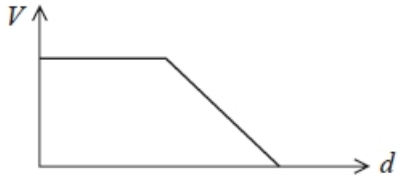
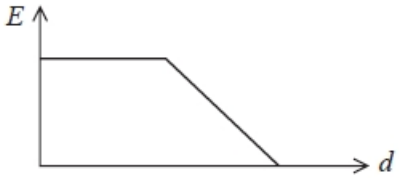
Electric Field (MCQ Only)

Q1.

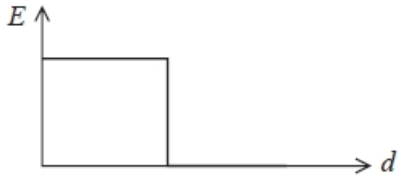
The graph shows how the potential *V* varies with distance *d* in an electric field.



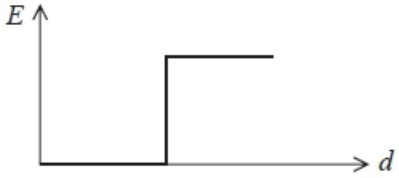
Which of the following shows the corresponding variation in electric field strength *E*?



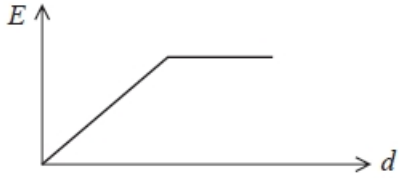
☒ **A**



☐ **B**



☒ **C**



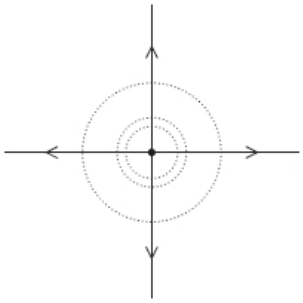
☐ **D**

(Total for question = 1 mark)

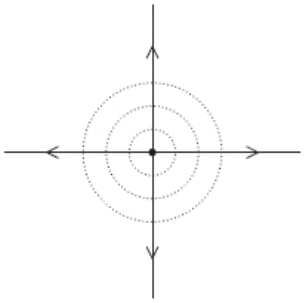
Q2.

A point object has a charge +Q.

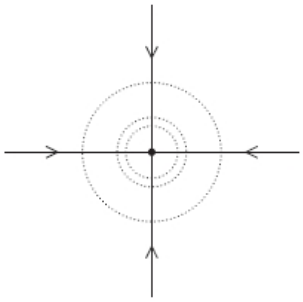
Which of the following diagrams shows equipotential lines differing by a constant potential difference, and electric field lines around the object?



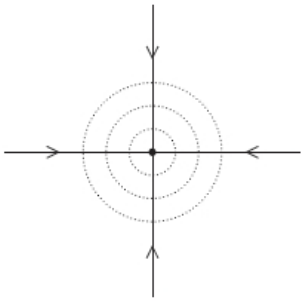
☒ A



☒ B



☒ C



☒ D

(Total for question = 1 mark)

Q3.

What is the acceleration of an electron at a point in an electric field where the electric field strength is 2.0×10^4 N C^{-1}?

☒ **A** 2.8×10^{-16} m s^{-2}

☒ **B** 3.2×10^{-15} m s^{-2}

☒ **C** 1.8×10^{11} m s^{-2}

☒ **D** 3.5×10^{15} m s^{-2}

(Total for question = 1 mark)

Q4.

A potential difference is applied across two parallel plates. A particle carrying a charge of +0.1 C is placed between the plates and experiences a force *F*.

The distance between the plates is halved. The potential difference remains constant.

Which of the following is now equal to the electric field strength between the plates?

☒ **A** 5*F*

☒ **B** 10*F*

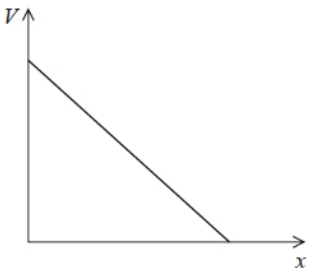
☒ **C** 20*F*

☒ **D** 40*F*

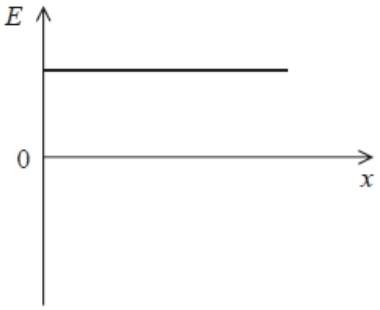
(Total for question = 1 mark)

Q5.

