

Congruence is a relational concept in the field of geometry in mathematics. Its dictionary definition is 'quality of being in harmony' or 'being identical in form'. In geometry, it maintains that same definition, and is usually attributed to shapes such as rectangles, squares, and triangles. Any shape with two or more points can be considered for congruence.

Since congruence is a comparison tool, it is a concept that requires two or more shapes. In geometry and other modern figure-based technologies, congruence allows systems to detect changes or errors between two shapes.

When talking about a non-congruent rectangle, for instance, you mean it is not identical to another rectangle in question. This comparison is based on a few more factors, which will be discussed in detail below.

What is Congruence?

In more formal terms, congruence is the quality of two or more figures — if they have the same shape and size. If one figure is a mirror image or a rotated image of the other but exactly same in shape and size, then the two figures are also said to be congruent. What matters is the size and shape and not the orientation or location.

The basic idea of congruency is that two sets of points in a shape (for example, a rectangle, which has four points) should be identical to each other even if they are translated, rotated, or mirrored. If a figure can be translated or made identical to another figure without resizing it or increasing/reducing the number of points, then it is said to be congruent. A rectangle, when compared with another rectangle that is 50% smaller, would mean that it is non-congruent.

Congruence is denoted with the symbol ' \cong '. It's an equal-to sign with a tilde on top. It represents 'almost equal to' and is often used in equations or to compare factors such as angles, lengths, and breadths.

What is Non-Congruence?

The above explanation simplifies the definition. If congruence means similarity between two figures with the exact same shape and size, non-congruence means that the figures have different sizes or shapes. This may or may not apply between different shapes, i.e. a square being compared to a rectangle.

Therefore, two figures are said to be non-congruent if they have different shapes or sizes. Let's take this meaning to answer the main question.

What is a Non-Congruent Rectangle?

A non-congruent rectangle is a rectangle that is not identical to another rectangle. Its size, shape, or dimensions are different from the other rectangle. To compare two figures and detect changes in their shape/size, you will need to know the basic [concepts of measurement](#). You may use Cuemath to take your child through basic measurement concepts.

In the case of a rectangle, measuring the length and breadth of the figures in question will help ascertain if they are congruent or not. In terms of geometry, two rectangles are said to be congruent if they have the same length and breadth.

Additionally, you can also consider the side angles to further confirm if two rectangles are congruent or not. For example, all the four angles of a rectangle are 90-degree angles. But, if you detect that one of them is slightly lower or higher, you can confirm that it is not congruent with the other one.

Another takeaway from this observation is that the figure may not be a rectangle at all since one of its angles is different from others. This would mean that the length and breadth of that side (region) are also different, which confirms the observation of it not being a rectangle.

Therefore, when comparing two rectangles for congruence, make sure you check the lengths, breadths, and angles to confirm. Use a scale and a protractor to do this.

Similarity vs Congruence

There is a slight difference between similarity and congruence. If congruence is defined as identical shapes with the same size, similarity means identical shapes but with different sizes.

For example, if two rectangles have the same length and breadth, they will be called congruent rectangles. On the other hand, if one rectangle is smaller in size than the other but has the same shape, the rectangles will be called similar. Consider the example above with a 50% smaller rectangle; they are similar but not congruent. Both similar and congruent shapes may or may not be exclusive. There is a debate about this, better to stick with the textbook definition when such questions are asked in exams.

Features of Congruent Rectangles

Congruence has some features that can help you compare two figures. While these features change according to the type of figure (say, a circle versus a triangle), the base concepts remain the same.

Here are some of the features of congruent rectangles:

- They have the same shape, i.e. length and breadth will be proportionate to each other
- The angles are in the same relative position in both the figures, i.e. they are corresponding angles
- The four sides of the rectangles are corresponding to each other

Changing Features in Other Figures

In rectangles, the correspondence is in the angles and the length of the sides.

Depending upon the figure in question, this will change, as listed below.

- Two lines are said to be congruent if they have the same length

- Two squares are said to be congruent if they have the same side length or area (since all sides are equal in length)
- Two circles are said to be congruent if they have the same radius/diameter

If you note the first example here, the length is the only defining factor in a line. The same is true with circles where the only defining factor is the radius or the diameter. Therefore, congruence involves measuring the figures in question to identify their shapes and sizes.

Examples of Non-Congruent Rectangles

Here are some examples of non-congruent rectangles that will further simplify its definition.

Example 1

Take a rectangle that has a length of 10 cm and a breadth of 5 cm. Now, take another rectangle which has a length of 9 cm and a breadth of 5 cm.

The question is: are these non-congruent rectangles? The answer is yes because there is a difference in the length of the rectangles. While one is 10-cm long, the other one is 9-cm long.

Example 2

Take a rectangle that is 100-cm long and 60-cm broad. Take another rectangle that is half the size of this rectangle, i.e. 50 cm in length and 30 cm in breadth.

If you compare these two rectangles, you will know that these are non-congruent rectangles. Both their length and breadth are different.

Comparing this with example 1, here both the length and breadth are different. This is an important point because non-congruence does not require a change in all parameters/features. A change in just one parameter, i.e. length or breadth, is enough to be non-congruent.

An Example of a Congruent Rectangle

Here's an example of a congruent rectangle for a better understanding:

Take a rectangle that is 20-cm long and 15-cm broad. Draw it vertically on a paper so that the lengthier sides are perpendicular to the bottom of the page. Draw another rectangle with the same measurements but horizontally. This means the shorter sides will be perpendicular to the bottom of the page.

When you finish drawing the rectangles and observe them, there is a chance that you may get confused. In reality, both rectangles are congruent even though one is horizontal and the other vertical.

Why? Because as noted in the initial sections of this article, a rotated image can also be congruent. The defining features are only length and breadth. The position or orientation of the figure does not change its congruence with another figure.

Conclusion

Understanding a non-congruent rectangle will be easier if you know the basic concepts of measurement and practice it visually. That's where Cuemath can come in handy, as it provides a visual way for children to study mathematics and make sense of simple and complex concepts.

More than the individual definition of such concepts, it is important to know the differences between them, so that your child can understand bigger concepts like non-congruence. With Cuemath, the definitions are easy to read and understand, and there are also examples which provide a visual cue to otherwise confusing topics. While learning about basic concepts such as length, breadth, and radius might be easy, it can get difficult with intermediate ones, such as metres-inches, pounds-kilograms, and litres-ounces. Knowing these basics is important as your child grows and moves to higher grades. So, make sure that you provide your child with sufficient support and use online services like Cuemath to build a better foundation in mathematics.