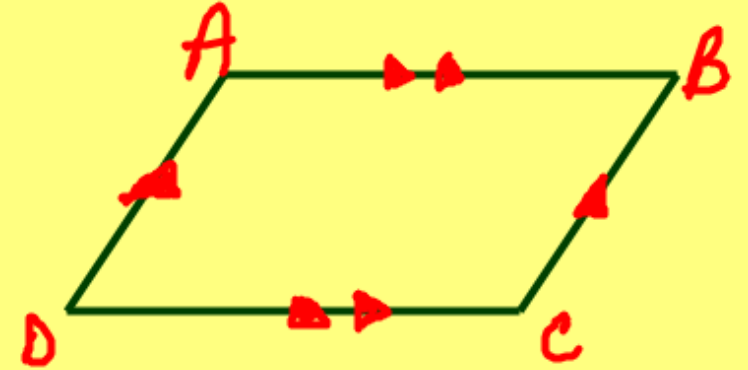# Parallelograms

CCSS

You will recognize and apply the properties of the angles, sides and diagonals of a polygon

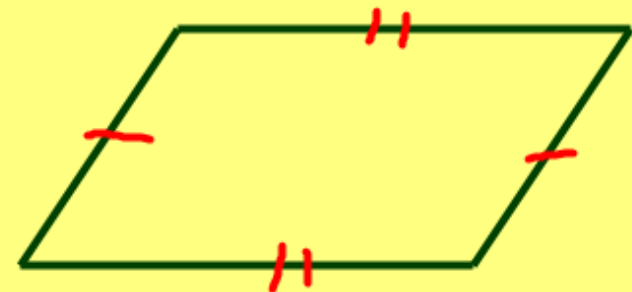You will recognize the conditions that ensure a quadrilateral is a parallelogram

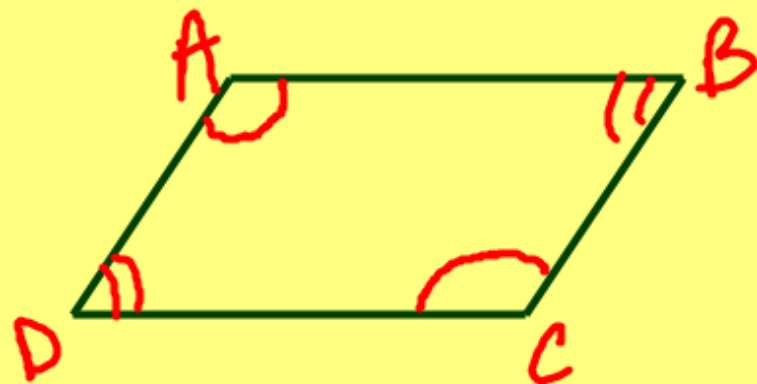# Parallelogram "parallelogram ABCD" ▱ABCD