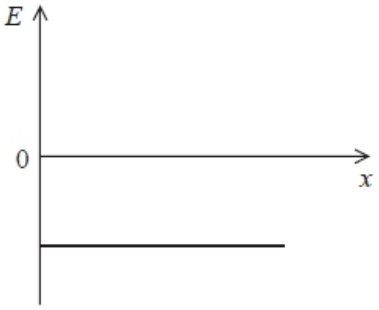
The graph shows how an electric potential *V* varies with distance *x*.



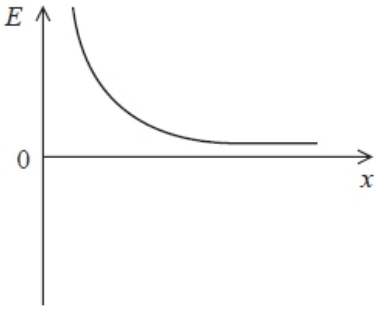
Which of the following shows the corresponding variation of electric field strength *E* with *x*?



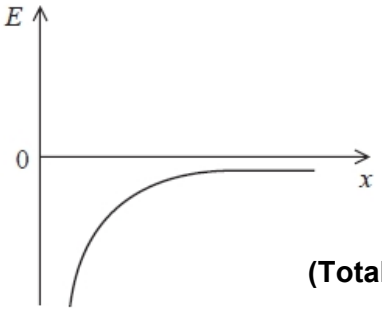
☒ **A**



☒ **B**



☒ **C**

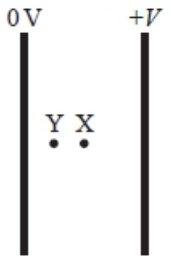


☒ **D**

(Total for question = 1 mark)

Q6.

A potential difference *V* is applied across two parallel plates. An electron midway between the two plates at point X experiences an electric force *F*.



The electron moves to point Y which is halfway between point X and the left-hand plate.

Which of the following is the electric force experienced by the electron at Y?

☒ **A** $2F$

☒ **B** F

☒ **C** $\frac{F}{2}$

☒ **D** $\frac{F}{4}$

(Total for question = 1 mark)

Q7.

The distance between a proton and an electron is *r*. The electrostatic force is *F*.

The distance between the proton and electron is doubled.

Which of the following is equal to the electrostatic force at this separation?

☒ **A** $2F$

☒ **B** $\frac{F}{2}$

☒ **C** $\frac{F}{3}$

☒ **D** $\frac{F}{4}$

(Total for question = 1 mark)

Q8.

The force between two identical point charges, X and Y, is *F*.

Charge X is doubled; charge Y remains the same.

Which row of the table gives the force on each charge?

	X	Y
☒ **A**	*F*	*F*
☒ **B**	*F*	*2F*
☒ **C**	*2F*	*F*
☒ **D**	*2F*	*2F*

(Total for question = 1 mark)

Mark Scheme - Electric Fields (MCQ Only)

Q1.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is C		**1**
	A is not correct because the E is equal to − gradient of the graph of V against r *B is not correct because the E is equal to − gradient of the graph of V against r* *D is not correct because the E is equal to − gradient of the graph of V against r*		

Q2.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is A *B is not correct because field direction is correct but equipotential lines will become further apart as distance increases as $V \propto 1/r$* *C is not correct because field direction is incorrect* *D is not correct because field direction is incorrect*		**1**

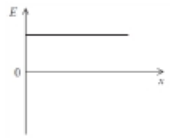
Q3.

Question Number	Answer	Mark
	D	**1**

Q4.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is C A is not correct as $E_{initial} = F/Q = 10F$, if d halved then $E_{after} = 20F$ B is not correct as $E_{initial} = F/Q = 10F$, if d halved then $E_{after} = 20F$ D is not correct as $E_{initial} = F/Q = 10F$, if d halved then $E_{after} = 20F$		**1**

Q5.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is A  	B,C and D are not the negative potential gradient	**1**

Q6.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is B A *is not correct because this is a uniform field so F constant* C *is not correct because this is a uniform field so F constant* D *is not correct because this is a uniform field so F constant*	F	**1**

Q7.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is D $\frac{F}{4}$	A,B and C do not show an inverse square	**1**

Q8.

Question Number	Acceptable answers	Additional guidance	Mark
	D		**1**