B1 · Extra practice

Original diploma-style practice | Items 1-2

Extra practice for this lesson. Original questions, not released diploma items. Select one option for multiple choice; other tasks state the required response.

Use $k = 8.99 \times 10^9$ N·m²/C² and $g = 9.81$ m/s² where needed (Alberta Physics 30 data sheets, Constants). For numerical responses, use the stated unit or coefficient and precision. Work in degrees.

B1-D01 · Multiple choice

A neutral solid metal sphere becomes positively charged by ordinary contact charging. Which change explains this?

A. It gains protons.
B. It loses electrons.
C. Its electrons become positive.
D. Its total positive and negative charges both disappear.

Response: _____

B1-D02 · Multiple choice

A negative rod is held near the left side of a neutral metal sphere on an insulating stand without contact. Which pair describes the sphere while the rod remains near?

A. Near side negative; net negative.
B. Near side positive; net positive.
C. Near side positive; net zero.
D. Near side negative; net zero.

Response: _____

B1 · Extra practice

Original diploma-style practice | Items 3-4

B1-D03 · Multiple choice

A positive rod is used to charge a neutral metal sphere by induction. The sphere is grounded, the ground is disconnected, then the rod is removed. Which result is correct?

A. Electrons enter from Earth; final sphere negative.
B. Electrons leave for Earth; final sphere positive.
C. Protons enter from Earth; final sphere positive.
D. No charge transfers; final sphere neutral.

Response: _____

B1-D04 · Multiple choice

A neutral insulator is attracted to a charged object without contact. Which explanation is best?

A. Its particles must become net positive.
B. Electrons flow freely through its full length.
C. The charged object must lose its charge.
D. Charges inside its atoms shift slightly, producing unequal near-side and far-side forces.

Response: _____

B1 · Extra practice

Original diploma-style practice | Items 5-6

B1-D05 · Numerical response

Two identical metal spheres on insulating stands start at +7.0 µC and −1.0 µC. They touch, then separate far apart. What is each final charge in µC? Record the positive value to one decimal place.

Response: _____

B1-D06 · Numerical response

For an induction procedure, actions are labelled: 1 remove rod; 2 disconnect ground; 3 connect ground; 4 bring negative rod near. Starting from a neutral conductor, what four-digit sequence leaves it positively charged without contact?

Response: _____

B1 · Extra practice

Original diploma-style practice | Items 7-8

B1-D07 · Numerical response

A neutral object has 14 protons and 14 electrons with charges of the same size. Four electrons leave. What is the size of its final total charge in units of e? Record a whole number.

Response: _____

B1-D08 · Numerical response

Classify these processes: (i) electrons shift inside a sphere on an insulating stand; (ii) electrons move from Earth to a sphere; (iii) electrons move between touching spheres. Use 1 = separation only and 2 = transfer on or off an object. What three-digit code classifies (i), (ii), (iii), in that order?

Response: _____

B1 · Extra practice

Original diploma-style practice | Items 9-10

B1-D09 · Select all that apply

Choose every true statement: A. A neutral sphere on an insulating stand can have its charges separated. B. An insulator cannot be charged. C. Ground can supply electrons. D. Attraction proves an object has the opposite total charge.

Response: _____

B1-D10 · Matching

Match each situation to its final sign. 1 = positive, 2 = negative, 3 = neutral. Situations: (a) a neutral object gains electrons; (b) one loses electrons; (c) a sphere on an insulating stand only has its charges separated. Record the three digits in a-b-c order.

Response: _____

B1 · Extra practice

Original diploma-style practice | Items 11-12

B1-D11 · Ranking

Identical spheres have total charges A = +6 μC, B = −9 μC, C = +2 μC and D = 0. Rank the sizes of their total charges from largest to smallest. State any ties.

Response: _____

B1-D12 · Source-based reasoning

A record of charging by induction shows a neutral sphere with a negative rod nearby. Frame 1: electrons move within the sphere. Frame 2: a ground wire connects and electrons leave. Frame 3: the wire disconnects. Frame 4: the rod is removed. Which frame first changes the sphere’s total charge, and what is its final sign?

Response: _____