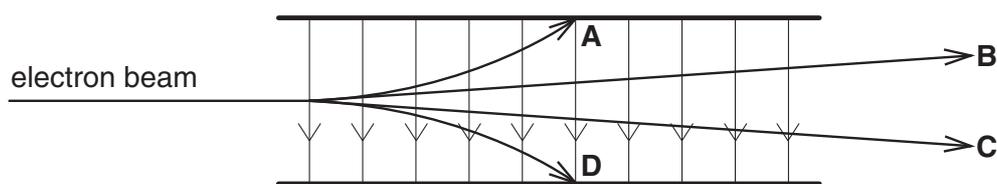
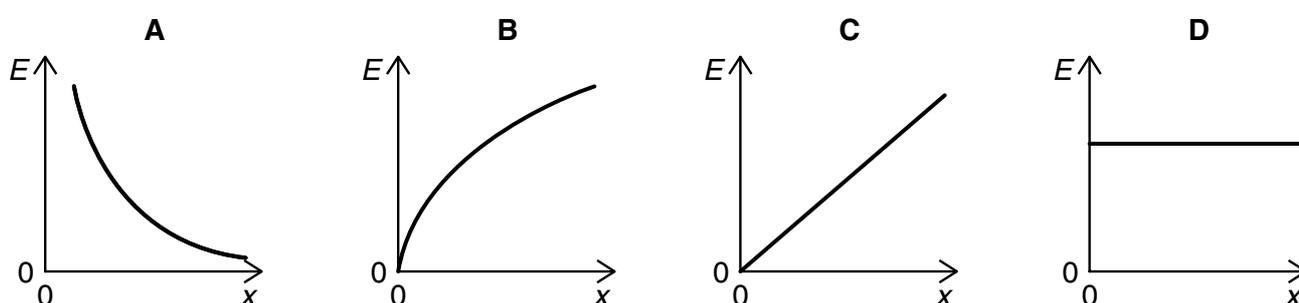


- 1 Which path shows a possible movement of an electron in the electric field shown?



- 2 Two parallel conducting plates are connected to a battery, one plate to the positive terminal and the other plate to the negative. The plate separation is gradually increased, the plates remaining connected to the battery.

Which graph shows how the electric field  $E$  between the plates depends on the plate separation  $x$ ?



- 3 What physical quantity would result from a calculation in which a potential difference is multiplied by an electric charge?

- A electric current
- B electric energy
- C electric field strength
- D electric power

- 4 The current in a component is reduced uniformly from 100 mA to 20 mA over a period of 8.0 s.

What is the charge that flows during this time?

- A 160 mC
- B 320 mC
- C 480 mC
- D 640 mC

- 5 The electric field strength between a pair of parallel plates is  $E$ . The separation of the plates is doubled and the potential difference between the plates is increased by a factor of four.

What is the new electric field strength?

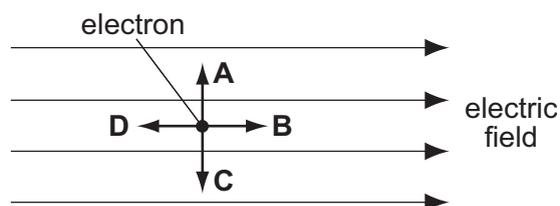
- A  $E$
- B  $2E$
- C  $4E$
- D  $8E$

- 6 What is an equivalent unit to 1 volt?

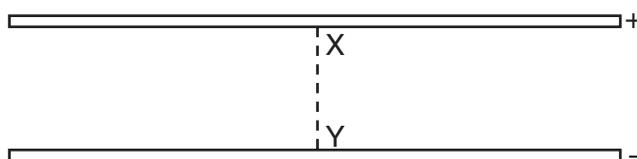
- A  $1\text{ J A}^{-1}$
- B  $1\text{ J C}^{-1}$
- C  $1\text{ W C}^{-1}$
- D  $1\text{ W s}^{-1}$

7 The diagram shows an electron in a uniform electric field.

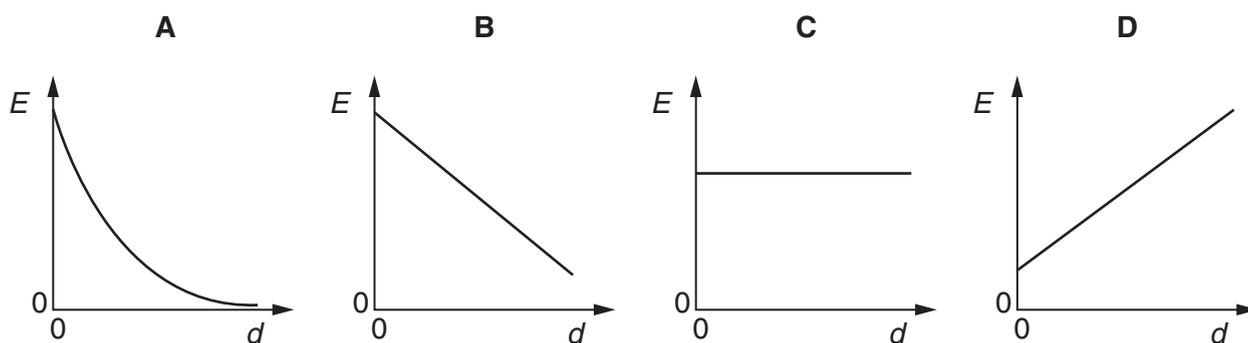
In which direction will the field accelerate the electron?



