

Brett Robbins Academic Consulting

Physics 30 Practice Test

Unit B: Forces & Fields

10 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

A point charge of $+2.0 \times 10^{-6} \text{ C}$ and a point charge of $+5.0 \times 10^{-6} \text{ C}$ are separated by a distance of 0.30 m. The magnitude of the electric force that each charge exerts on the other is

- | | |
|-----------|----------|
| A) 0.30 N | B) 1.0 N |
| C) 3.0 N | D) 9.0 N |

Question 2

A test charge of $+2.0 \times 10^{-8} \text{ C}$ experiences an electric force of $3.6 \times 10^{-5} \text{ N}$ at a point in an electric field. The magnitude of the electric field strength at that point is

- | | |
|--------------------------------------|-------------------------------------|
| A) $7.2 \times 10^{-13} \text{ N/C}$ | B) $5.6 \times 10^{-4} \text{ N/C}$ |
| C) $1.8 \times 10^2 \text{ N/C}$ | D) $1.8 \times 10^3 \text{ N/C}$ |

Question 3

Two parallel plates are separated by a distance of 2.0 cm and are connected to a 24 V battery. The magnitude of the electric field between the plates is

- | | |
|----------------------------------|----------------------------------|
| A) 0.48 N/C | B) 12 N/C |
| C) $1.2 \times 10^3 \text{ N/C}$ | D) $2.4 \times 10^3 \text{ N/C}$ |

Question 4

An electron is accelerated from rest through an electric potential difference of 150 V.

The kinetic energy gained by the electron, expressed in units of 10^{-17} J and to three significant digits, is

Question 5

A proton moves at a speed of 4.0×10^5 m/s in a direction perpendicular to a magnetic field of strength 0.25 T. The magnitude of the magnetic force on the proton is

- A) 1.6×10^{-14} N B) 1.6×10^{-13} N
C) 6.4×10^{-14} N D) 4.0×10^{-19} N

Question 6

One point charge exerts an electric force of magnitude F on a second point charge.

The distance between the charges is then tripled, and the charge on one of the charges is doubled. The magnitude of the new force is

- A) $\frac{2}{3}F$ B) $\frac{9}{2}F$
C) $\frac{1}{9}F$ D) $\frac{2}{9}F$

Question 7

Two identical conducting spheres are mounted on insulating stands. One sphere carries a charge of $+6.0 \times 10^{-6}$ C and the other carries a charge of -2.0×10^{-6} C.

The spheres are touched together and then separated. The charge on each sphere is now

- A) $+2.0 \times 10^{-6}$ C B) $+4.0 \times 10^{-6}$ C
C) -2.0×10^{-6} C D) $+8.0 \times 10^{-6}$ C

Question 8

The magnitude of the electric field strength at a distance of 0.25 m from a point charge of $+3.2 \times 10^{-6}$ C, expressed in scientific notation, is $a.bc \times 10^d$ N/C.

Record the values of a , b , c , and d , in order, as a four – digit answer.

Question 9

An external agent moves a charge of $+2.50 \times 10^{-6} \text{ C}$ from the negative plate of a parallel plate apparatus to the positive plate. The electric potential difference between the plates is 320 V. The work done by the external agent, expressed in scientific notation, is $a.bc \times 10^{-d} \text{ J}$. Record the values of a , b , c , and d , in order, as a four – digit answer.

Question 10

A proton moves horizontally toward the right side of the page through a magnetic field that is directed toward the top of the page. Both the velocity of the proton and the magnetic field lie in the plane of the page. The direction of the magnetic force on the proton is

A) into the page

B) out of the page

C) toward the top of the page

D) toward the bottom of the page

Answer Key

- | | | |
|---------|---------|---------|
| 1. B | 5. A | 9. 8004 |
| 2. D | 6. D | 10. B |
| 3. C | 7. A | |
| 4. 2.40 | 8. 4605 | |

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