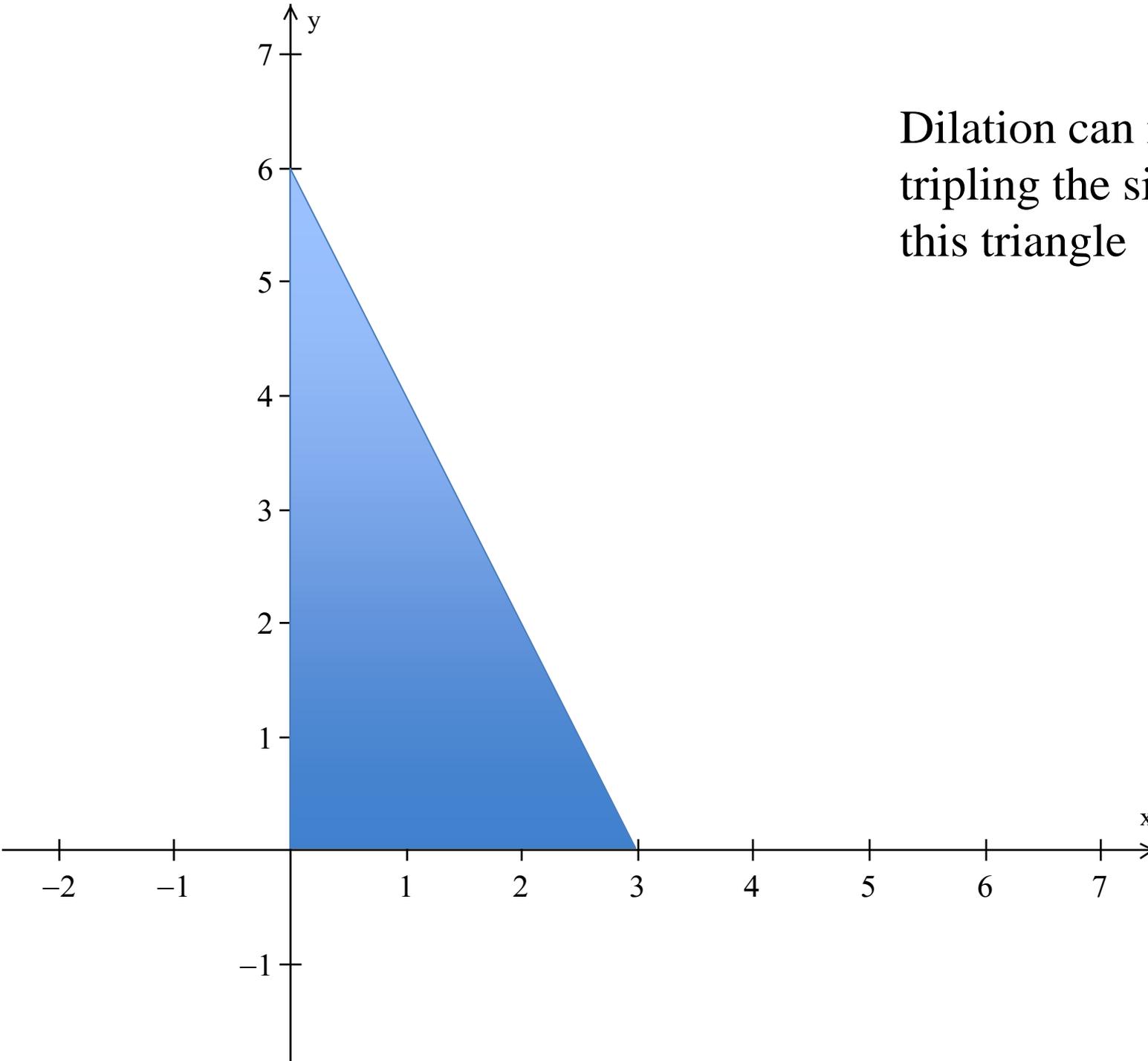# Dilations

- A **dilation** is a transformation that produces an image that is the same shape as the original, but is a different size.
