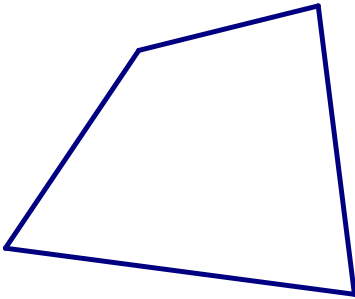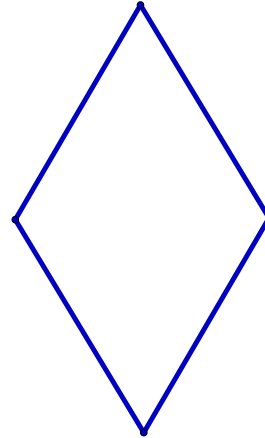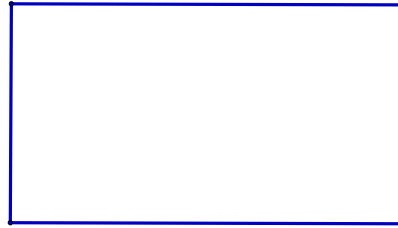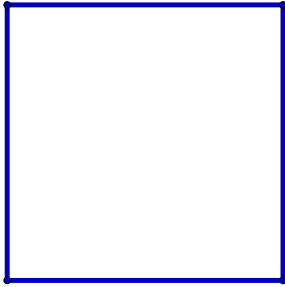# Parallelograms

Def. A quadrilateral is a 4-sided polygon.
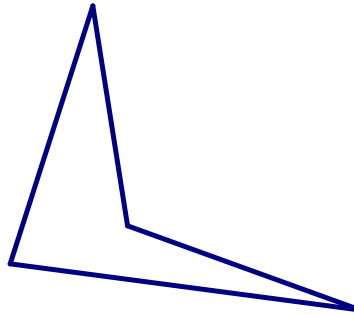
<u>Thm.</u> The angles of a quadrilateral add up to 360°

<u>Ex.</u> Find x.

85

6x-1
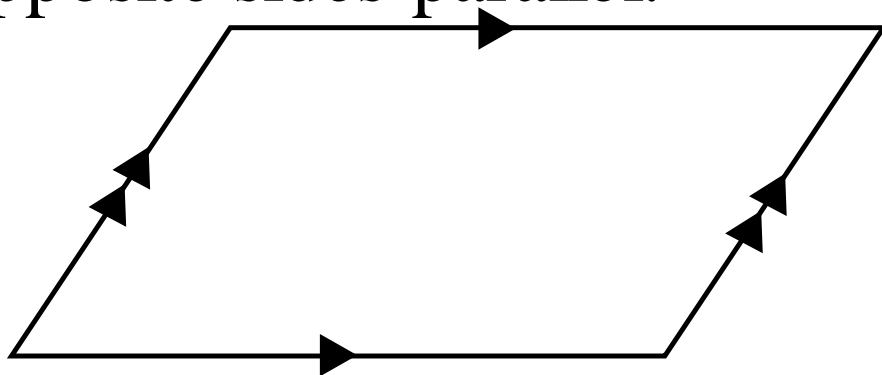
78

3x

$6x - 1 + 3x + 85 + 78 = 360$

$9x + 162 = 360$
$ -162 \quad -162$

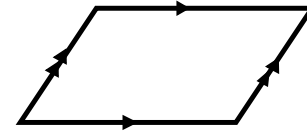$\dfrac{9x}{9} = \dfrac{198}{9}$

$x = 22$

Def. A <u>parallelogram</u> is a quadrilateral with both pairs of opposite sides parallel.

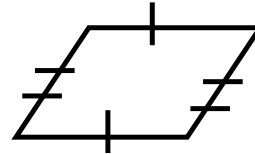## Def. of a parallelogram:
- A quadrilateral with 2 pairs of parallel sides.

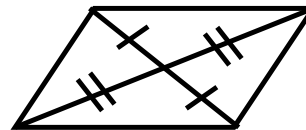## If a quadrilateral is a parallelogram then. . .

- Opposite sides are congruent

- Opposite angles are congruent

- Diagonals bisect each other

Find all the missing angles in the parallelogram.

B   C $180 - 119 = 61$

119   61°

61°   119°

A   D
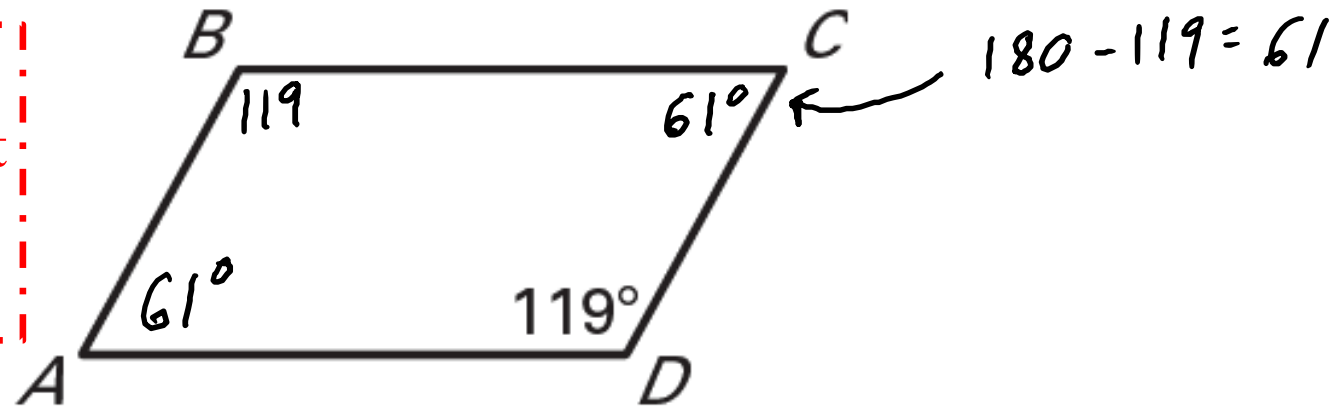
<u>Same-side Interior Angles:</u> If lines are parallel, same-side int. angles are supplementary.