opposite sides are parallel

opposite sides are $\cong$

opposite angles are $\cong$
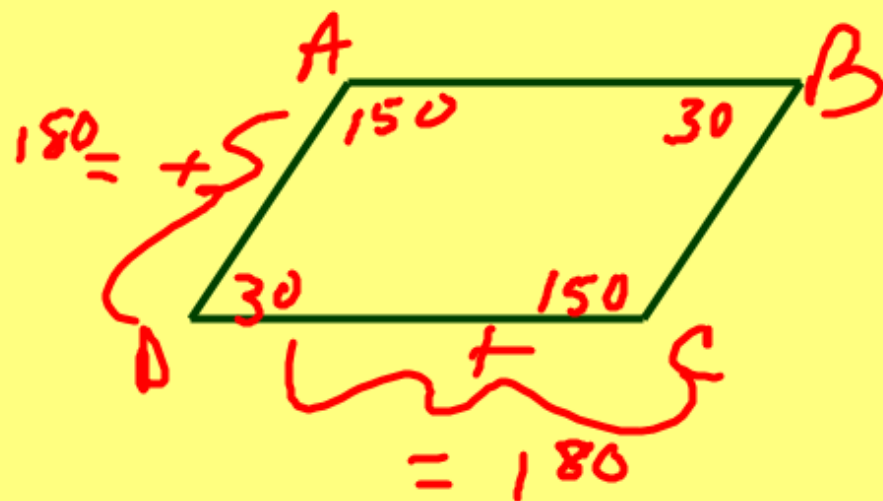

$$\angle A \cong \angle C$$
$$\angle D \cong \angle B$$

consecutive <'s are supplementary
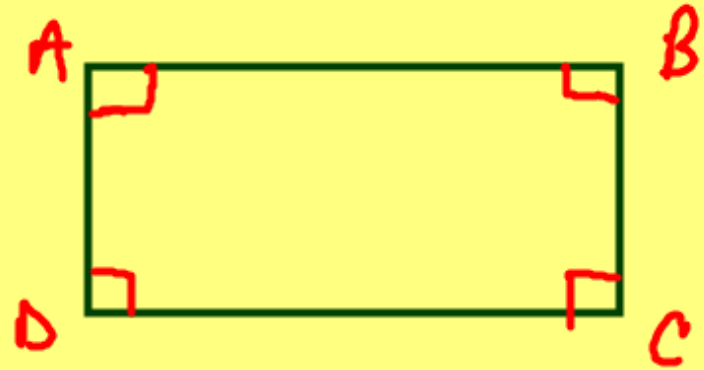
$$m\angle A + m\angle D = 180$$
$$m\angle A + m\angle B = 180$$
$$m\angle B + m\angle C = 180$$
$$m\angle C + m\angle D = 180$$

$180 = +$

$= 180$

If ▱ has 1 right <,
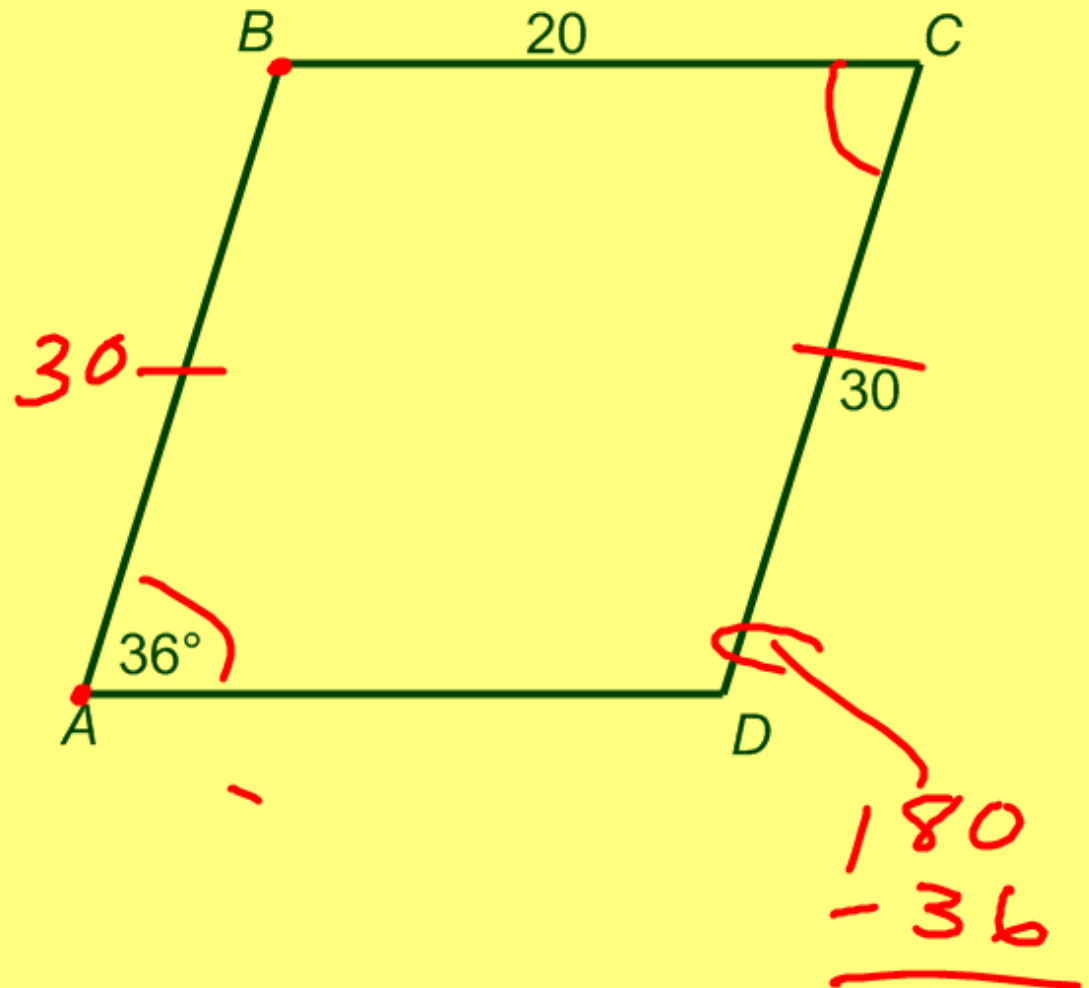then it has 4 right <'s
(Rectangle)

