Q1. Which line, **A** to **D**, correctly describes the trajectory of charged particles which enter, at right angles, (a) a uniform electric field, and (b) a uniform magnetic field?

	(a) uniform electric field	(b) uniform magnetic field
A	circular	circular
B	circular	parabolic
C	parabolic	circular
D	parabolic	parabolic

(Total 1 mark)

Q2. The force between two point charges is *F* when they are separated by a distance *r*. If the separation is increased to 3*r* what is the force between the charges?

A $\frac{F}{3r}$

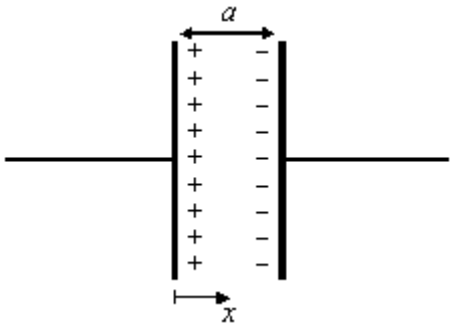
B $\frac{F}{9r}$

C $\frac{F}{3}$

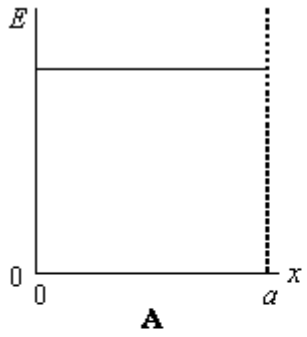
D $\frac{F}{9}$

(Total 1 mark)

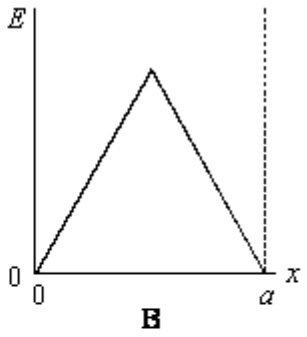
Q3.



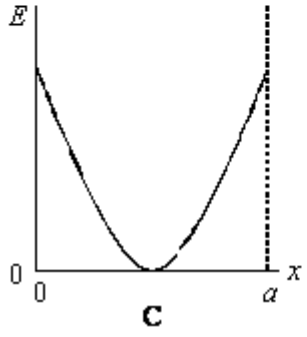
Two parallel metal plates of separation *a* carry equal and opposite charges. Which one of the following graphs, **A** to **D**, best represents how the electric field strength *E* varies with the distance *x* in the space between the plates?



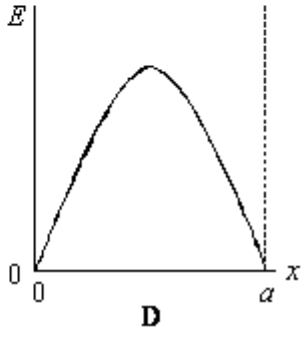
A



B



C



D

(Total 1 mark)

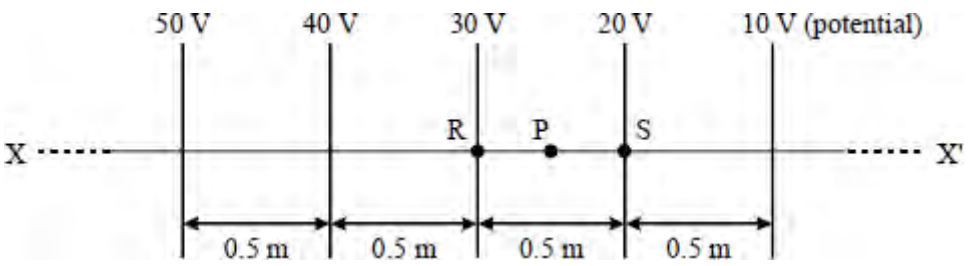
Q4. Two horizontal parallel plate conductors are separated by a distance of 5.0 mm in air. The lower plate is earthed and the potential of the upper plate is + 50 V.

Which line, **A** to **D**, gives correctly the electric field strength, *E*, and the potential, *V*, at a point midway between the plates?

	electric field strength E/V m^{-1}	*potential V*/V
A	1×10^4 upwards	25
B	1×10^4 downwards	25
C	1×10^4 upwards	50
D	1×10^4 downwards	50

(Total 1 mark)

Q5.



The diagram shows how the electric potential varies along a line XX' in an electric field. What will be the electric field strength at a point P on XX' which is mid−way between R and S?

A 5.0 V m^{-1}

B 10 V m^{-1}

C 20 V m^{-1}

D 30 V m^{-1}

(Total 1 mark)

Q6. If the potential difference between a pair of identical, parallel, conducting plates is known, what is the only additional knowledge required to determine the electric field strength between the plates?

A the permittivity of the medium between the plates

B the separation and area of the plates

C the separation and area of the plates and the permittivity of the medium between the plates

D the separation of the plates

(Total 1 mark)

Q7. Which one of the following statements about *electric field strength* and *electric potential* is **incorrect**?

A Electric potential is a scalar quantity.

B Electric field strength is a vector quantity.

C Electric potential is zero whenever the electric field strength is zero.

D The potential gradient is proportional to the electric field strength.

(Total 1 mark)

Q8. Which one of the following statements about electric potential and electric field strength is correct?

A Electric potential is zero whenever the electric field strength is zero.

B Electric field strength is a scalar quantity.

C Electric potential is a vector quantity.

D Electric potential due to a point charge varies as $\frac{1}{r}$ where r is the distance from the point charge.

