

FlexiPrep: Downloaded from flexiprep.com

For solved question bank visit doorsteptutor.com and for free video lectures visit [Examrace YouTube Channel](#)

Triangle Inequality: Activity-Triangle Inequality Theorem and Triangle Inequality Theorem (For CBSE, ICSE, IAS, NET, NRA 2022)

Get unlimited access to the best preparation resource for CAT Mathematics: [fully solved questions with step-by-step explanation](#)- practice your way to success.

A triangle is a three-sided polygon. It has three sides and three angles. The three sides and three angles share an important relationship. Term “inequality” represents the meaning “not equal” .

What is Triangle Inequality?

“Triangle inequality” is meant for any triangles. Let us take a, b, and c are the lengths of the three sides of a triangle, in which no side is being greater than the side c, then the triangle inequality states that,

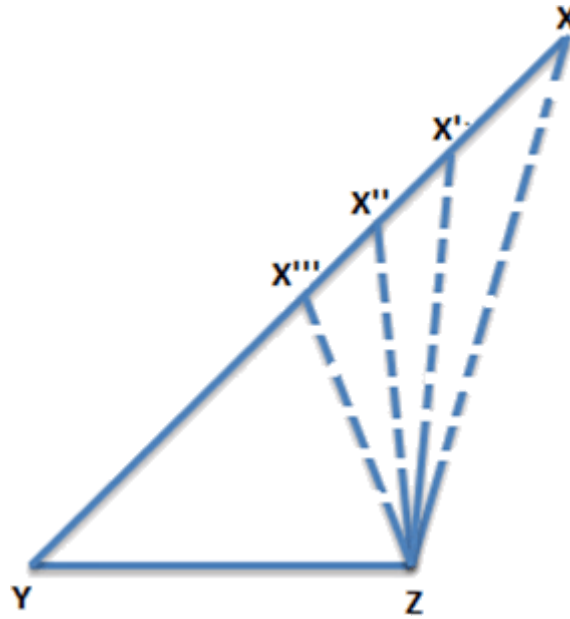
$$c \leq a + b$$

This states that the sum of any two sides of a triangle is greater than or equal to the third side of a triangle.

Activity - Triangle Inequality Theorem

Activity 1: On a paper mark two points Y and Z and join them to form a straight line. Mark another point X outside the line lying on the same plane of the paper. Join XY as shown.

Now mark another point X 'on the line segment XY, join X' Z. Similarly mark X " and join X " Z with dotted lines as shown.

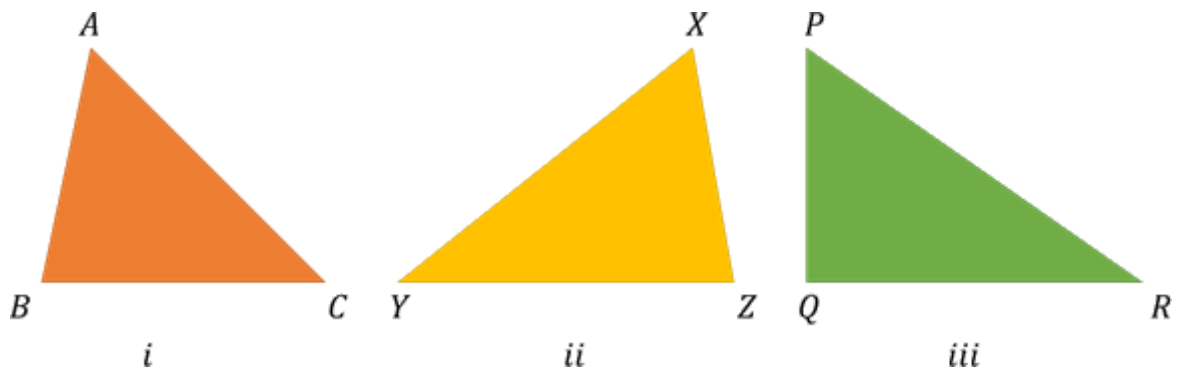


©FlexiPrep. Report @violations @https://tips.fbi.gov/

From the above figure we can easily deduce that if we keep on decreasing the length of side XY such that $XY > X'Y > X''Y > X'''Y$ the angle opposite to side XY also decreases i.e., $\angle XZY > \angle X'ZY > \angle X''ZY > \angle X'''ZY$. Thus, from the above activity we can infer that if we keep on increasing one side of a triangle then the angle opposite to it increases.

Now let us try out another activity.

Activity: Draw 3 scalene triangles on a sheet of paper as shown.



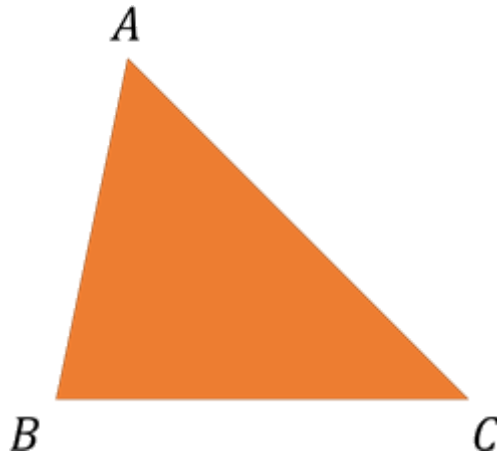
©FlexiPrep. Report @violations @https://tips.fbi.gov/

Let us consider fig. (i) . In $\triangle ABC$, AC is the longest side and AB is the shortest. We observe that $\angle B$ is the largest in measure and $\angle C$ is the smallest. Similarly, in

$\triangle XYZ$, XY is the largest side and XZ is the smallest and $\angle Z$ is the largest in measure and $\angle Y$ is the smallest. In the last figure also the same kind of pattern is followed i.e., side PR is largest and so is the $\angle Q$ opposite to it.

Triangle Inequality Theorem

Let us consider the triangle. The following are the triangle inequality theorems.



[©FlexiPrep. Report ©violations @https://tips.fbi.gov/](https://tips.fbi.gov/)

Theorem 1: In a triangle, the side opposite to the largest side is greatest in measure.

The converse of the above theorem is also true according to which in a triangle the side opposite to a greater angle is the longest side of the triangle.

In the above fig. , since AC is the longest side, the largest angle in the triangle is $\angle B$.

Another theorem which follows can be stated as:

Theorem 2: The sum of lengths of any two sides of a triangle is greater than the length of its third side.

According to triangle inequality, $AB + BC > AC$

Example: In $\triangle PQR$, $\angle P = 60^\circ$ and $\angle Q = 50^\circ$, which side of the triangle is the longest?

Solution:

- Here given,
- In $\triangle PQR$, $\angle P = 60^\circ$, $\angle Q = 50^\circ$
- For the finding of other triangle, using angle sum property of triangle.

$$\angle P + \angle Q + \angle R = 180^\circ$$

Put the value of $\angle P$, and $\angle Q$ in above equation.

$$60^\circ + 50^\circ + \angle R = 180^\circ$$

Sum of the angle P and angle Q.

$$110^\circ + \angle R = 180^\circ$$

$$\angle R = 180^\circ - 110^\circ$$

$$\angle R = 70^\circ$$

- So, $\angle R$ is the largest angle.
- According to Theorem 1, In a triangle, the side opposite to the largest side is greatest in measure.
- Here largest angle is $\angle R$, opposite side of the triangle is the largest side.
- PQ is the longest side.

Developed by: [Mindsprite Solutions](#)