WorkBook

GEOMETRY
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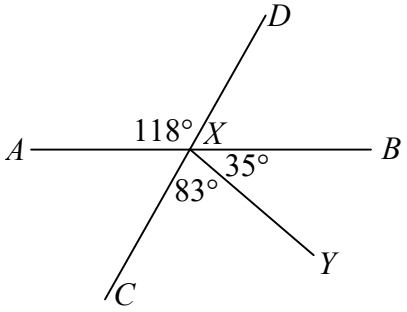
DEDUCTIVE GEOMETRY

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

Straight line results.

Example 1

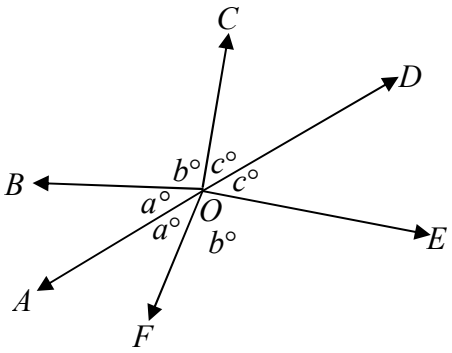
Prove that *AB* is a (straight) line if *CD* is a line.



CD is a line (given)
$\angle CXB = 118°$ (sum of $\angle CXY$ and $\angle YXB$)
$\angle AXD = 118°$ (given)
$\therefore$ *AB* is a line (vertically opposite angles are equal)
OR
$\angle AXC = 62°$ (straight angle)
$\angle AXB = 180°$ (sum of $\angle AXC$, $\angle CXY$ and $\angle YXB$)
$\therefore$ *AB* is a line (angle sum is 180°)

Example 2

Determine which two rays form a (straight) line

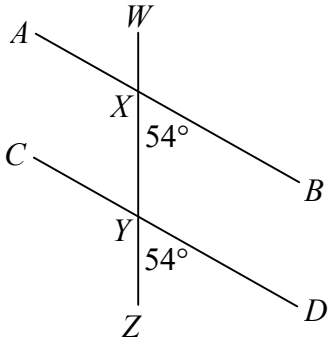


$a° + b° + c° + c° + b° + a° = 360°$ (given)
$2(a° + b° + c°) = 360°$
$a° + b° + c° = 180°$
$\angle AOD = a° + b° + c°$ (sum of $\angle AOB$, $\angle BOC$ and $\angle COD$)
$\therefore$ *AD* is a line (angle sum is 180°)

Parallel lines

Example 3

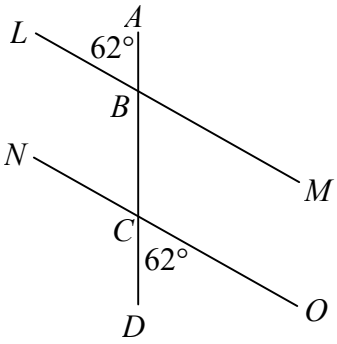
Prove that *AB* is parallel to *CD*.



$\angle YXB = 54°$ (given)
$\angle ZYD = 54°$ (given)
$\therefore$ *AB*||*CD* (corresponding angles are equal)

Example 4

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



$\angle NCB = 62°$ (vertically opposite to $\angle DCO$)
$\angle ZYD = 62°$ (given)
$\therefore$ *LM*||*NO* (corresponding angles are equal)
OR
$\angle CBM = 62°$ (vertically opposite to $\angle LBA$)
$\angle DCO = 62°$ (given)
$\therefore$ *LM*||*NO* (corresponding angles are equal)

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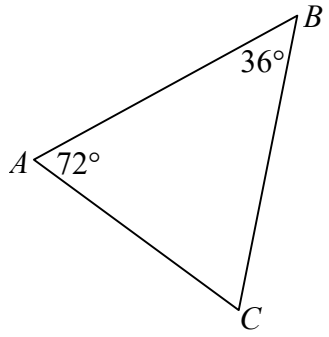
Triangles.

Example 5

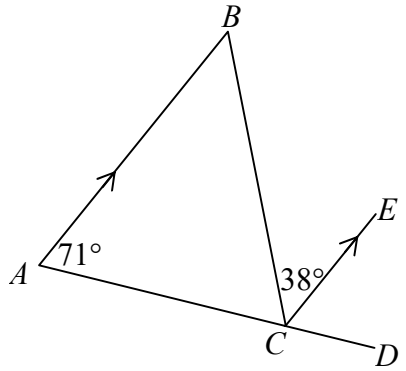
Prove that ΔABC is isosceles.



$\angle ACB = 72°$ (angle sum of a triangle)
$\angle\ ABC = 72°$ (given)
$\therefore\ \Delta ABC$ is isosceles (a pair of equal angles)

Example 6

Prove that ΔABC is isosceles.

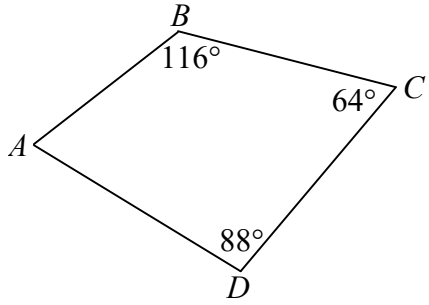


$\angle ABC = 38°$ (alternate angles, $AB||CE$)
$\angle ACB = 71°$ (angle sum of a triangle)
$\angle\ CAB = 71°$ (given)
$\therefore\ \Delta ABC$ is isosceles (a pair of equal angles)

Quadrilaterals

Example 7

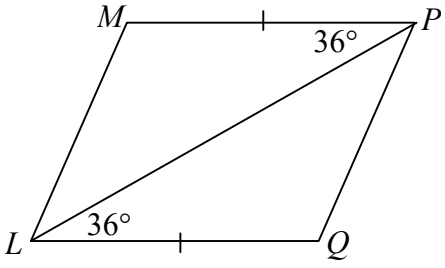
Find $\angle DAB$



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

Example 8

Prove that $MPQL$ is a parallelogram.



$\angle MPL = 36°$ (given)
$\angle QLP = 36°$ (given)
$\therefore\ MP||QL$ (alternate angles are equal)
$MP = QL$ (given)
$\therefore\ MPQL$ is a parallelogram (opposite sides are parallel and equal)

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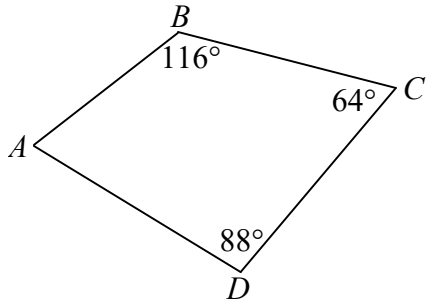
Further examples

Example 7

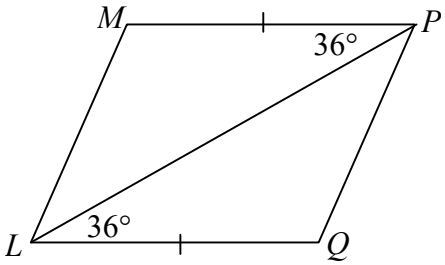
Find $\angle DAB$



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

Example 8

Prove that $MPQL$ is a parallelogram.



$\angle MPL = 36°$ (given)

$\angle QLP = 36°$ (given)

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

$MP = QL$ (given)

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