- A **dilation** stretches or shrinks the original figure.
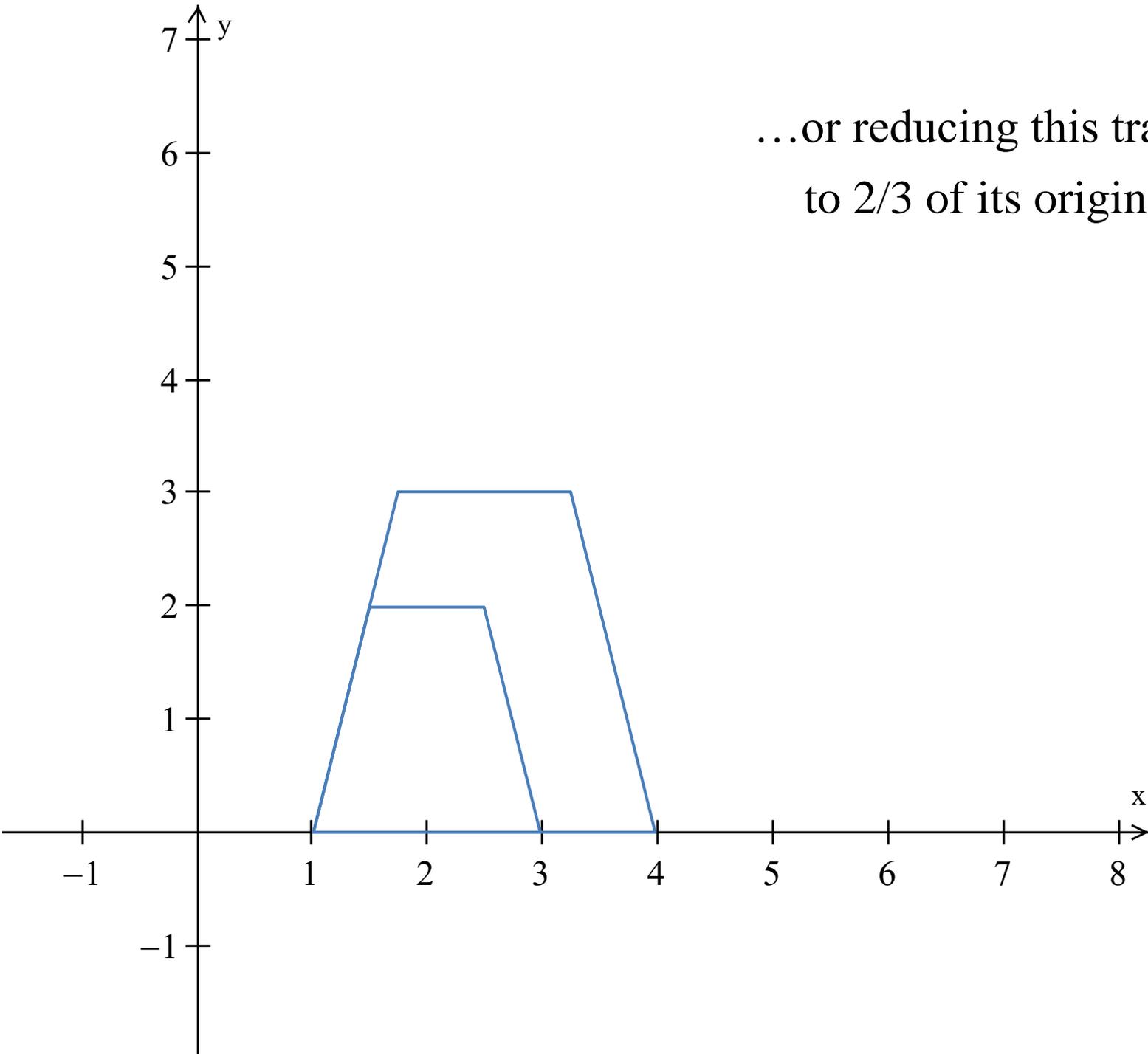- The description of a **dilation** includes the scale factor (or ratio) and the center of the dilation.

