

Answers to selected questions

Chapter 21

Q6. Gravity has been the force most difficult to incorporate into a completely unified field theory. String theory and other models have been proposed, but they have not yet been verified by experimental tests.

Q12. The term “Big Bang” refers to the beginning of the expansion of the known universe. When the expansion began there were no atoms or larger entities. These all developed as the expansion proceeded according to our modern cosmological theories.

Q18. The fact that small changes in voltage across the base and emitter regions of a transistor can produce large changes in current and voltage across the collector and emitter is what makes transistors able to amplify electrical signals.

Q24. Transistors are connected to only one or two other transistors in a digital computer whereas the neurons in our brain form multiple connections of varying strengths with other neurons. The organization of our brain is therefore much more complex than that of a digital computer.

Q30. Yes. To produce a hologram, a laser beam is split into a reference beam and an object beam. After being reflected from the object, the object beam interferes with the reference beam to form an interference pattern on a photographic film. This interference pattern, after the film is developed, becomes the hologram.