

Sh. d. → State the PAPA 4
Special theory of relativity.

There are two basic or fundamental postulates of the special theory of relativity-

(1) The Principle of relativity: The laws of physical phenomena are the same when stated in terms of two systems of reference in uniform translatory motion relative to each other.

(2) The Principle of constancy of velocity of light: The velocity of light in vacuum is a constant, independent of the velocity of the observer or the velocity of the source, i.e. it has the same value in all inertial frames.

The first postulate, which is the principle of equivalence, is a generalisation ~~form~~ ~~of~~ from a wide range of physical experience. This postulate is an extension of the conclusion drawn from Newtonian Mechanics, i.e. the velocity is not absolute but it is relative as is evident from the failure of Michelson-Morley experiment performed to determine the velocity of earth through ether.

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The second postulate affirming the constancy of the velocity of light as well as its independence from the relative velocity of source and observer appears to represent a simple experimental fact. It is this postulate which draws a demarcation line between the classical theory and the theory of relativity given by Einstein.

To pass from the coordinates which describe a physical event in one system to the coordinates which describe the same event in another system moving uniformly and rectilinearly with respect to the first, without violating in any way the principle of equivalence, the universal constancy of light in both systems must be used. From such a combination of the two postulates thus follows a series of very important deductions, such as the futility of ether, the intrinsic quantum nature of radiations, the variation of the mass of a moving body with its velocity, and the universal mass-energy relation.