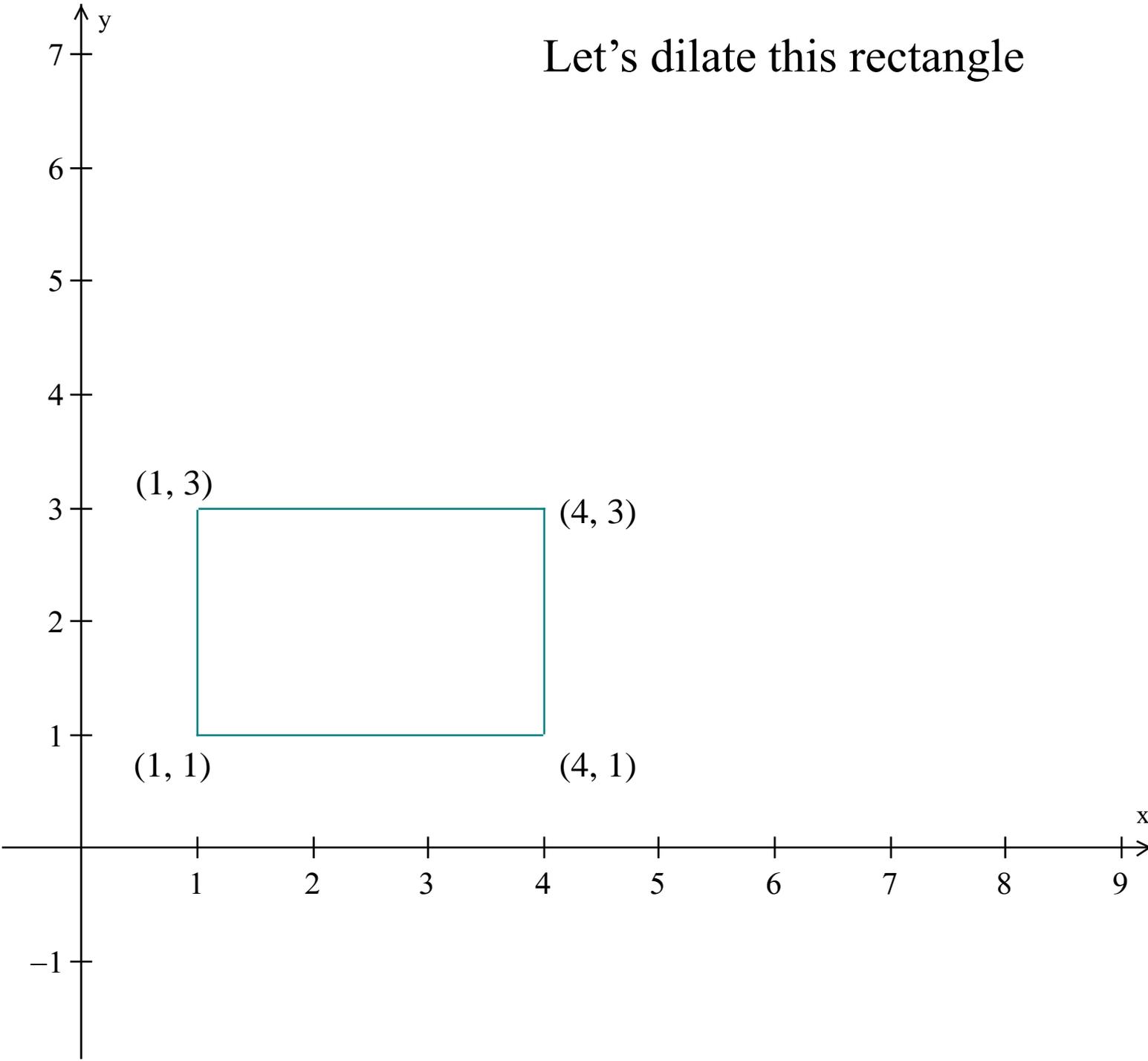Dilation can mean tripling the size of this triangle
