Short Answer

10.1 Postulates of Special Relativity 26.

What is the postulate having to do with the speed of light on which the theory of special relativity is based?

a. The speed of light remains the same in all inertial frames of reference.
b. The speed of light depends on the speed of the source emitting the light.
c. The speed of light changes with change in medium through which it travels.
d. The speed of light does not change with change in medium through which it travels.

27.

What is the postulate having to do with reference frames on which the theory of special relativity is based?

a. The frame of reference chosen is arbitrary as long as it is inertial.
b. The frame of reference is chosen to have constant nonzero acceleration.
c. The frame of reference is chosen in such a way that the object under observation is at rest.
d. The frame of reference is chosen in such a way that the object under observation is moving with a constant speed.

28.

If you look out the window of a moving car at houses going past, you sense that you are moving. What have you chosen as your frame of reference?

a. the car
b. the sun
c. a house

29.

Why did Michelson and Morley orient light beams at right angles to each other?

a. To observe the particle nature of light
b. To observe the effect of the passing ether on the speed of light
c. To obtain a diffraction pattern by combination of light
d. To obtain a constant path difference for interference of light

10.2 Consequences of Special Relativity 30.

What is the relationship between the binding energy and the mass defect of an atomic nucleus?

a. The binding energy is the energy equivalent of the mass defect, as given by $E0 = mc$.
b. The binding energy is the energy equivalent of the mass defect, as given by $E0 = mc^2$.

c. The binding energy is the energy equivalent of the mass defect, as given by $E_0 = \frac{m}{c}$
d. The binding energy is the energy equivalent of the mass defect, as given by $E_0 = \frac{m}{c^2}$.

31.

True or false—It is possible to just use the relationships $F = ma$ and $E = Fd$ to show that both sides of the equation $\mathrm{E_0 = mc^2}$ have the same units.

a. True
b. False

32.

Explain why the special theory of relativity caused the law of conservation of energy to be modified.

a. The law of conservation of energy is not valid in relativistic mechanics.
b. The law of conservation of energy has to be modified because of time dilation.
c. The law of conservation of energy has to be modified because of length contraction.
d. The law of conservation of energy has to be modified because of mass-energy equivalence.

33.

The sun loses about 4×10^9 kg of mass every second. Explain in terms of special relativity why this is happening.

a. The sun loses mass because of its high temperature.
b. The sun loses mass because it is continuously releasing energy.
c. The Sun loses mass because the diameter of the sun is contracted.
d. The sun loses mass because the speed of the sun is very high and close to the speed of light.