8 An electric field exists in the space between two charged metal plates.

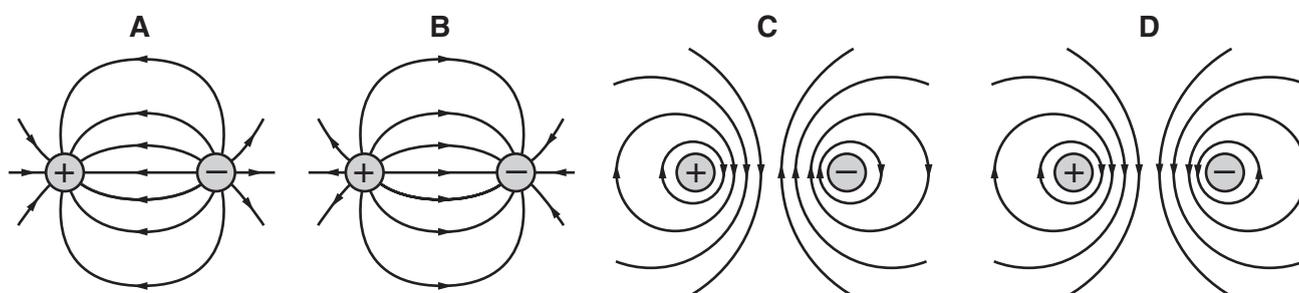


Which of the following graphs shows the variation of electric field strength  $E$  with distance  $d$  from  $X$  along the line  $XY$ ?

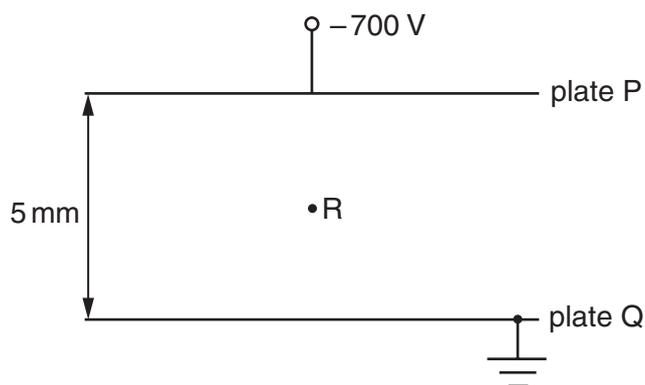


9 A positive charge and a negative charge of equal magnitude are placed a short distance apart.

Which diagram best represents the associated electric field?

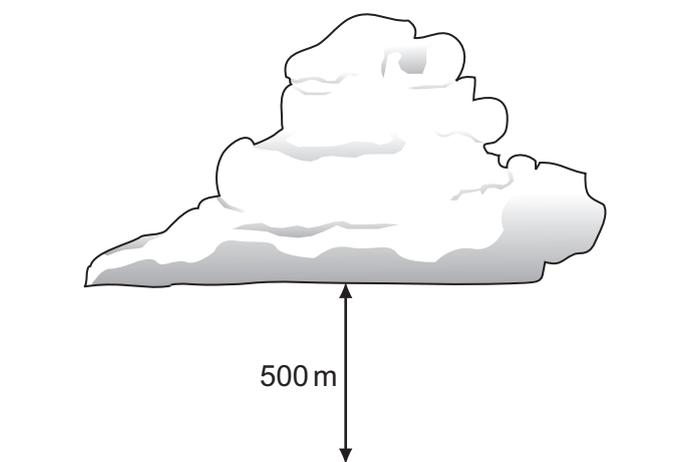


- 10 The diagram shows two metal plates P and Q between which there is a potential difference of 700 V. Plate Q is earthed.



What is the magnitude and direction of the electric field at point R?

- A**  $1.4 \times 10^2 \text{ NC}^{-1}$  from P towards Q  
**B**  $1.4 \times 10^2 \text{ NC}^{-1}$  from Q towards P  
**C**  $1.4 \times 10^5 \text{ NC}^{-1}$  from P towards Q  
**D**  $1.4 \times 10^5 \text{ NC}^{-1}$  from Q towards P
- 11 The diagram shows a thundercloud whose base is 500 m above the ground.

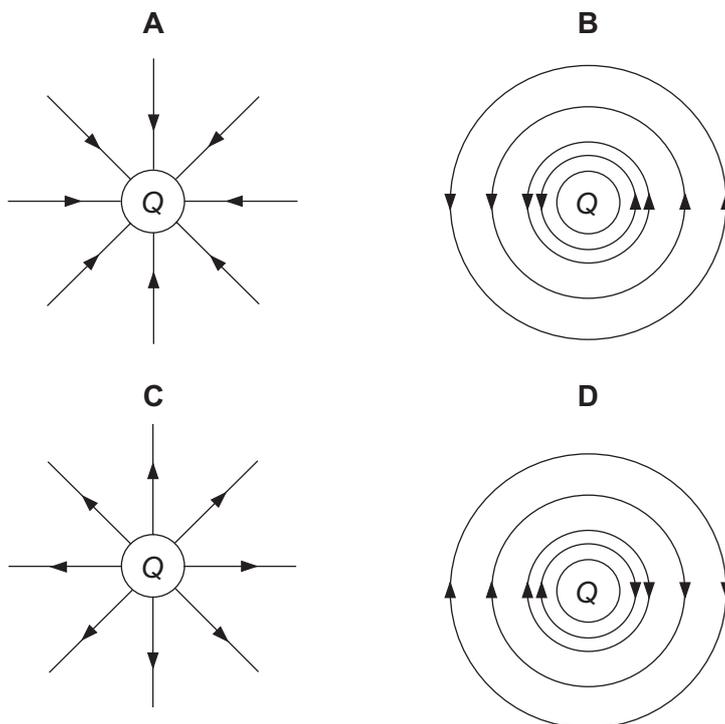


The potential difference between the base of the cloud and the ground is 200 MV. A raindrop with a charge of  $4.0 \times 10^{-12} \text{ C}$  is in the region between the cloud and the ground.

