➜ ***A rhombus is a parallelogram with its adjacent sides equal.***

III- Parallelogram whose one of its diagonals is a bisector:

ABCD is a parallelogram such that [*BD*) is a bisector of $A\hat{B}C$.

a. Prove that *ABC* is an isosceles triangle of vertex *B*.

………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………



b. Complete:

$$\left.\begin{array}{l} AB = DC(opp\ sides\ of\ a\ parm) \\ AB = ...(Legs\ of\ an\ isoscles\ \Delta) \\ AD = ...(opp\ sides\ of\ a\ parm) \end{array}\right\} hence,\ AB = ... = ... = ...$$

Thus, $ABCD\ is\ a$ ....

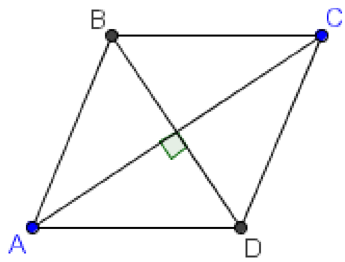
➢ ***Conclusion:*** A parallelogram with one of its diagonals is a …………… is a rhombus.

IV- Parallelogram whose diagonals are perpendicular:

ABCD is a parallelogram such that $(AC) \perp (BD)$.

a. Prove that sides adjacent to vertex A are equal.

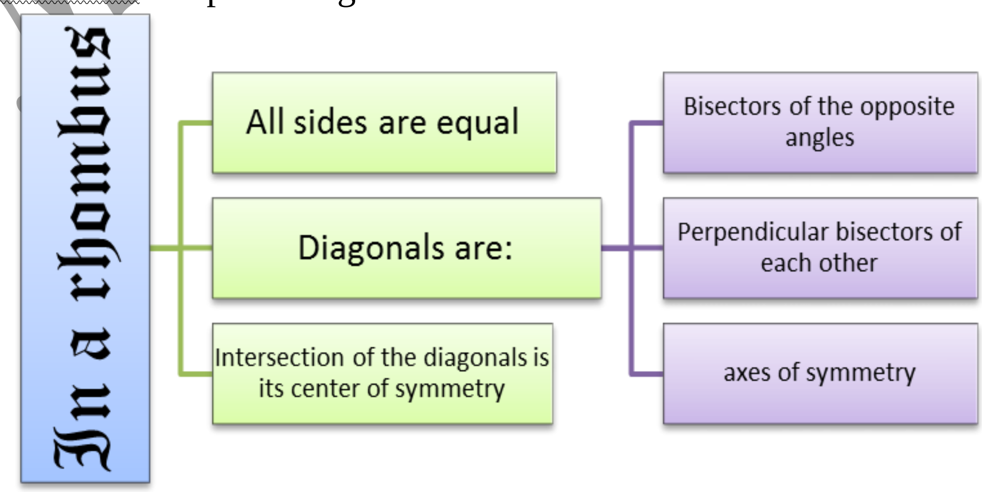
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………
………………………………………………………………



b. What can you say about the other sides? Justify.

………………………………………………………………
………………………………………………………………
………………………………………………………………

➢ ***Conclusion:*** A parallelogram with …………………..… is a rhombus.



How to prove a quadrilateral is a rhombus?

i- ***Starting from the definition:*** A quadrilateral with four equal sides is a rhombus.

ii- ***Starting from diagonals:*** A quadrilateral in which diagonals are perpendicular and bisect each other is a rhombus.

iii- ***Starting from axes of symmetry:*** A quadrilateral whose diagonals are axes of symmetry is a rhombus.

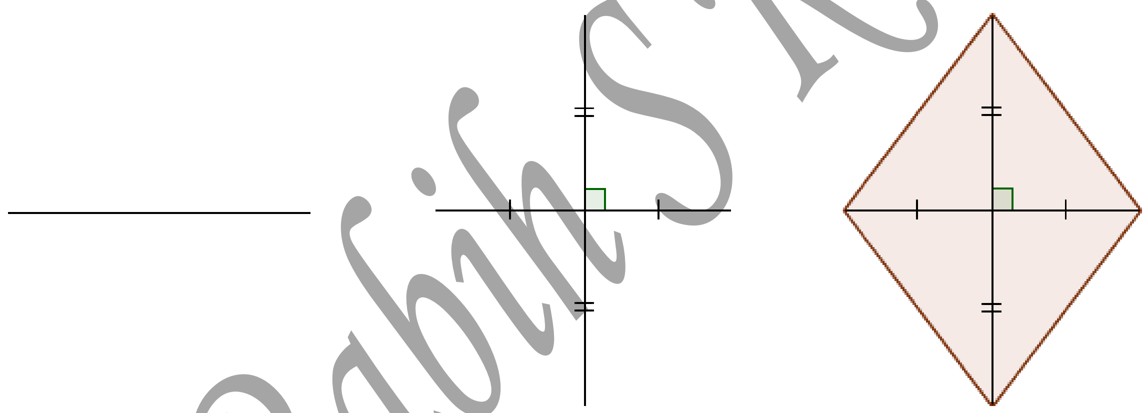
How to prove a parallelogram is a rhombus?

i- ***Starting from sides:*** A parallelogram with two equal consecutive sides is a rhombus.

ii- ***Starting from diagonals:*** A parallelogram with perpendicular diagonals is a rhombus.

iii- ***Starting from diagonals:*** A parallelogram with one diagonal is a bisector of its one angles is a rhombus.

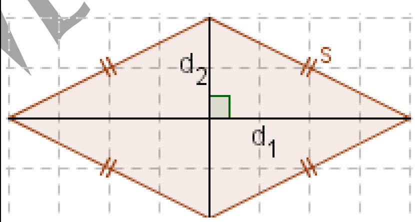
How to construct a rhombus?



Draw a segment

Draw another segment so that the two segments are perpendicular bisectors of each other

Join the four extremities of the diagonals

	*Area is:* $A = \frac{d_1 \times d_2}{2}$.
	Perimeter is: $P = sum\ of\ all\ sides.$ $= 4s.$