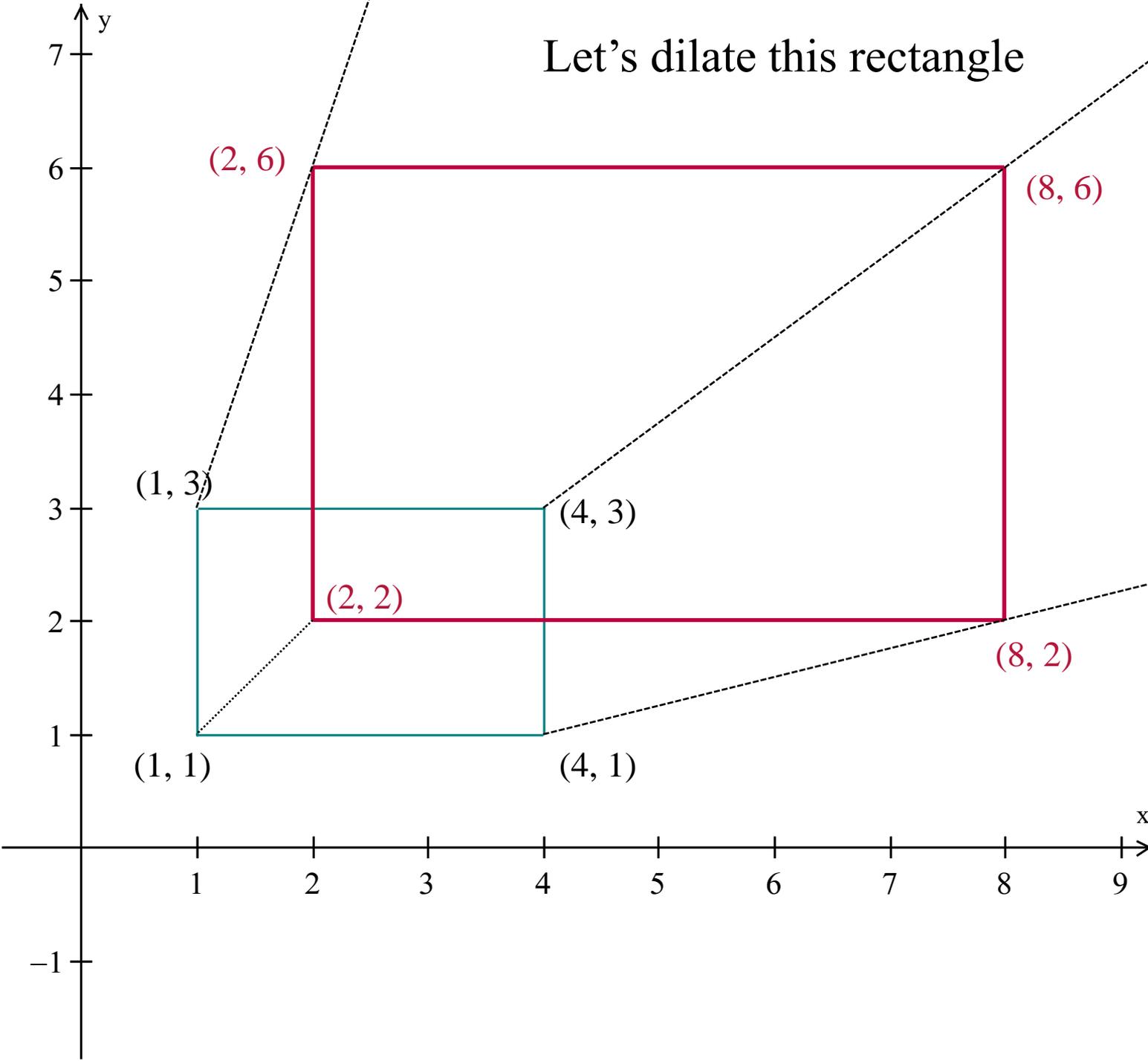
…or doubling the dimensions of this rectangle