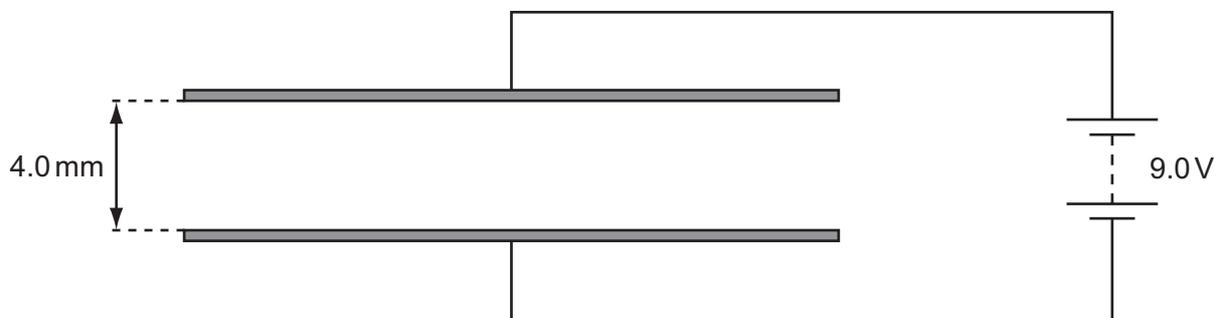
What is the electrical force on the raindrop?

- A**  $1.6 \times 10^{-6} \text{ N}$     **B**  $8.0 \times 10^{-4} \text{ N}$     **C**  $1.6 \times 10^{-3} \text{ N}$     **D**  $0.40 \text{ N}$

- 12 Which diagram represents the electric field in the vicinity of a positive electric charge of magnitude  $Q$ ?



- 13 The diagram shows a pair of metal plates 4.0 mm apart connected to a 9.0 V battery.

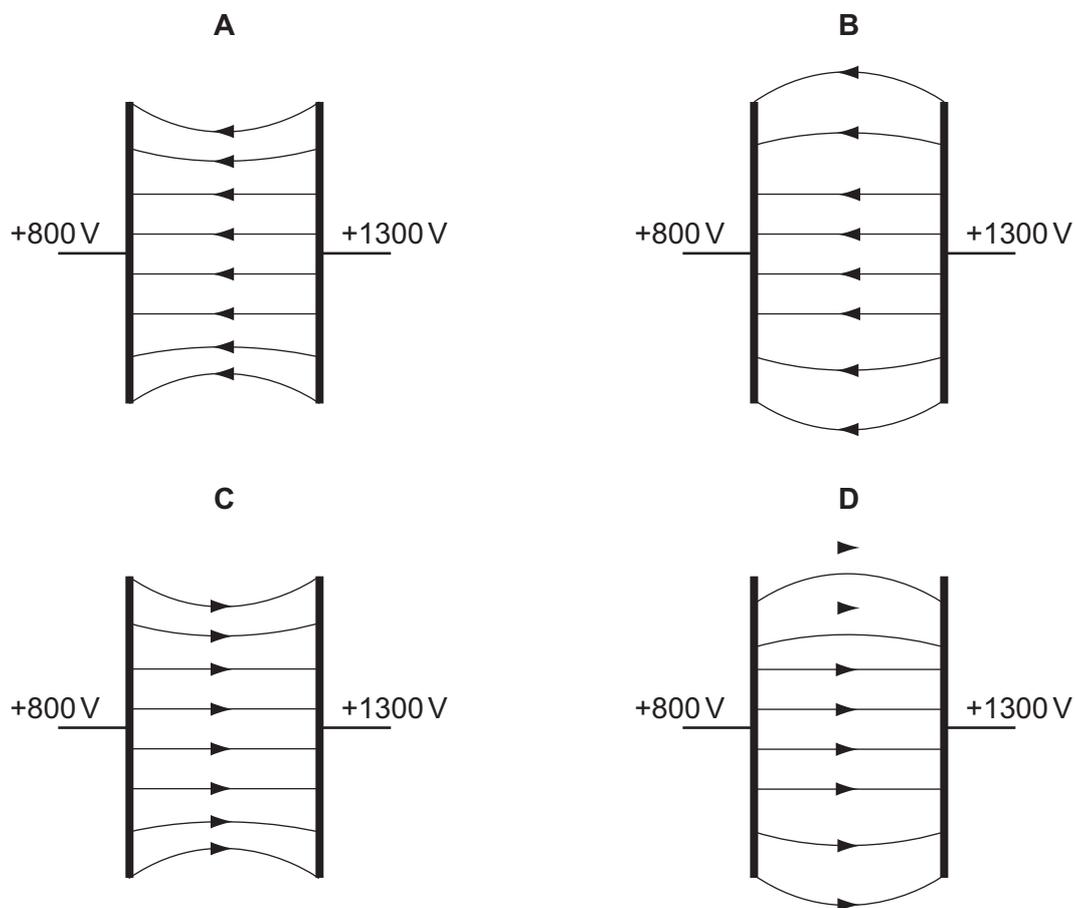


What is the electric field between the plates?

