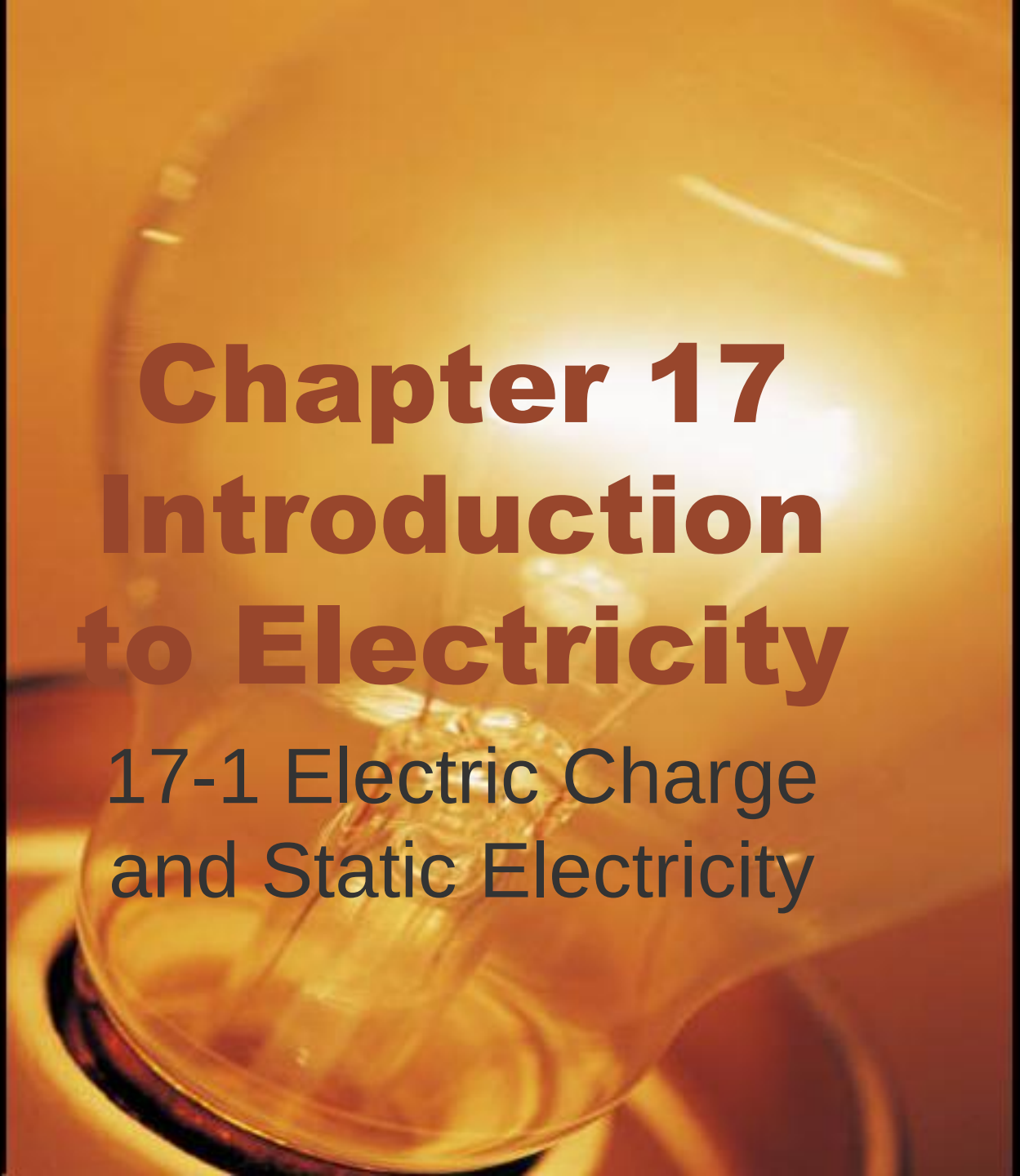

Chapter 17 Introduction to Electricity

17-1 Electric Charge and Static Electricity

Essential Questions

- How do charged objects interact by using the law of electric charges?
- What are three ways that an object can become charged?
- What is the difference between conductors and insulators?

Vocabulary

- Law of electric charges – like charges repel, opposites attract
- Electric force – force of attraction or repulsion of objects
- Electric field – region around charged objects that has electric force

Vocab. cont.

- Electrical conductor – material in which charges move freely (conducts electricity)
- Electrical insulator – material that does not allow charges to move freely
- Static electricity – electric charge at rest on an object
- Electric discharge – loss of static electricity

Electric Charge

- All matter is made of atoms
  - protons, neutrons, electrons
- Charges exert forces
  - Charge is a physical property
  - Objects have positive, negative or no charge
  - Law of electric charges – like charges push against each other, opposite charges attract

- Electric force and electric field
  - Force between charged objects
  - Depends on: charge & distance
- Electric field – distance within which a charged object attracts or repels another

Three Ways to Charge an Object

- Friction
  - Occurs when electrons are “wiped” from one object to another
  - Objects that lose electrons – positive
  - Objects that gain electrons - negative
- Conduction
  - Occurs when electrons move by direct contact (carpet static)

- Induction
  - Occurs when charge changes without direct contact
  - Electrons “jump” to positively charges object

- Conservation of charge
  - Charge is not created or destroyed
  - Electrons only move from object to object
- Detecting charge
  - Electroscopes can be used to detect charge
  - Cannot show if charge is positive or negative

Moving Charges

- Conductors
  - Allow charges to move freely
  - Ex: metals
- Insulators
  - Do not allow charges to move freely
  - Ex: plastic, rubber, etc.

Static Electricity

- Static electricity – electric charge at rest on an object
  - Static means not moving
  - Object keeps its' charge
  - Ex: static cling
- Electric discharge
  - Charges eventually move off an object
  - Can be slow (static cling going away), or fast (shock from a doorknob)

- Lightning – one of the most dramatic examples of electric discharge
  - Negative charges build up at bottom of cloud
  - Positive charges build up on top
  - Negative charge at bottom induces a positive charge on the ground – charge attracts, creating lightning bolt
  - Most lightning is between clouds

- Lightning dangers
  - Lightning strikes at the highest point of a charged area
  - Anything that stands out is more likely to get hit (Ex: tree in a field)

- Lightning Rods
  - Rod connected to the ground by a wire (grounded)
  - Carries lightning’s charge to the Earth
  - Keeps buildings from burning