A �················· B
└ ················ ┘
┌ ················ ┐
D ················· C

ABCD is a parallelogram.
Find.....

1. *AB* $= 30$

2. *m<C* $= 36°$

3. *m<D* $= 144°$

B ——— 20 ——— C

30 ——|

30

36°

A ——————— D

180
-36
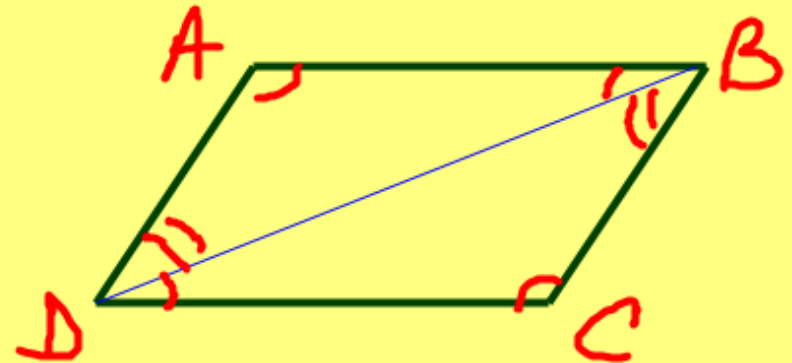
Diagonals of a ▱ bisect each other