(Total 1 mark)

Q9. **X** and **Y** are two points in an electric field a distance d apart. The potential difference between **X** and **Y** is V. A particle carrying a charge Q is accelerated by that field from **X** to **Y** in a time t. The gain in kinetic energy of the particle is

A QV

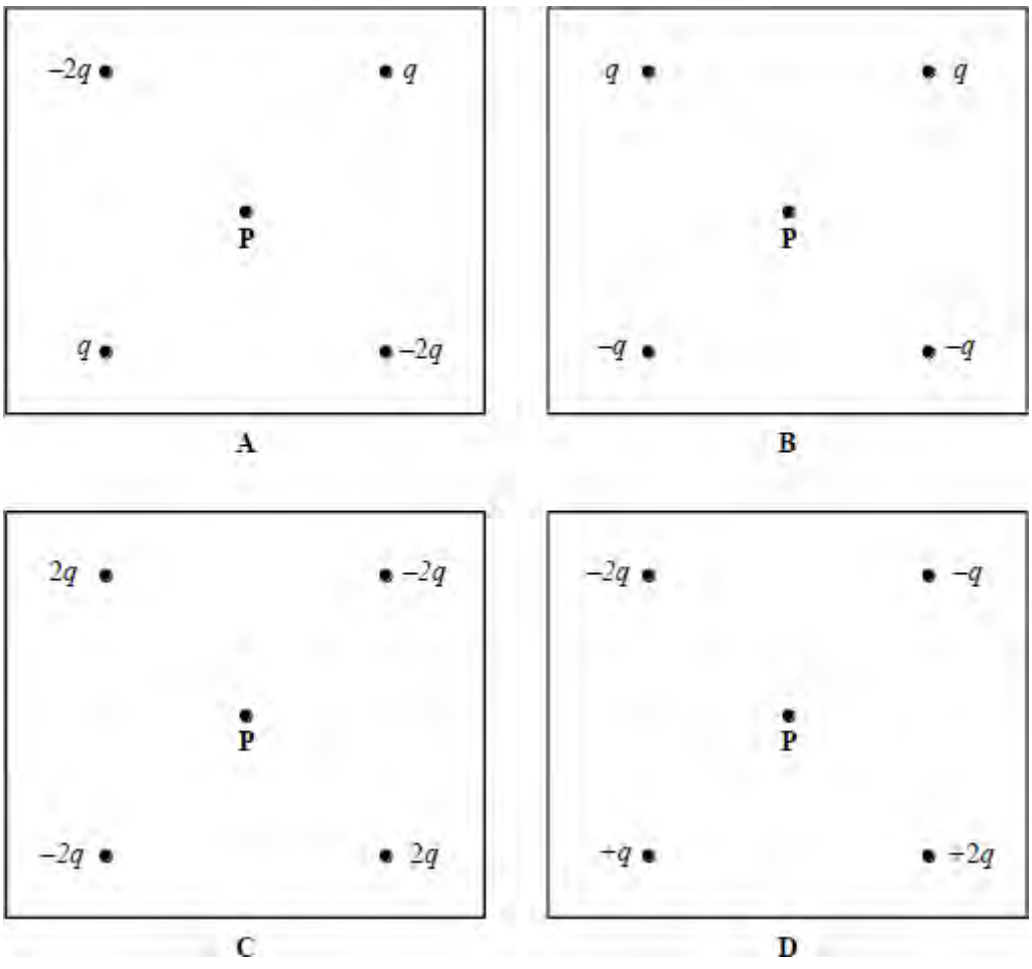
B $\frac{1}{2}QV^2$

C $\frac{QVt}{d}$

D QVd

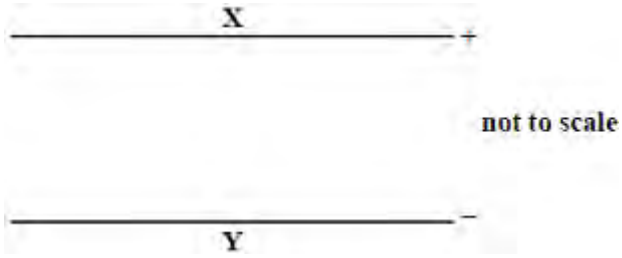
(Total 1 mark)

Q10. Which one of the following arrangements of charge will produce zero electric field strength and zero electric potential at the point labelled **P**?



(Total 1 mark)

Q11. An electric field is maintained in the region between two circular parallel metal plates, the separation of which is small compared with their diameter.



Along the line **X** to **Y** between the plates

A the electric field strength decreases uniformly

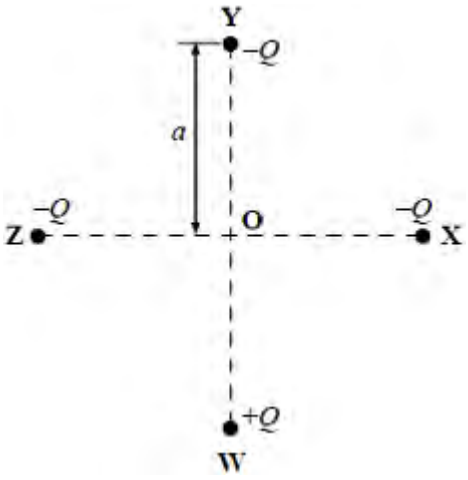
B the electric field strength increases uniformly

C the electric field strength increases and then decreases again

D the electric field strength is the same everywhere

(Total 1 mark)

Q12. Four point charges **W**, **X**, **Y** and **Z** are each placed at a distance a from **O** as shown in the diagram. **X**, **Y** and **Z** each have a charge $-Q$ and **W** has a charge $+Q$.



The resultant electric field strength at **O** is

A $\frac{Q}{\pi\varepsilon a^2}$ toward **Y**

B $\frac{Q}{2\pi\varepsilon a^2}$ toward **Y**

C $\frac{Q}{2\pi\varepsilon a^2}$ toward **W**

D $\frac{Q}{4\pi\varepsilon a^2}$ toward **W**

(Total 1 mark)