

Answer all questions on the answer sheet! This test consists of 16 multiple choice questions and 1 **extra credit** question. Questions are on both sides of the paper.

1. You and a friend are spending the weekend making up missed lab experiments. You are on to second semester material and are studying the electrostatic interaction of two charges. You notice that two charges are exerting a certain force on one another. If the distance between two electric charges doubles, then the force they exert on each other changes by how much?
 - (A) 1/4 as large
 - (B) 4 times as large
 - (C) 1/2 as large
 - (D) 2 times as large
2. If an electron and a proton both experience the same electric force,
 - (A) the proton will have greater acceleration.
 - (B) the electron will have greater acceleration.
 - (C) their accelerations will have the same magnitude.
 - (D) neither will accelerate.
3. Good electrical conductors are usually good thermal conductors because
 - (A) neither type of object has a high specific heat.
 - (B) both types of objects have low density.
 - (C) of pure coincidence.
 - (D) electrons are responsible for thermal and electric conduction.
4. In the dark, the photoconductors used in most xerographic copiers are
 - (A) super-conductors.
 - (B) insulators.
 - (C) semi-conductors.
 - (D) conductors.
5. You are installing a new battery in your car. Although there are two terminals on the battery you hook up only one of your car's battery cables to the battery. Hooked up like this, the current that would then flow through the headlights when turned on is
 - (A) twice the current that flowed when both terminals were present and plugged in.
 - (B) half the current that flowed when both terminals were present and plugged in.
 - (C) the same as the current that flowed when both terminals were present and plugged in.
 - (D) zero.

6. A 12 volt battery is connected across a 36Ω resistor. The current through the resistor is:
- (A) 3 Amperes
 - (B) 2 Amperes
 - (C) 0.33 Ampere
 - (D) 0.033 Ampere
7. A car stereo draws 24 A of current at a voltage of 12 V. What power does it use?
- (A) 2 W
 - (B) 24 W
 - (C) 288 W
 - (D) 448 W
8. An electrical appliance has a power rating of 600 Watts when connected to a 120 volt electrical outlet. What is the resistance of the appliance?
- (A) $24\ \Omega$
 - (B) $12\ \Omega$
 - (C) $5\ \Omega$
 - (D) $0.48\ \Omega$
9. You are working with a magnet and it breaks in half. You then end up with
- (A) Two north poles only
 - (B) Two magnets, each with a south and a north pole.
 - (C) One north and one south pole
 - (D) Two south poles only
10. Electricity and magnetism are different because
- (A) Electrical forces decrease with increasing separation.
 - (B) Only magnetism has to do with electrons.
 - (C) There are no electric monopoles.
 - (D) There are no magnetic monopoles.
11. A magnetic field points due south and parallel to the surface of the earth. A positive charge is moving due east parallel to the earth's surface. What is the direction of the magnetic force on the positive charge
- (A) up
 - (B) down
 - (C) south
 - (D) north

12. A transformer provides the 12,000 volts needed to operate the neon sign in a local convenience store. When AC current flows through the transformer's primary coil and experiences a voltage drop of 120 volts, current flows through the transformer's secondary coil and experiences a voltage rise of 12,000 volts. Based on this observation, it is likely that
- (A) the secondary coil has about 100 times as many turns in it as the primary coil.
 - (B) the currents in the two coils are about equal.
 - (C) the primary coil has about 100 times as many turns in it as the secondary coil.
 - (D) the current in the secondary coil is about 100 times as large as the current in the primary
13. Faraday's law says
- (A) current times resistance is equal to voltage
 - (B) a changing magnetic field produces an induced voltage
 - (C) there are no magnetic mono-poles
 - (D) a changing electric field produces an induced magnetic field
14. An electrical generator
- (A) is normally used to create DC power
 - (B) generates electrical current by rotating a coil in an magnetic field
 - (C) use a magnetic field created by magnetic mono-poles
 - (D) can not make AC power
15. When you drop a strong magnet through the center of a copper pipe, the magnet
- (A) descends slowly because its motion causes currents to flow in the pipe and those currents repel the magnet.
 - (B) falls at the usual rate because copper metal is nonmagnetic.
 - (C) descends slowly because it is attracted to the magnetic copper metal.
 - (D) descends rapidly because its motion causes currents to flow in the pipe and those currents attract the magnet.
16. The principal **disadvantage** of sending electric power across country on very low voltage transmission lines would be
- (A) high current would cause significant power loss.
 - (B) the wires need to be too thick and heavy.
 - (C) the low voltage can leak out, leaving none at the end.
 - (D) they would interfere with each other too much
17. James Maxwell showed
- (A) a changing magnetic field produces an electric potential
 - (B) light is an electromagnetic wave
 - (C) momentum is based on translational symmetry
 - (D) that magnetic mono-poles could not exist