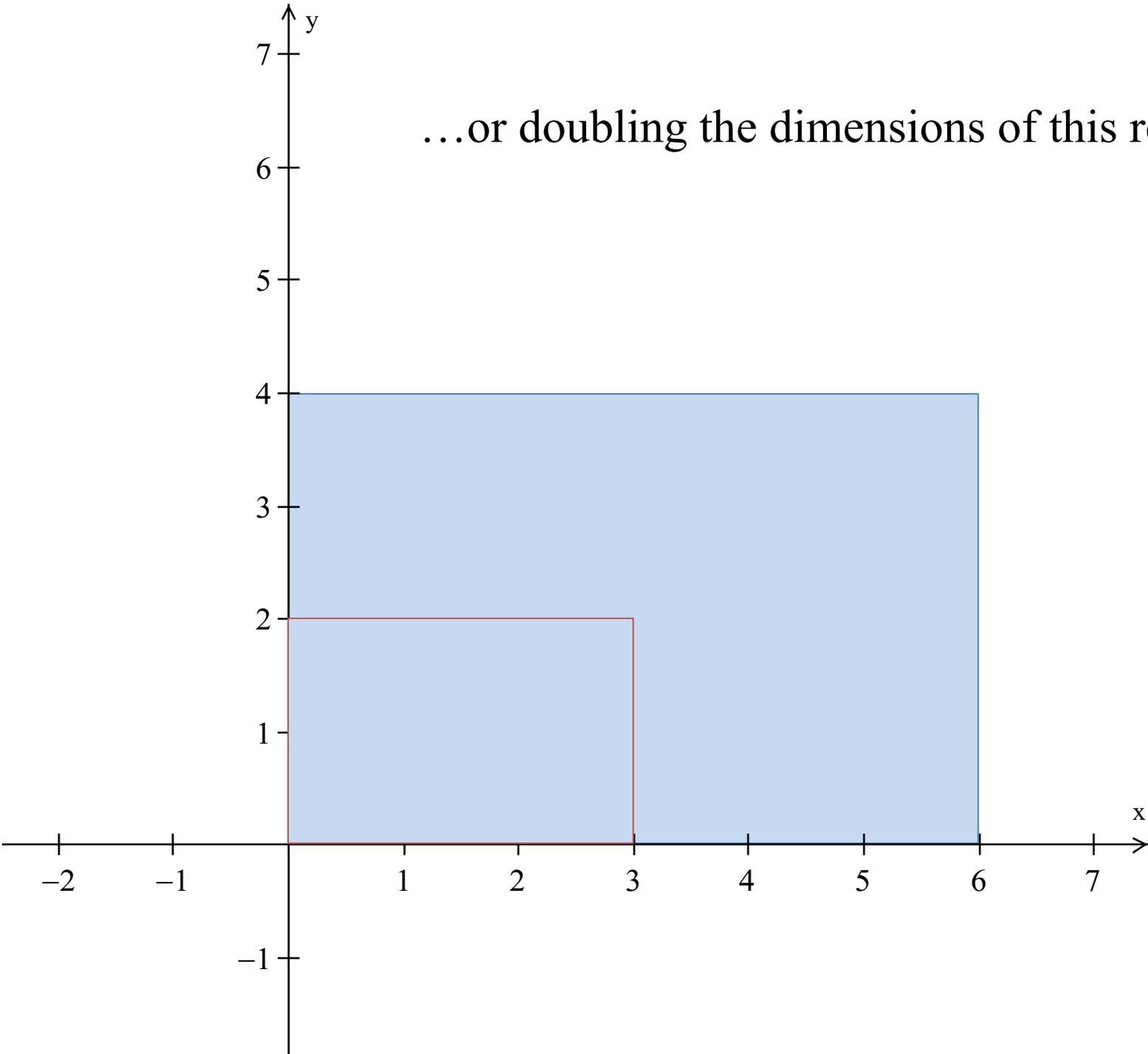
…or reducing this trapezoid to 2/3 of its original size

