B2 · 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.

B2-D01 · Multiple choice

The force between two charges is F. One charge magnitude becomes four times larger and distance doubles; the other charge is unchanged. What is the new force magnitude?

A. F/4
B. F/2
C. F
D. 4F

Response: _____

B2-D02 · Multiple choice

For fixed charges, which graph is ideally a straight line through the origin?

A. Force F against distance r.
B. Force F against $1/r^2$.
C. Force F against r^2.
D. Force F against 1/r.

Response: _____

B2 · Extra practice

Original diploma-style practice | Items 3-4

B2-D03 · Multiple choice

A charged object A attracts B with 0.300 N. B has twice A’s mass. Which statement about the two forces is correct?

A. B attracts A with 0.300 N in the opposite direction.
B. B attracts A with 0.600 N in the opposite direction.
C. B attracts A with 0.150 N in the opposite direction.
D. Both forces point in the same direction.

Response: _____

B2-D04 · Multiple choice

Which statement correctly compares Coulomb’s and Cavendish’s torsion balances?

A. Both measured only repulsion.
B. Both created charge from nothing.
C. Both made a direct photograph of the charges.
D. Both used a wire’s twist to detect a small force, but studied different forces.

Response: _____

B2 · Extra practice

Original diploma-style practice | Items 5-6

B2-D05 · Numerical response

Point charges +2.00 μC and +3.00 μC are 0.400 m apart in air. Use $k = 8.99 \times 10^9$ $N \cdot m^2/C^2$. What is the force magnitude in N? Record three significant figures.

Response: _____

B2-D06 · Numerical response

The force between two charges is initially 0.810 N. Both charge magnitudes are doubled and distance is tripled. What is the new force magnitude in N? Record three significant figures.

Response: _____

B2 · Extra practice

Original diploma-style practice | Items 7-8

B2-D07 · Numerical response

Point-charge magnitudes are 1.00 μC and 4.00 μC, with force 0.899 N in air. Use $k = 8.99 \times 10^9$ N·m²/C². What is the distance in m? Record three significant figures.

Response: _____

B2-D08 · Numerical response

Sample data for fixed charges give 0.450 N at 0.200 m and 0.1125 N at 0.400 m. On a graph of F against $1/r^2$, what is the slope in N·m²? Express it as a $\times 10^{-2}$ N·m² and record a to three significant figures.

Response: _____

B2 · Extra practice

Original diploma-style practice | Items 9-10

B2-D09 · Select all that apply

For two fixed point-charge magnitudes in air, choose every true statement: A. Tripling distance gives F/9. B. Reversing one sign changes the force magnitude. C. Force on A and on B have equal magnitudes. D. The graph of F against r is a straight line.

Response: _____

B2-D10 · Matching

Match each change to a force factor. Codes: 1 = 2; 2 = 1/4; 3 = 4; 4 = 1/2. Changes: (a) double one charge at fixed distance; (b) double distance at fixed charges; (c) halve distance at fixed charges. Record a-b-c codes.

Response: _____

B2 · Extra practice

Original diploma-style practice | Items 11-12

B2-D11 · Ranking

Same charge magnitudes in each case: A has distance r; B has distance 2r; C has distance r/2; D has distance 3r. Rank force magnitudes largest to smallest.

Response: _____

B2-D12 · Ordering

Order an investigation with measurements: 1 compare several results on a straightened graph; 2 set the charges and keep them fixed; 3 choose and measure centre-to-centre distances; 4 measure force for each distance. What is a sensible four-digit order?

Response: _____