In a parallelogram, these are called <u>consecutive angles</u>

Ex. Find the value of each variable in the parallelogram.

$b + 2$

$a - 3$ 14

7
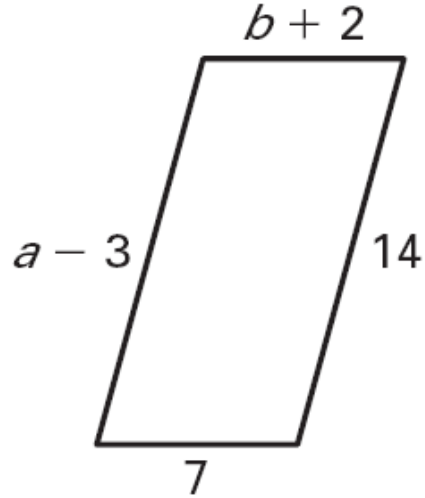
$a - 3 = 14$

$a = 17$

$b + 2 = 7$

$b = 5$

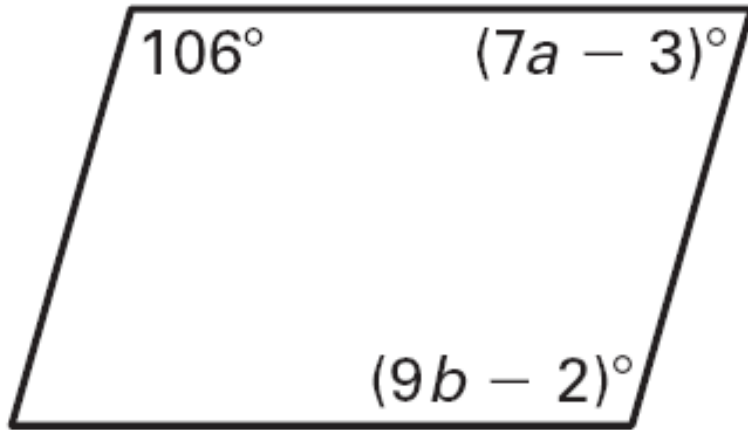Ex. Find the value of each variable in the parallelogram.

106°   (7a − 3)°

(9b − 2)°

$$9b - 2 = 106$$
$$9b = 108$$
$$b = 12$$

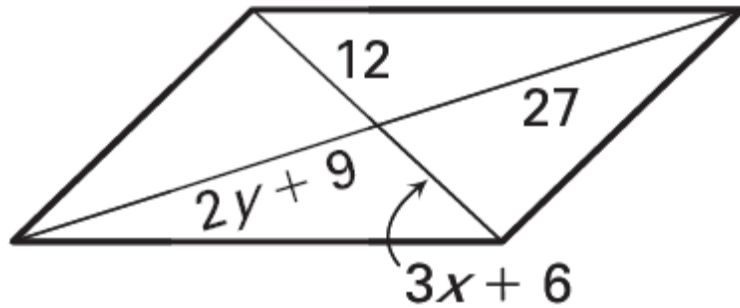$$7a - 3 + 106 = 180$$
$$7a + 103 = 180$$
$$7a = 77$$
$$a = 11$$

Ex. Find the value of each variable in the parallelogram.

12

27

$2y + 9$

$3x + 6$

$2y + 9 = 27$
$2y = 18$
$y = 9$

$3x + 6 = 12$
$3x = 6$
$x = 2$

Ex. Find *y* so that the figure below is a parallelogram.
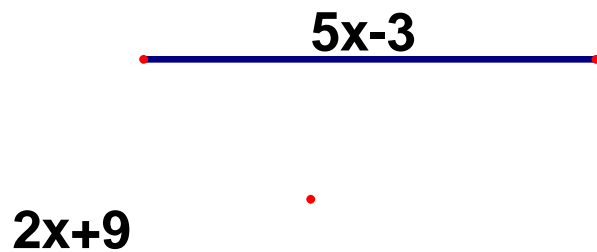
(2y+10)°

(3y)°

$2y + 10 = 3y$

$10 = y$

For 1 and 2, refer to parallelogram $ABCD$

1) If $m\angle BAD = 59$, then $m\angle ADC = 180 - 59 = 121$

2) If $DE = 4x + 6$ and $EB = x + 18$, then $x =$

$$4x + 6 = x + 18$$
$$3x + 6 = 18$$
$$3x = 12 \rightarrow x = 4$$

3) In the parallelogram below, find x.

5x-3

2x+9

$$5x - 3 = 2x + 9$$
$$3x - 3 = 9$$
$$3x = 12$$
$$x = 4$$

A   59°

.B

E

D   ?

.C