$\overline{AE} \cong \overline{EC}$

$\overline{DE} \cong \overline{BE}$
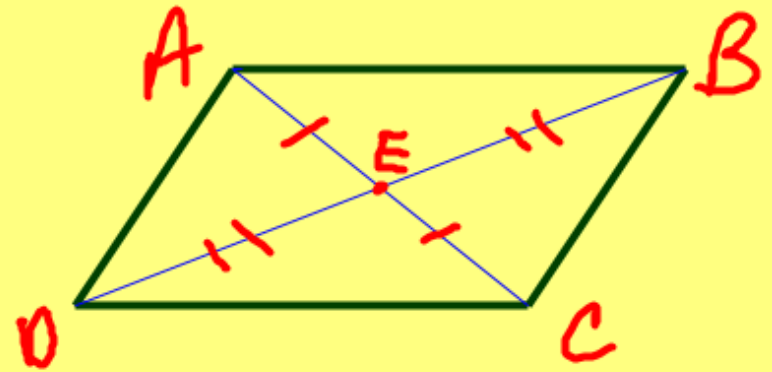
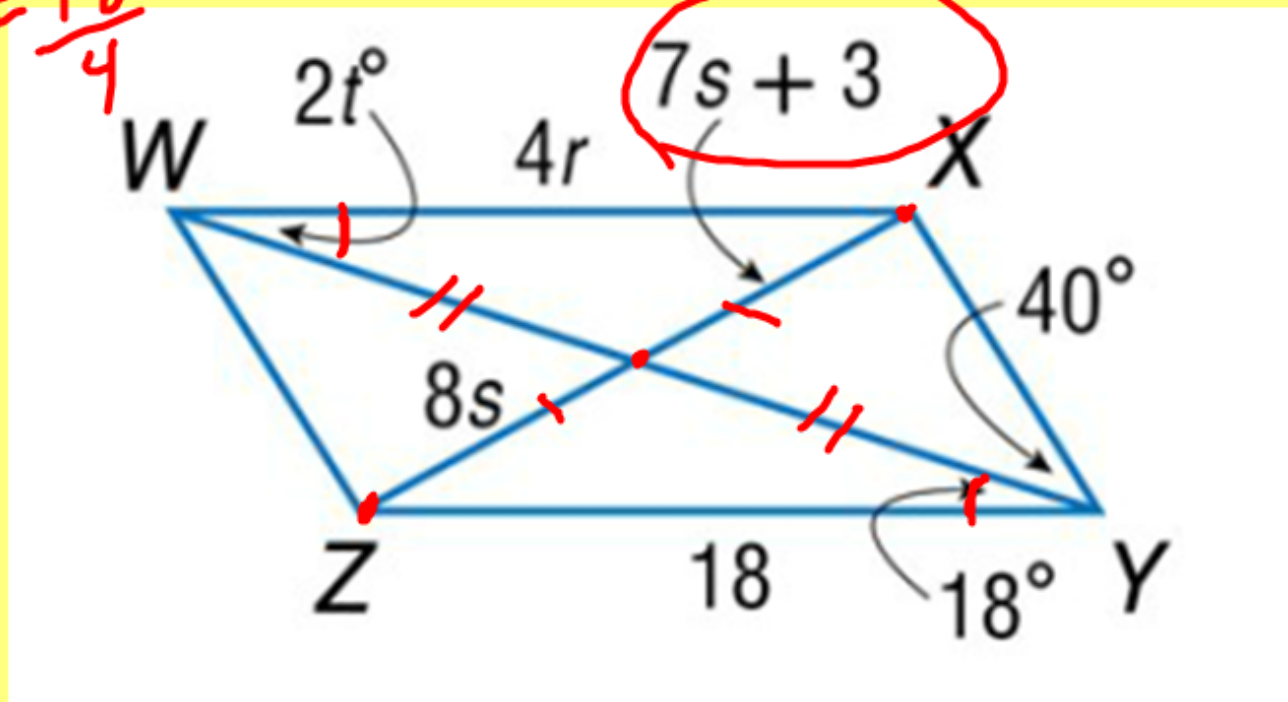A diagonal separates ▱ into 2 $\cong$ Δ's

$\triangle ABD \cong \triangle CDB$

If *WXYZ* is a parallelogram, find the value of.....

