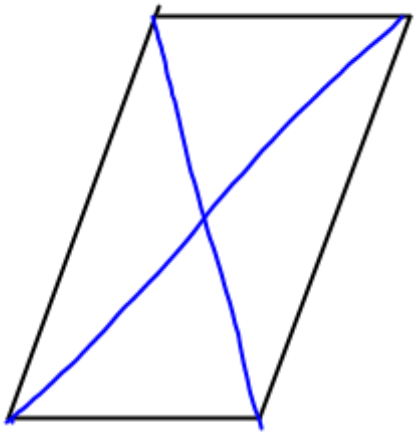
Tests for parallelograms

(How do we know FOR SURE that a figure is a parallelogram?)

The answer is NOT just by looking at it

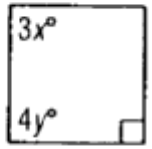


Four tests we can do:

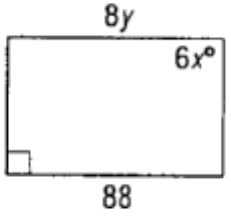
1.) Check opp. side lengths for congruence (distance formula)
2.) Check opp. sides for being //. (slope)
3.) Check that diagonals bisect each other (Midpoint formula)
4.) Check 1 pair of opp. sides for length congruence & slope ≅.

Exercises

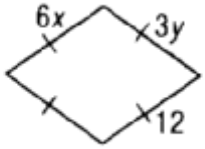
Find x and y in each parallelogram.

1. 

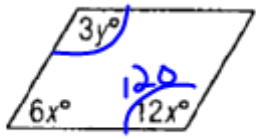
$x = 30; y = 22.5$

2. 

$x = 15; y = 11$

3. 

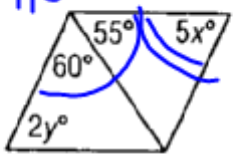
$x = 2; y = 4$

4. 

$6x + 12x = 180$
$18x = 180$
$x = 10$

$3y = 120$
$y = 40$

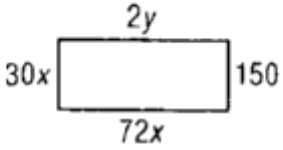
$x = 10; y = 40$

5. 115°


$115 + 5x = 180$

$115 + 2y = 180$

$x = 13; y = 32.5$

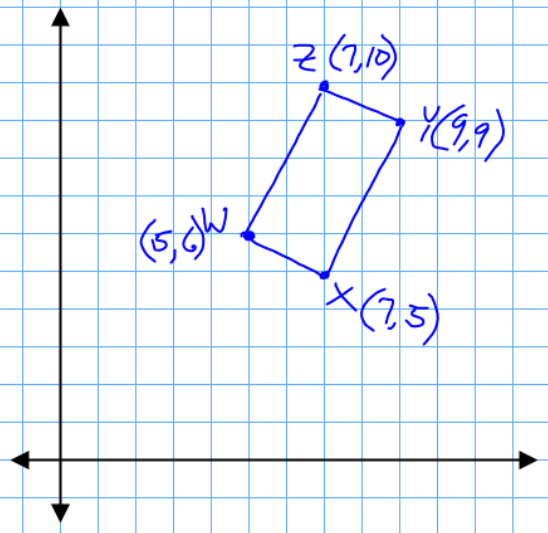
6. 

$x = 5; y = 180$

Is the quadrilateral with the given vertices a parallelogram? Justify your answer in four different ways.

W(5,6); X(7,5); Y(9,9); Z(7,10)

Tests for Parallelograms!



① Opp. sides parallel?

m of $\overline{ZY}$: $\frac{\text{rise}}{\text{run}} = \frac{-1}{2}$ | m of $\overline{WZ}$: $\frac{4}{2} = 2$

m of $\overline{WX}$: $\frac{-1}{2}$ | m of $\overline{XY}$: $\frac{4}{2} = 2$

Since both pairs of opposite sides have $\cong$ slopes, they are $\parallel$ and therefore make a ▱.

(x_2, y_2) $(9,9)$

(x_1, y_1) $(7,10)$

② Check side lengths:

$ZY = \sqrt{(9-7)^2+(9-10)^2}$

$= \sqrt{4+1}$

$ZY = \sqrt{5}$

$ZW = \sqrt{(7-5)^2+(10-6)^2}$

$= \sqrt{4+16}$

$= \sqrt{20} = 2\sqrt{5}$

$WX = \sqrt{(7-5)^2+(5-6)^2}$

$= \sqrt{4+1}$

$ZY = \sqrt{5}$

$XY = \sqrt{(9-7)^2+(9-5)^2}$

$= \sqrt{4+16}$

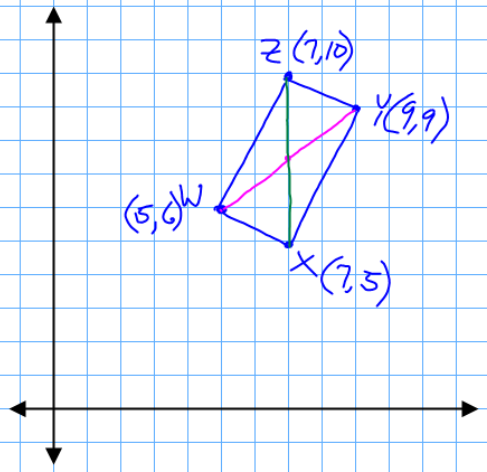
$= \sqrt{20} = 2\sqrt{5}$

Since opposite sides are $\cong$, the figure is a parallelogram.

Is the quadrilateral with the given vertices a parallelogram? Justify your answer in four different ways.

W(5,6); X(7,5); Y(9,9); Z(7,10)

Tests for Parallelograms!



(3) Check midpoints of diagonals

midpoint of $\overline{WY}$: $\left(\frac{5+9}{2}, \frac{6+9}{2}\right)$

$(7, 7.5)$

midpoint of $\overline{ZX}$: $\left(\frac{7+7}{2}, \frac{10+5}{2}\right)$

$(7, 7.5)$

Since diagonals have the same midpoint, they bisect each other. Therefore the figure is a parallelogram.

(4) Check 1 pair of opp. sides for congruence & parallel.

m of $\overline{ZW}$: $m = \frac{-4}{-2} = 2$ $\quad ZW = 2\sqrt{5}$ (see work above)

m of $\overline{YX}$: $m = \frac{-4}{-2} = 2$ $\quad YX = 2\sqrt{5}$ (see work above)

Since 1 pair of opposite sides is both parallel and congruent, the figure is a parallelogram.

S. $x^2 - 1x - 20$ T. $8x^2 + 10x - 3$ U. $15d^2 - 13d + 2$

V. $3x^2 + 18x + 24$ W. $2a^2 + 3a - 7$ X. $-6x^2 - 9x + 15$

4 Terms- Factor by grouping - look for GCF's or Perfect Square Trinomials - you may need to re-order the terms of the polynomial

Factoring Checklist WS - Microsoft Word

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Type a question for help

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4 Terms- Factor by grouping - look for GCF's or Perfect Square Trinomials - you may need to re-order the terms of the polynomial

Y. $7ax+7ay-2mx-2my$

Z. $y^2+4y+4-x^2$

A2. $6a^2+4b+3ab+8a$

Draw AutoShapes

Page 2 Sec 1 2/2 At Ln Col REC TRK EXT OVR