

# **WorkBook**

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# **WorkBook**

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# WorkBook

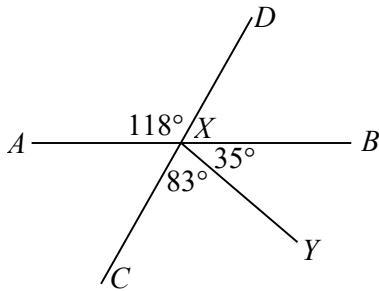
## DEDUCTIVE GEOMETRY

Methods for finding values, determining a relationship or completing proofs in questions where vertices are given.

### Straight line results.

#### Example 1

Prove that  $AB$  is a (straight) line if  $CD$  is a line.



$CD$  is a line (given)

$\angle CXB = 118^\circ$  (sum of  $\angle CXY$  and  $\angle YXB$ )

$\angle AXD = 118^\circ$  (given)

$\therefore AB$  is a line (vertically opposite angles are equal)

**OR**

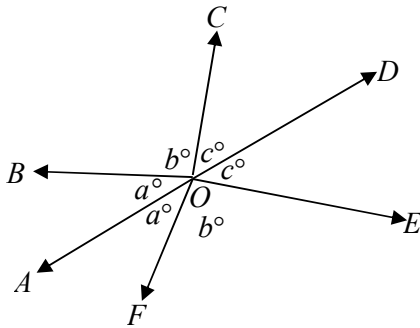
$\angle AXC = 62^\circ$  (straight angle)

$\angle AXB = 180^\circ$  (sum of  $\angle AXC$ ,  $\angle CXY$  and  $\angle YXB$ )

$\therefore AB$  is a line (angle sum is  $180^\circ$ )

#### Example 2

Determine which two rays form a (straight) line



$a^\circ + b^\circ + c^\circ + c^\circ + b^\circ + a^\circ = 360^\circ$  (given)

$2(a^\circ + b^\circ + c^\circ) = 360^\circ$

$a^\circ + b^\circ + c^\circ = 180^\circ$

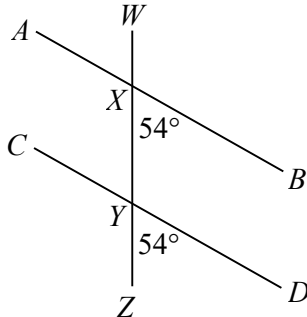
$\angle AOD = a^\circ + b^\circ + c^\circ$  (sum of  $\angle AOB$ ,  $\angle BOC$  and  $\angle COD$ )

$\therefore AD$  is a line (angle sum is  $180^\circ$ )

### Parallel lines

#### Example 3

Prove that  $AB$  is parallel to  $CD$ .



$\angle YXB = 54^\circ$  (given)

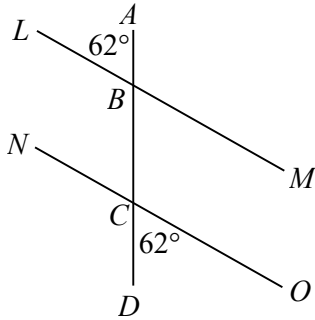
$\angle ZYD = 54^\circ$  (given)

$\therefore AB \parallel CD$  (corresponding angles are equal)

## WorkBook

### Example 4

Prove that  $LM$  is parallel to  $NO$ .



$$\angle NCB = 62^\circ \text{ (vertically opposite to } \angle DCO)$$

$$\angle ZYD = 62^\circ \text{ (given)}$$

$$\therefore LM \parallel NO \text{ (corresponding angles are equal)}$$

**OR**

$$\angle CBM = 62^\circ \text{ (vertically opposite to } \angle LBA)$$

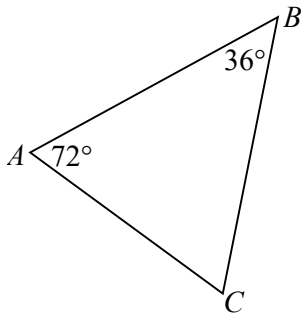
$$\angle DCO = 62^\circ \text{ (given)}$$

$$\therefore LM \parallel NO \text{ (corresponding angles are equal)}$$

## Triangles.

### Example 5

Prove that  $\triangle ABC$  is isosceles.



