One way to help you through geometry is to:

- Draw a clear figure.
- Code the figure with the essential parts.
- Know what is given, what is required then relate to reach an answer

Proving a quadrilateral to be a parallelogram

Starting from

Sides	**Diagonals**	**Angles**

| Definition	Two pairs of sides	A pair of sides				
A quadrilateral with *two pairs of opposite sides parallel* is a parm	A quadrilateral with *two pairs of opposite sides equal* is a parm	A quadrilateral with *a pair of opposite sides equal & parallel* is a parm	A quadrilateral with its *diagonals bisect each other at same midpoint* is a parm	A quadrilateral that admits a *center of symmetry* is a parm	A quadrilateral *with two pairs of opposite angles equal* is a parm	A quadrilateral with *two pairs of adjacent angles supplementary* is a parm

$\alpha + \theta = 180^o$

$\alpha + \beta = 180^o$
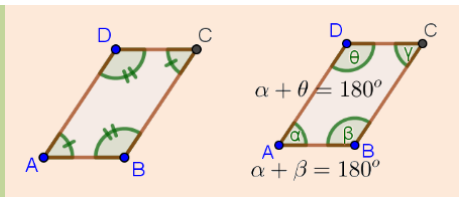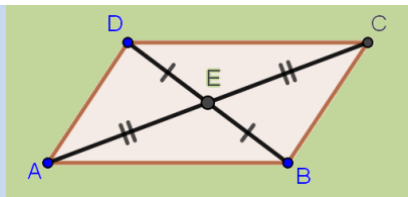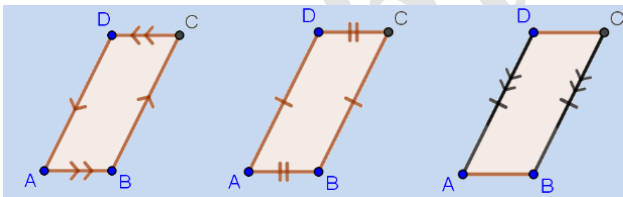
How to prove a quadrilateral a rectangle?

Starting from the:

Definition
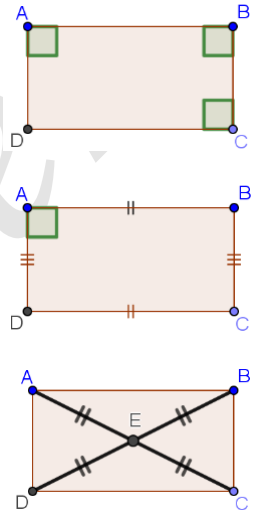- A quadrilateral with four equal angles is a rectangle.

Angles
- A quadrilateral with three right angles is a rectangle.

Sides & angles
- A quadrilateral with its opposite sides equal or (parallel) and have one right angle is a rectangle.

Diagonals
- A quadrilateral in which its diagonals are equal and bisect each other is a rectangle.

How to prove a parallelogram to be a rectangle?

Starting from the

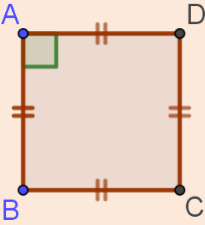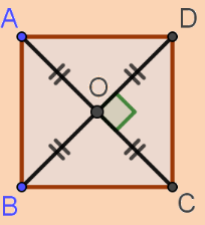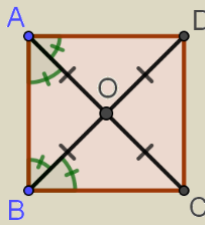| Angles	Diagonals
A parallelogram with one right angle is a rectangle	A parallelogram with equal diagonals is a rectangle.

Proving a quadrilateral to be a rhombus starting from

	Definition	**Diagonals**	**Axes of symmetry**
In words	A quadrilateral with four equal sides is a rhombus	A quadrilateral whose diagonals are perpendicular and bisect each other is a rhombus	A quadrilateral whose diagonals are axes of symmetry is a rhombus.
Graphically			

How to prove a parallelogram 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.

Proving a quadrilateral to be a square starting from

	Definition	**Diagonals**	**Diagonals & angles**
In words	Four equal sides and one right angle	Diagonals are perpendicular, equal and bisect each other	Diagonals are equal and bisect the angles of the quadrilateral
Graphically			

Application

Let *ABCD* be a parallelogram of center T.

The following parts are independent:

1) If $B\hat{C}D = 135°$, then find the measure of $B\hat{A}D$.

2) If $AC = 5x - 12 \, and \, AT = 14$, then find the value of $x.$ (check existence).

3) If $BT = 3x + 1 \, and \, BD = 4x + 8$, then determine the value of $x.$ (check existence).

4) If $BC = 4x - 7 \, and \, AD = 8x - 5$, then compute the value of $x.$ (check existence).

5) If $B\hat{C}D = 3x + 14 \, and \, A\hat{D}C = x + 10$, then work out the exact value of $A\hat{D}C$.