- A  $4.4 \times 10^{-4} \text{ NC}^{-1}$   
 B  $3.6 \times 10^{-2} \text{ NC}^{-1}$   
 C  $36 \text{ NC}^{-1}$   
 D  $2.3 \times 10^3 \text{ NC}^{-1}$

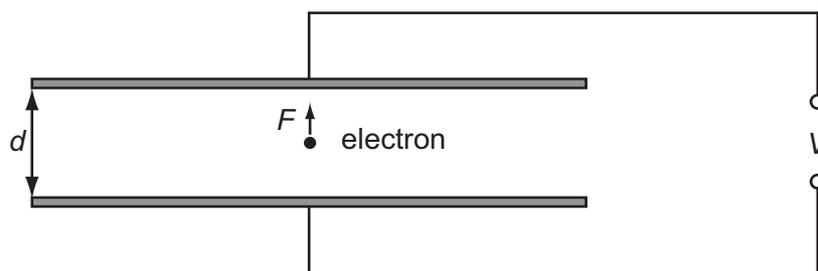
- 14 Two parallel metal plates are at potentials of +800 V and +1300 V.

Which diagram best shows the electric field between the metal plates?



- 15 An electron of charge  $e$  is introduced between two metal plates a distance  $d$  apart.

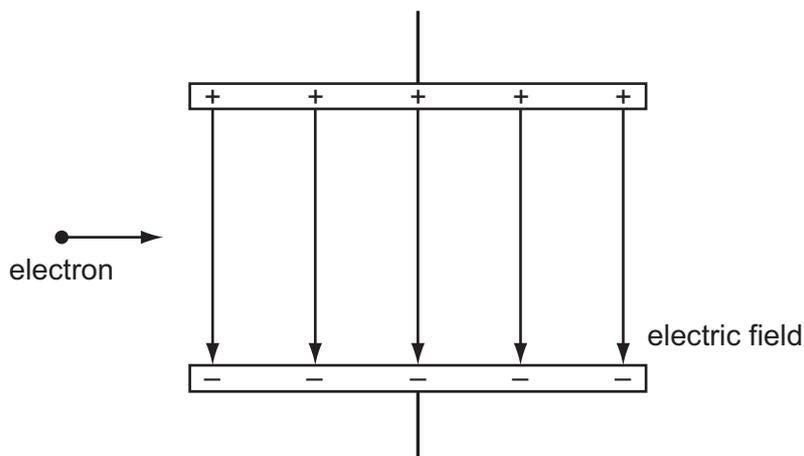
A potential difference  $V$  is applied to the plates as shown in the diagram.



Which expression gives the electric force  $F$  on the electron?

- A  $\frac{eV}{d}$       B  $eVd$       C  $\frac{V}{ed}$       D  $\frac{dV}{e}$

- 16 An electron, travelling horizontally at constant speed in a vacuum, enters a vertical electric field between two charged parallel plates as shown.



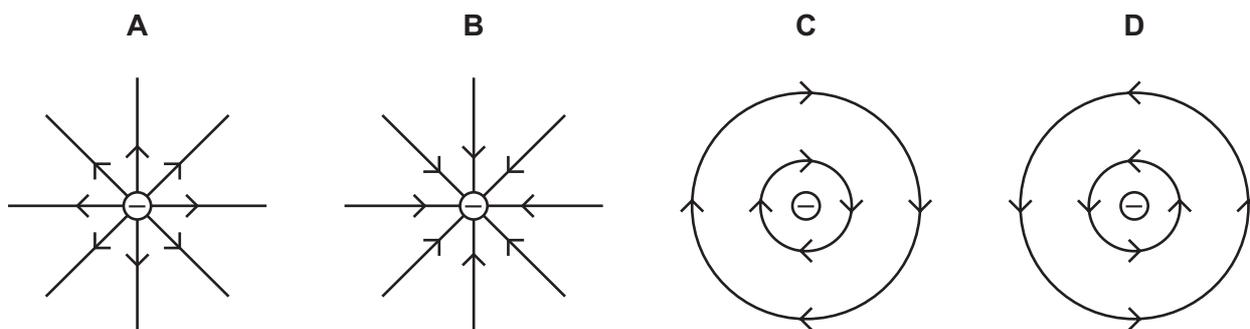
What are the horizontal and vertical components of the motion of this electron when it is in the field?

	horizontal component of motion	vertical component of motion
<b>A</b>	constant speed	acceleration upwards
<b>B</b>	constant speed	acceleration downwards
<b>C</b>	acceleration to the right	acceleration downwards
<b>D</b>	acceleration to the right	acceleration upwards

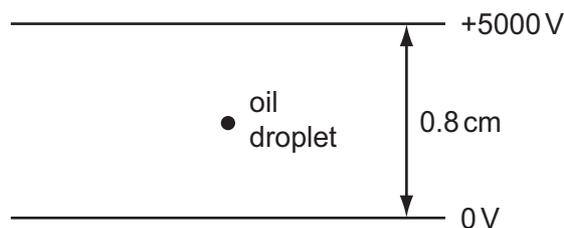
- 17 Which electrical quantity would be the result of a calculation in which energy is divided by charge?

- A current
- B potential difference
- C power
- D resistance

- 18 Which diagram shows the electric field pattern of an isolated negative point charge?

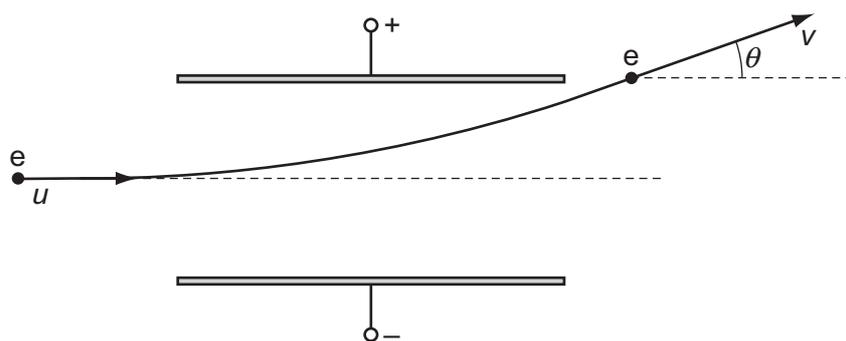


- 19 The diagram shows an oil droplet that has become charged by gaining five electrons. The droplet remains stationary between charged plates.