1. $r = 4.5$

$$\frac{4r}{4} = \frac{18}{4}$$

2. $s = 3$

3. $t = 9$

$$2t = 18$$
$$t = 9$$

$2t°$

W

$4r$

$7s + 3$

X

$40°$

$8s$

Z

18

$18°$ Y

$$8s = 7s + 3$$
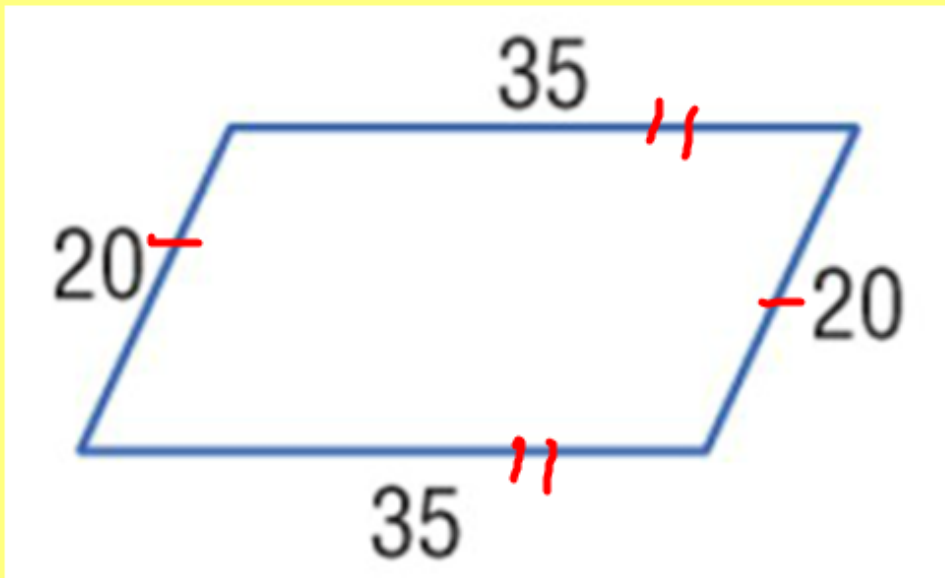$$-7s \quad -7s$$
$$\overline{}$$
$$s = 3$$

Tests for Parallelograms......

A Quad is a parallelogram if........

1) Both pairs of opp sides are parallel

2) Both pairs of opp sides are $\cong$

3) Both pairs of opp $\angle$'s are $\cong$.

4) If the diagonals bisect each other
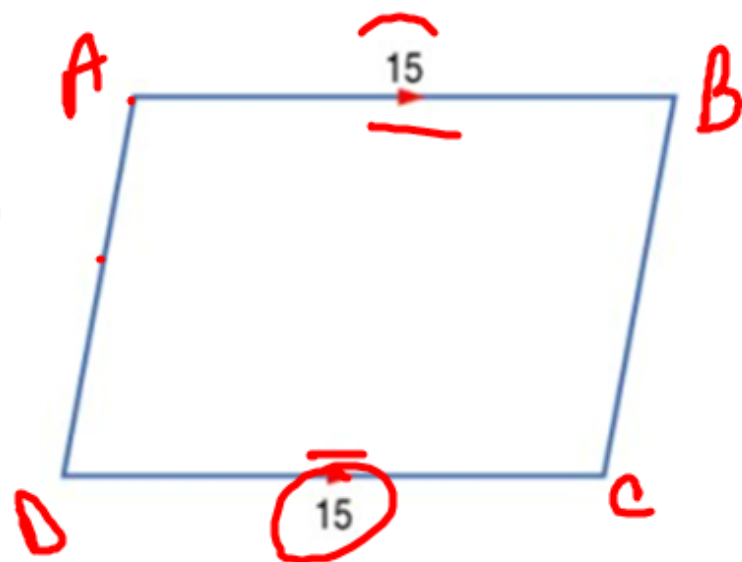
5) If one pair of sides is both $\cong$ and parallel

Determine whether the quadrilateral is a parallelogram. Justify your answer.

yes,

Both pairs opp
sides ≅

EXAMPLE 1 ✓ **Check Your Progress** ✓**Check**Point

Which method would prove the quadrilateral is a parallelogram?

A. Both pairs of opp. sides ||.

B. Both pairs of opp. sides ≅.

C. Both pairs of opp. ∠s ≅.

D. One pair of opp. sides both || and ≅.

Find *x* and *y* so that the quadrilateral is a parallelogram

$$4x - 1 = 3(x + 2)$$

$$3(y + 1) = 4y - 2$$