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- _____ 1) Which particle has *no* charge?
1) electron 2) neutron 3) positron 4) proton
- _____ 2) Which phrase describes an atom?
1) a negatively charged nucleus surrounded by positively charged protons
2) a negatively charged nucleus surrounded by positively charged electrons
3) a positively charged nucleus surrounded by negatively charged protons
4) a positively charged nucleus surrounded by negatively charged electrons
- _____ 3) Which particles have approximately the same mass?
1) alpha particle and beta particle 3) neutron and positron
2) alpha particle and proton 4) neutron and proton
- _____ 4) In the late 1800s, experiments using cathode ray tubes led to the discovery of the
1) electron 2) neutron 3) positron 4) proton
- _____ 5) Which subatomic particle will be attracted by a positively charged object?
1) proton 2) neutron 3) electron 4) positron
- _____ 6) Which statement concerning elements is true?
1) Different elements must have different numbers of isotopes.
2) Different elements must have different numbers of neutrons.
3) All atoms of a given element must have the same mass number.
4) All atoms of a given element must have the same atomic number.
- _____ 7) Which particles are found in the nucleus of an atom?
1) electrons, only 3) protons and electrons
2) neutrons, only 4) protons and neutrons
- _____ 8) Which conclusion was a direct result of the gold foil experiment?
1) An atom is mostly empty space with a dense, positively charged nucleus.
2) An atom is composed of at least three types of subatomic particles.
3) An electron has a positive charge and is located inside the nucleus.
4) An electron has properties of both waves and particles.
- _____ 9) Which two particles have opposite charges?
1) an electron and a neutron 3) a proton and a neutron
2) an electron and a proton 4) a proton and a positron

Base your answers to questions **10** and **11** on the information below.

In 1897, J. J. Thomson demonstrated in an experiment that cathode rays were deflected by an electric field. This suggested that cathode rays were composed of negatively charged particles found in all atoms. Thomson concluded that the atom was a positively charged sphere of almost uniform density in which negatively charged particles were embedded. The total negative charge in the atom was balanced by the positive charge, making the atom electrically neutral.

In the early 1900s, Ernest Rutherford bombarded a very thin sheet of gold foil with alpha particles. After interpreting the results of the gold foil experiment, Rutherford proposed a more sophisticated model of the atom.

10) State *one* aspect of the modern model of the atom that agrees with a conclusion made by Thomson.

11) State *one* conclusion from Rutherford's experiment that contradicts one conclusion made by Thomson.

Fill in the following chart

Subatomic Particle	Symbol	Charge	Location inside atom
Electron	e -		
Proton	p +		
Neutron	n 0		