What is the magnitude and direction of the electrostatic force on the oil droplet?

- A  $5.0 \times 10^{-15}$  N upwards  
 B  $5.0 \times 10^{-15}$  N downwards  
 C  $5.0 \times 10^{-13}$  N upwards  
 D  $5.0 \times 10^{-13}$  N downwards
- 20 An electron enters the space between two parallel charged plates with an initial velocity  $u$ .

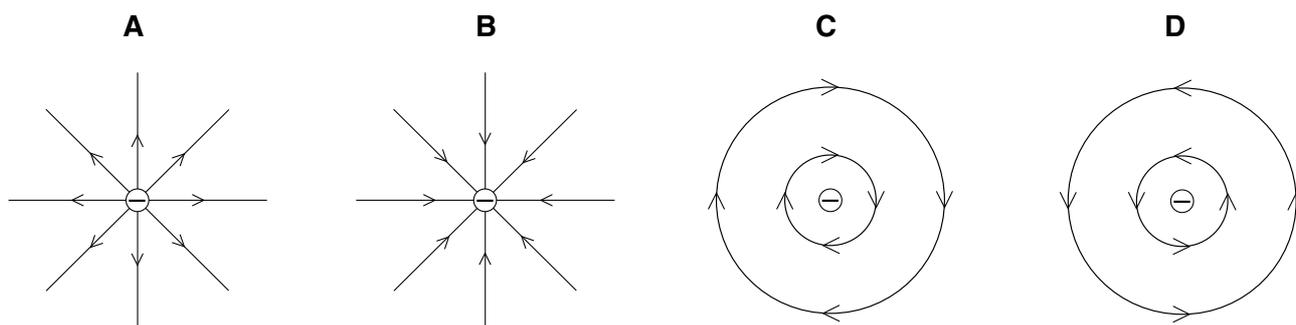


While in the electric field, its direction changes by  $\theta$  and it emerges with a velocity  $v$ .

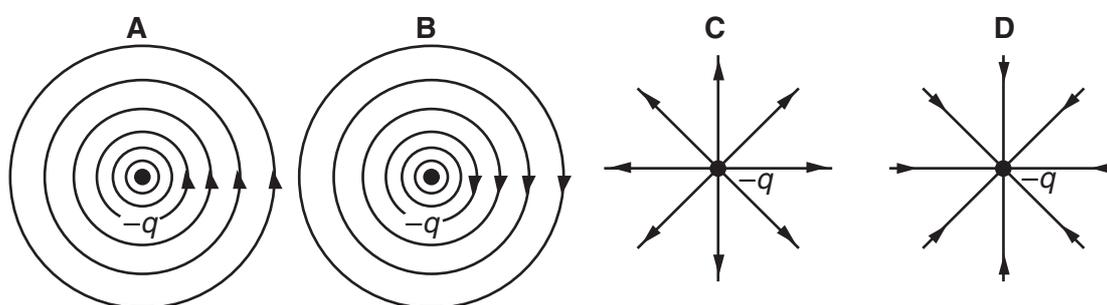
What is the relation between  $v$  and  $u$ ?

- A  $v = \frac{u}{\cos \theta}$       B  $v = u \cos \theta$       C  $v = \frac{u}{\sin \theta}$       D  $v = u \sin \theta$
- 21 A total charge of 100 C flows through a 12 W light bulb in a time of 50 s.
- What is the potential difference across the bulb during this time?
- A 0.12 V      B 2.0 V      C 6.0 V      D 24 V

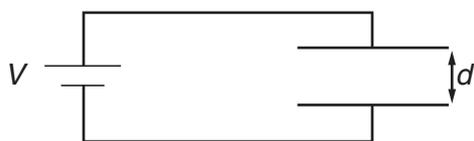
22 Which diagram shows the electric field pattern of an isolated negative point charge?



23 Which diagram represents the electric field of a negative point charge  $-q$ ?



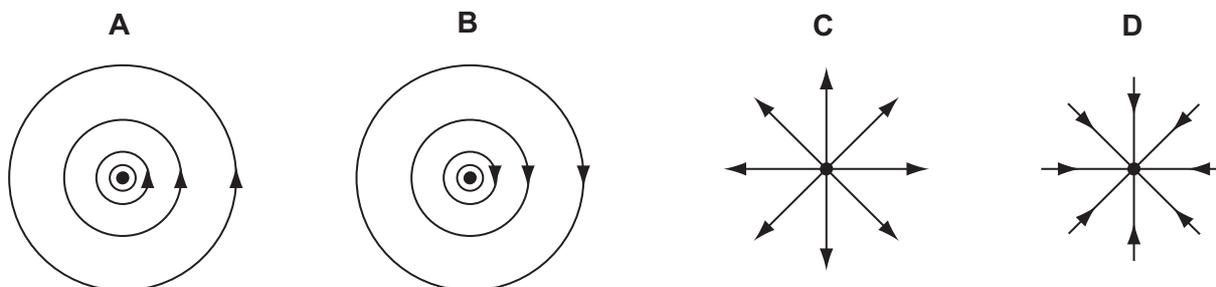
24 A potential difference  $V$  is applied between two parallel plates a small distance  $d$  apart, and produces an electric field of strength  $E$  between the plates.



