

8.2 Electric Charge and the Process of Charging

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

KEY WORDS ground 接地 • conductor 导体 • induction 感应 • insulator 绝缘体
• conduction 接触

Objective

Build the skills to answer exam questions on **electric charge and the process of charging**.

You must be able to:

- distinguish **conductors** 导体 from **insulators** 绝缘体
- explain charging by **friction** 摩擦, **conduction** 接触, and **induction** 感应
- explain the role of **grounding** 接地 in charging
- account for charge distributions using **conservation of charge**

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Conductors and insulators

Charge moves freely in a **conductor**, but stays put in an **insulator**.

■ Three ways to charge

Friction (transfers electrons), conduction (contact shares charge), and induction (a nearby charge rearranges charge, then grounding removes some).

■ Grounding

A **ground** is a huge charge reservoir: it can supply or drain electrons, fixing the sign of an induced charge before the connection is broken.

2 Practice

2.1 State the three methods of charging an object. [2]

2.2 Explain the role of grounding when charging a conductor by induction. [2]

2.3 State where excess charge sits on an isolated solid conductor. [1]

3 Exam-style questions

3.1 Charging by induction requires [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** direct contact only
B rubbing two materials
C a nearby charge and a ground connection
D heating the object

3.2 Grounding a conductor allows it to [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** gain or lose electrons
B melt
C become an insulator
D store light

3.3 A positively charged rod is held near a neutral metal sphere; the sphere is then grounded, and the ground is removed before the rod.

(a) State the sign of the final charge on the sphere. [1]

(b) Explain the sequence of steps that produces it. [3]