Let's dilate this rectangle

(1, 3)   (4, 3)

(1, 1)   (4, 1)

Let's dilate this rectangle

y

7

6 — (2, 6) ————————————————————— (8, 6)

The side lengths
have increased
by a factor of

5

2

4

The area has
increased by a
factor of

3 (1, 3) (4, 3)

(2, 2)

4

2 (8, 2)

What is the
pattern to how
the coordinate

1 (1, 1) (4, 1) x values change
from the smaller
to the larger
rectangle?

1 2 3 4 5 6 7 8 9

−1

Let's dilate this rectangle
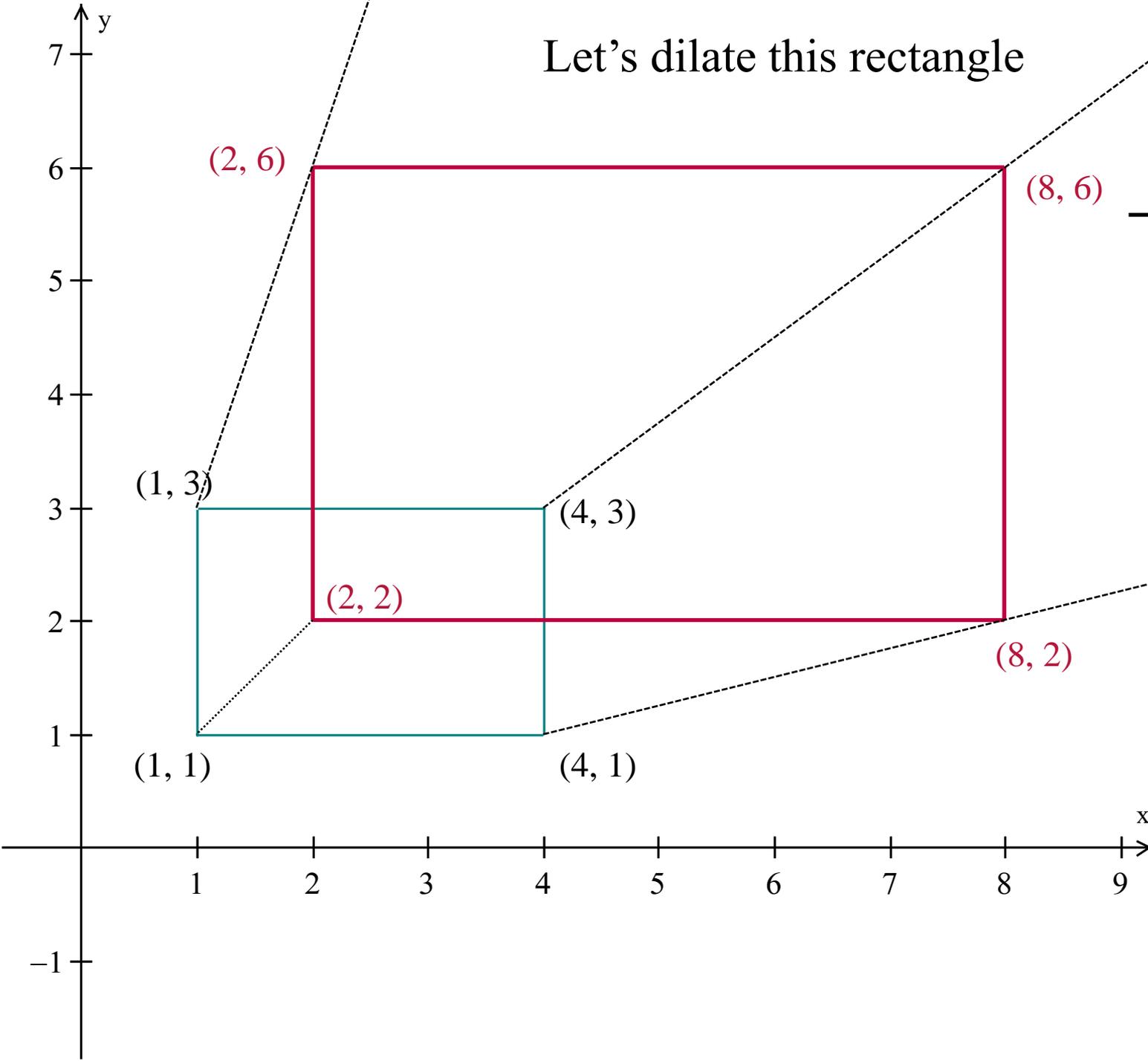
(1, 1)	(2, 2)
(1, 3)	(2, 6)
(4, 1)	(8, 2)
(4, 3)	(8, 6)