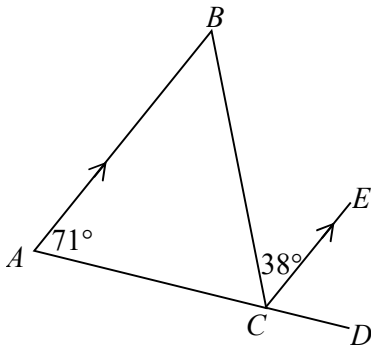
$$\angle ACB = 72^\circ \text{ (angle sum of a triangle)}$$

$$\angle ABC = 72^\circ \text{ (given)}$$

$$\therefore \triangle ABC \text{ is isosceles (a pair of equal angles)}$$

### Example 6

Prove that  $\triangle ABC$  is isosceles.



$$\angle ABC = 38^\circ \text{ (alternate angles, } AB \parallel CE)$$

$$\angle ACB = 71^\circ \text{ (angle sum of a triangle)}$$

$$\angle CAB = 71^\circ \text{ (given)}$$

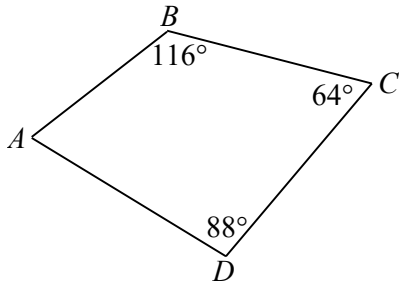
$$\therefore \triangle ABC \text{ is isosceles (a pair of equal angles)}$$

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## Quadrilaterals

### Example 7

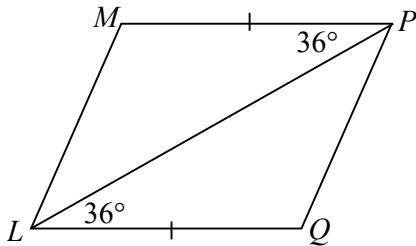
Find  $\angle DAB$



$\angle DAB = 85^\circ$  (Angle sum of a quadrilateral)

### Example 8

Prove that  $MPQL$  is a parallelogram.



$\angle MPL = 36^\circ$  (given)

$\angle QLP = 36^\circ$  (given)

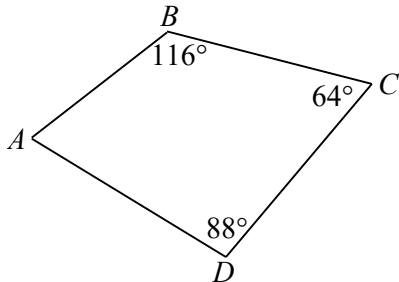
$\therefore MP \parallel QL$  (alternate angles are equal)

$MP = QL$  (given)

$\therefore MPQL$  is a parallelogram (opposite sides are parallel and equal)

### Example 7

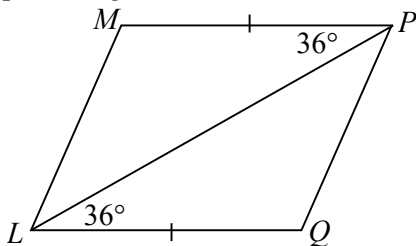
Find  $\angle DAB$



$\angle DAB = 85^\circ$  (Angle sum of a quadrilateral)

### Example 8

Prove that  $MPQL$  is a parallelogram.



$\angle MPL = 36^\circ$  (given)

$\angle QLP = 36^\circ$  (given)

$\therefore MP \parallel QL$  (alternate angles are equal)

$MP = QL$  (given)

$\therefore MPQL$  is a parallelogram (opposite sides are parallel and equal)