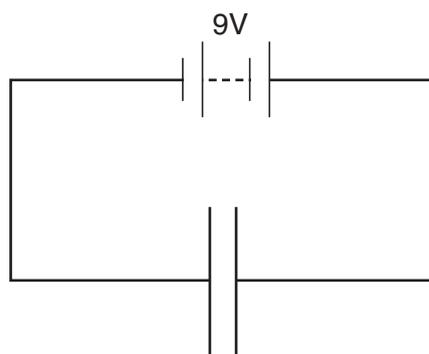
What is the electric field strength between the plates when both  $V$  and  $d$  are doubled?

- A  $E/4$       B  $E$       C  $2E$       D  $4E$

25 Which diagram represents the electric field of a negative point charge, shown by  $\bullet$ ?



- 26 In the circuit below, the distance between the two parallel plates is  $2.0 \times 10^{-3} \text{ m}$ . An electron is situated between the plates.



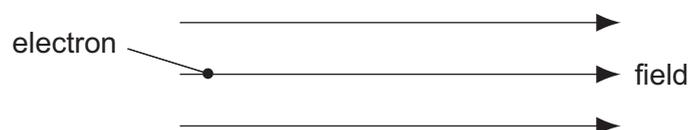
What is the force on the electron?

- A  $3.2 \times 10^{-22} \text{ N}$   
 B  $2.9 \times 10^{-21} \text{ N}$   
 C  $8.9 \times 10^{-18} \text{ N}$   
 D  $7.2 \times 10^{-16} \text{ N}$
- 27 A certain nuclide, Uranium-235, has nucleon number 235, proton number 92 and neutron number 143. Data on four other nuclides are given below.

Which is an isotope of Uranium-235?

	nucleon number	proton number	neutron number
<b>A</b>	235	91	144
<b>B</b>	236	92	144
<b>C</b>	237	94	143
<b>D</b>	238	95	143

- 28 An electron is situated in a uniform electric field, as shown in the diagram.

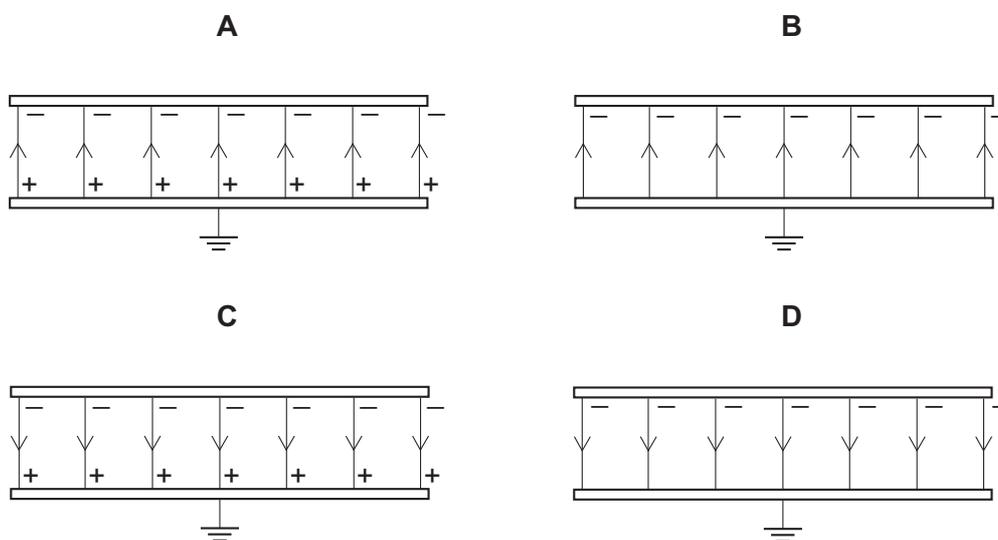


What is the direction of the electric force acting on the electron?

- A downwards  
 B to the left  
 C to the right  
 D upwards

- 29 In a uniform electric field, which statement is correct?
- A All charged particles experience the same force.
  - B All charged particles move with the same velocity.
  - C All electric field lines are directed towards positive charges.
  - D All electric field lines are parallel.
- 30 Which of the following describes the electric potential difference between two points in a wire that carries a current?
- A the force required to move a unit positive charge between the points
  - B the ratio of the energy dissipated between the points to the current
  - C the ratio of the power dissipated between the points to the current
  - D the ratio of the power dissipated between the points to the charge moved
- 31 Two parallel, conducting plates with air between them are placed close to one another. The top plate is given a negative charge and the bottom one is earthed.

Which diagram best represents the distribution of charges and the field in this situation?