Each coordinate is just doubled in value

(2, 6)

(8, 6)

(1, 3)

(4, 3)

(2, 2)

(8, 2)

(1, 1)

(4, 1)

Other ways of transforming polygons on the coordinate plane include…

A **reflection** (or flip) is a transformation across a line, called the line of reflection. Each point and its image are the same distance from the line of reflection.

Let's reflect this rectangle across the *x*-axis

Here the coordinates (–3, 1), (–3, 4), (–1, 4), and (–1, 1) are reflected across the *x*-axis to give us

(–3, –1), (–3, – 4), (–1, –4), and (–1, –1)

A **translation** (or slide) is a transformation in which all the points of a figure move the same distance in the same direction.

Let's move this rectangle from here…
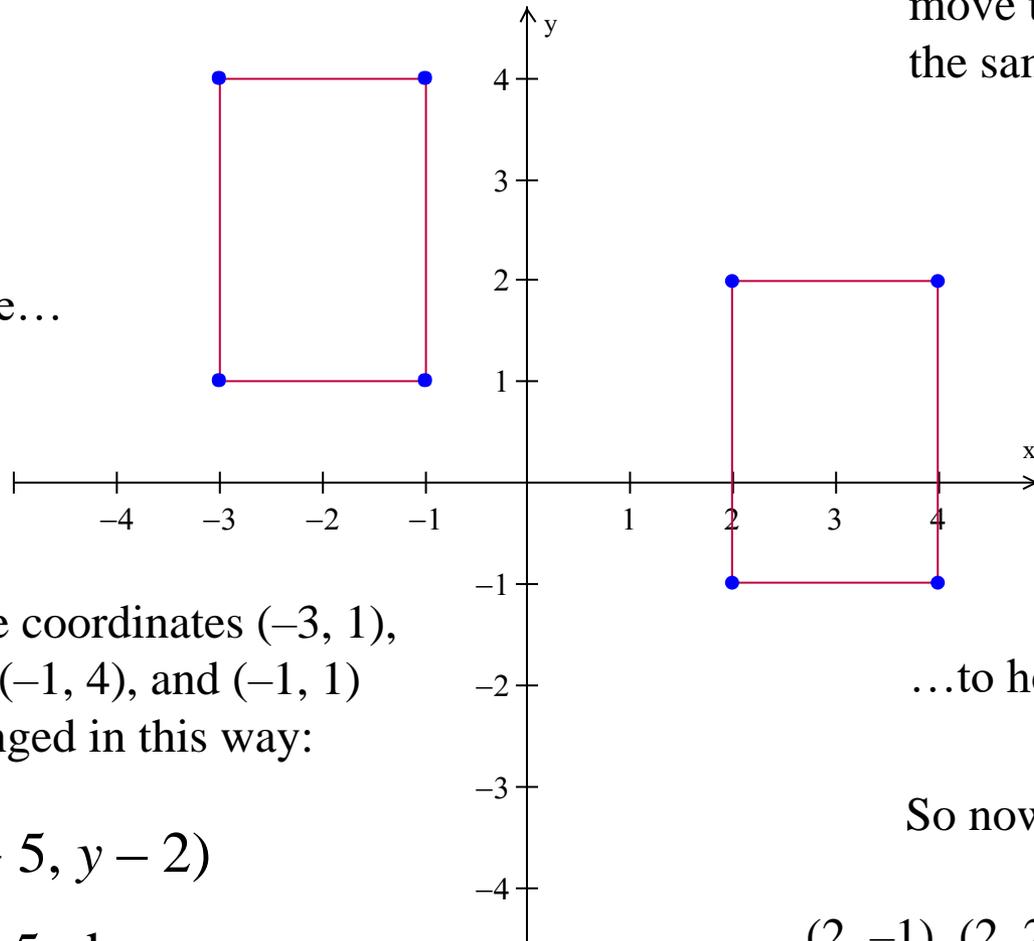
Here the coordinates (–3, 1), (–3, 4), (–1, 4), and (–1, 1) are changed in this way:

