

## PROPERTIES OF QUADRILATERALS – WORKED EXAMPLE

### COURSE/LEVEL

NSW Secondary High School Year 11 Preliminary Mathematics.

### TOPIC

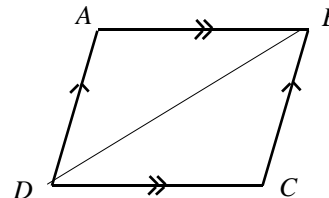
Plane Geometry: Properties of Quadrilaterals. (Syllabus Ref: 2.2)

### Example

- (a) Show that a diagonal of a parallelogram divides it into two congruent triangles.  
(b) Hence show that the opposite sides of a parallelogram are equal.

#### Steps to follow

1. Draw a diagram of a parallelogram and construct (or add) its diagonal.



#### Solution to (a)

2. State what is given in the problem, what has been constructed, and the aim of the problem.

Given: Parallelogram  $ABCD$ .

Construction: Draw diagonal  $BD$ .

Aim: To prove that  $\triangle DAB \equiv \triangle DCB$

3. Prove the result

In  $\triangle DAB$  and  $\triangle DCB$ ,

$$\angle ADB = \angle DBC \quad (\text{alternate angles, } AD \parallel BC) \quad \text{A}$$

$$\angle ABD = \angle BDC \quad (\text{alternate angles, } AB \parallel DC) \quad \text{A}$$

$$BD = BD \quad (BD \text{ is common}) \quad \text{S}$$

$$\therefore \triangle DAB \equiv \triangle DCB \quad (\text{AAS})$$

4. State conclusion

Thus, a diagonal divides a parallelogram into two congruent triangles.

#### Steps to follow

1. State what is given and what needs to be proved.

Given: Parallelogram  $ABCD$ ,  $\triangle DAB \equiv \triangle DCB$ .

Aim: To prove that  $AD = BC$  and  $AB = DC$ .

2. Name congruent sides

$$AD = BC \quad (\text{Corresponding sides in congruent } \triangle\text{s})$$

$$AB = DC \quad (\text{Corresponding sides in congruent } \triangle\text{s})$$

3. State conclusion

Thus, the opposite sides of a parallelogram are equal.