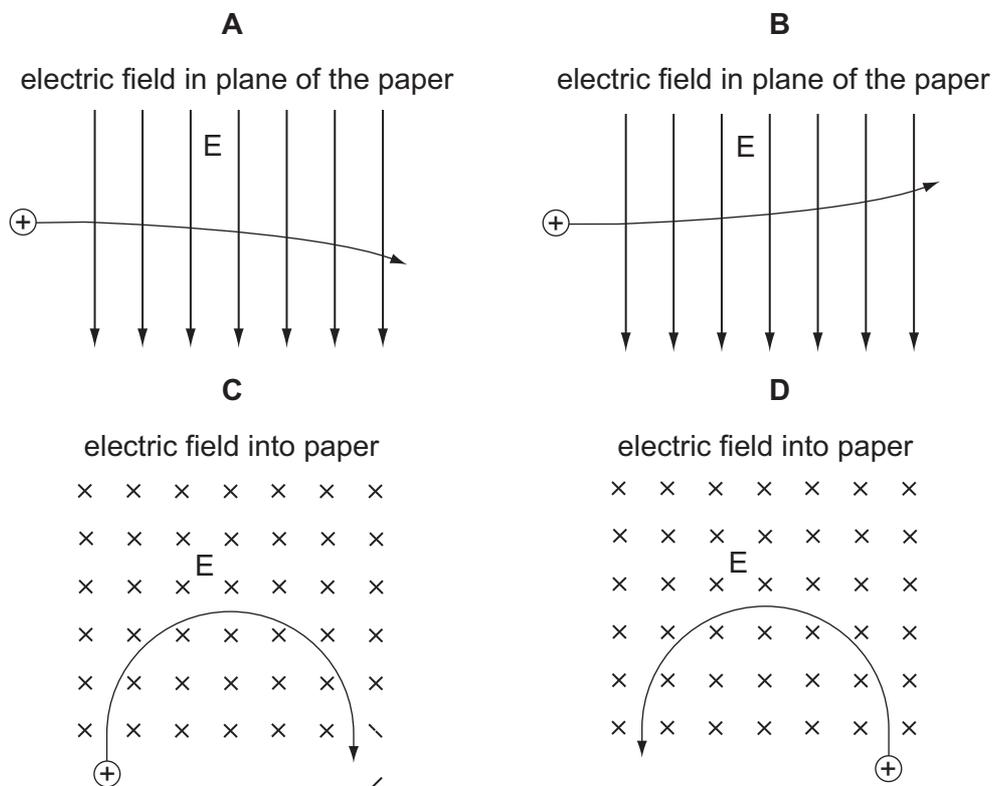
- 32 The charge that a fully-charged 12V car battery can supply is 100 kC. The starter motor of the car requires a current of 200A for an average period of 2.0 s. The battery does not recharge because of a fault.

What is the maximum number of times the starter motor of the car can be used?

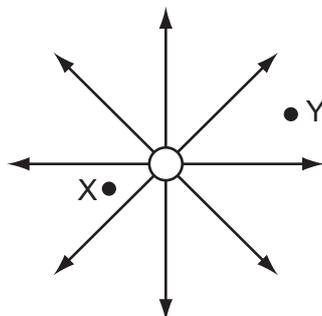
- A 21
- B 25
- C 42
- D 250

33 A positively charged particle is projected into a region of uniform electric field  $E$ .

Which diagram represents the motion of the particle in the electric field?



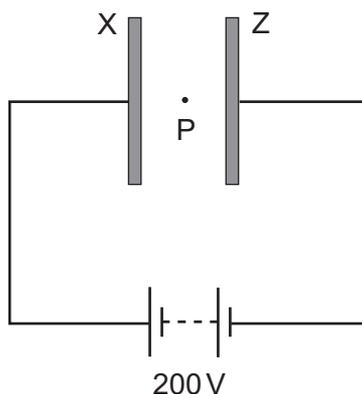
34 The diagram shows the electric field near a point charge and two electrons X and Y.



Which row describes the forces acting on X and Y?

	direction of force	magnitude of force on X
<b>A</b>	radially inwards	less than force on Y
<b>B</b>	radially inwards	greater than force on Y
<b>C</b>	radially outwards	less than force on Y
<b>D</b>	radially outwards	greater than force on Y

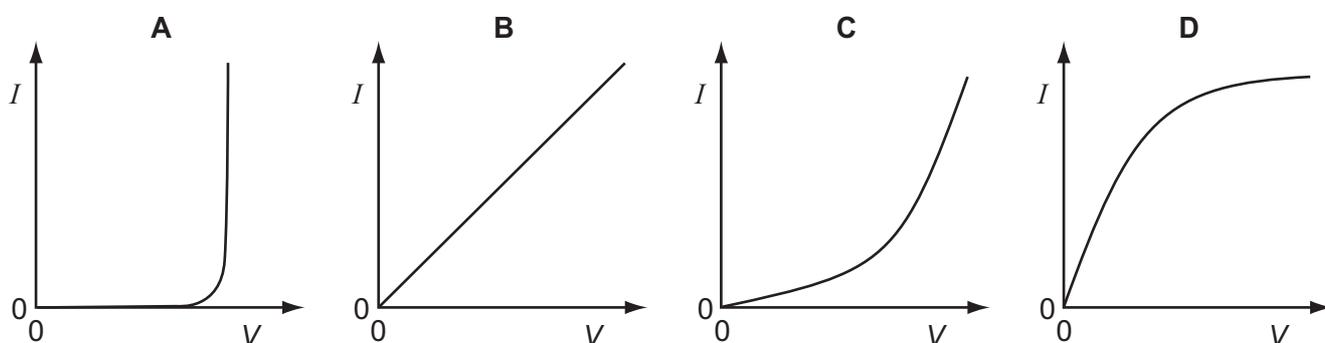
- 35 Two large parallel plates X and Z are placed 5.0 mm apart and connected as shown to the terminals of a 200 volt d.c. supply.



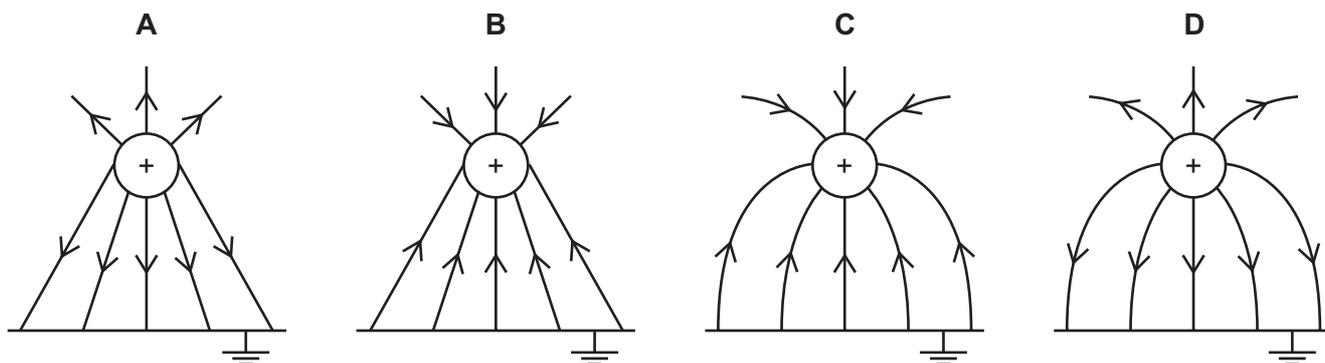
A small oil drop at P carries one excess electron.