$$(x + 5, y - 2)$$

right 5, down 2
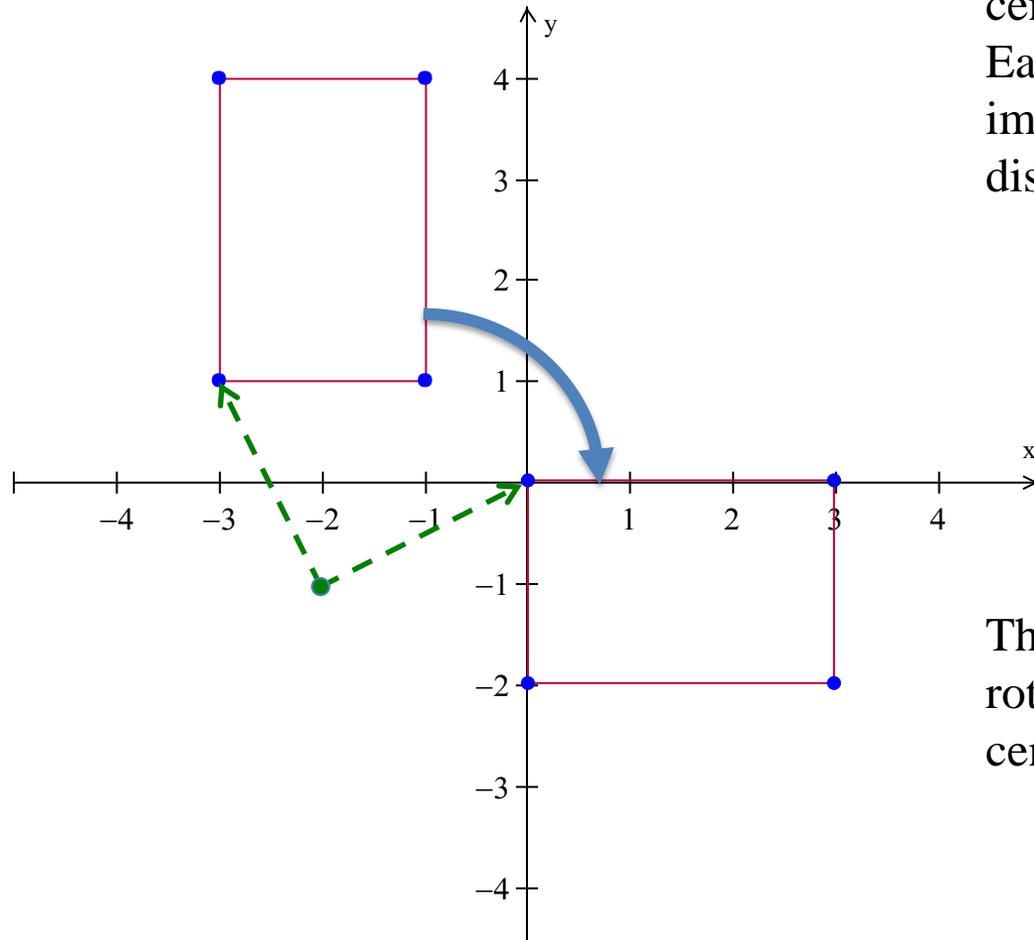
…to here

So now we have

(2, –1), (2, 2), (4, 2), and (4, –1)

A **rotation** (or turn) is a transformation about a point P, called the center of rotation. Each point and its image are the same distance from P.

This is an example of a rotation around the central point (–2, –1)

The only examples of this that you will need to know for now is how to recognize them graphically. Calculating rotations will come later