What is the magnitude of the electrostatic force acting on the oil drop due to the electric field between the plates?

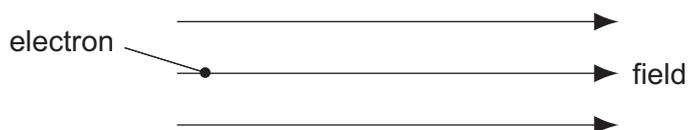
- A  $6.4 \times 10^{-15}$  N  
 B  $6.4 \times 10^{-18}$  N  
 C  $1.6 \times 10^{-19}$  N  
 D  $4.0 \times 10^{-24}$  N
- 36 Which graph shows the  $I - V$  characteristic of a filament lamp?



- 37 Which diagram shows the electric field between a positively charged metal sphere and an earthed metal plate?

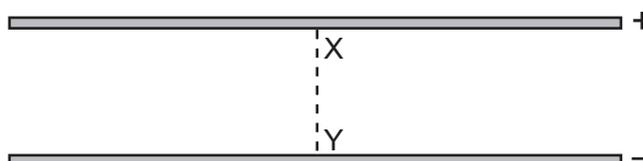


- 38 An electron is situated in a uniform electric field as shown in the diagram.

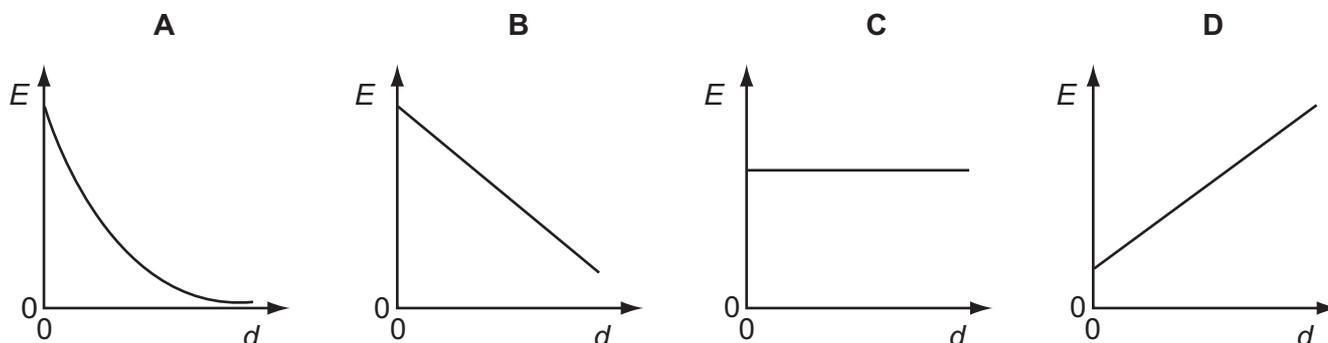


What is the direction of the electric force acting on the electron?

- A** downwards into the paper  
**B** upwards out of the paper  
**C** to the left  
**D** to the right
- 39 An electric field exists in the space between two charged metal plates.



Which graph shows the variation of electric field strength  $E$  with distance  $d$  from X along the line XY?

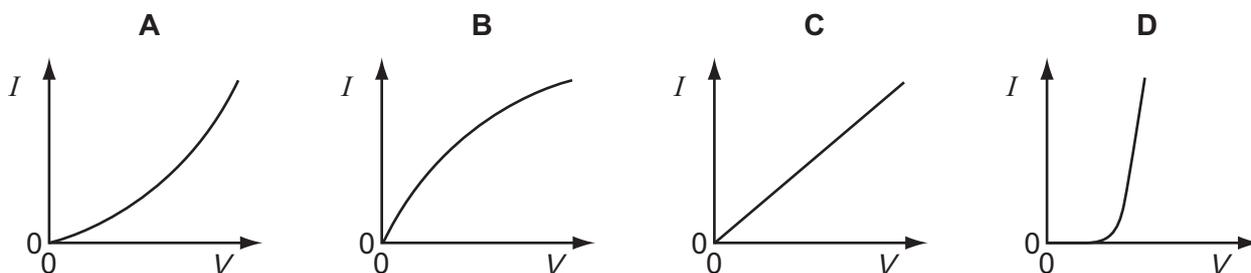


- 40 A particle is in a uniform field. The particle experiences a force in the opposite direction to the field.

Which field is the particle in, and on which property of the particle is the field acting?

	field	property of particle on which the field acts
<b>A</b>	electric	charge
<b>B</b>	electric	current
<b>C</b>	gravitational	mass
<b>D</b>	gravitational	weight

- 41 Which graph best represents the way the current  $I$  through a filament lamp varies with the potential difference  $V$  across it?



- 42 A particle has a charge of  $4.8 \times 10^{-19} \text{ C}$ . The particle remains at rest between a pair of horizontal, parallel plates having a separation of 15 mm. The potential difference between the plates is 660 V.

What is the weight of the particle?

- A  $2.1 \times 10^{-14} \text{ N}$
- B  $2.1 \times 10^{-15} \text{ N}$
- C  $2.1 \times 10^{-17} \text{ N}$
- D  $1.1 \times 10^{-23} \text{ N}$