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2002

XVIII

1583

Time allowed
14 Minutes

Score

/12

Percentage

%

Physics

Topic Questions

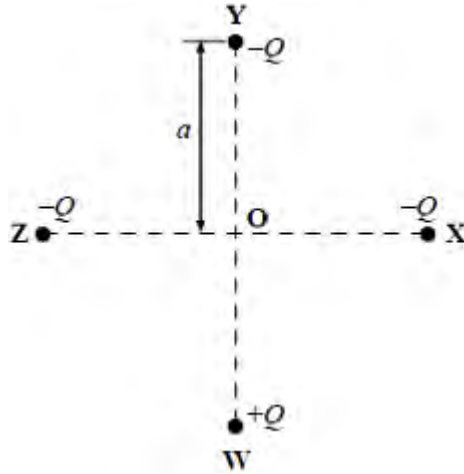
**AQA
AS & A LEVEL**

**3.7 Fields and their
consequences (A-level
only)**

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- 1 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 $+Q$.

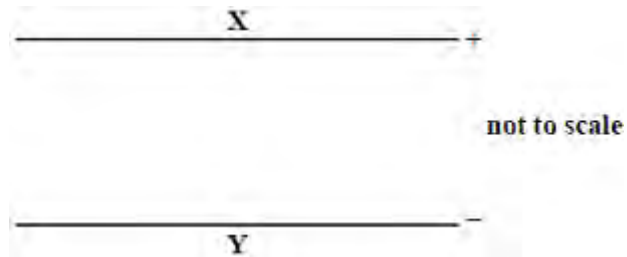


The resultant electric field strength at **O** is

- A $\frac{Q}{\pi a^2}$ toward **Y**
- B $\frac{Q}{2\pi a^2}$ toward **Y**
- C $\frac{Q}{2\pi a^2}$ toward **W**
- D $\frac{Q}{4\pi a^2}$ toward **W**

(Total 1 mark)

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



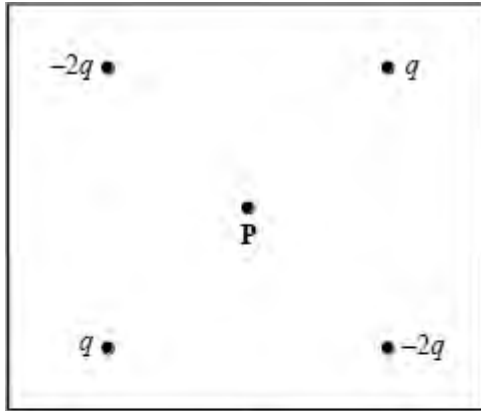
Along the line X to Y between the plates

- 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

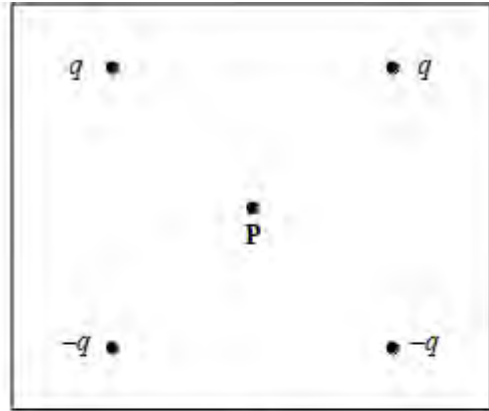
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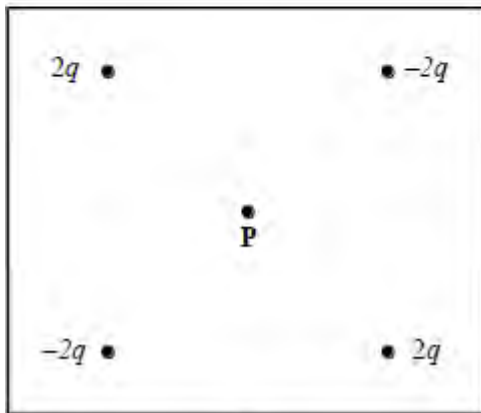
- 3 Which one of the following arrangements of charge will produce zero electric field strength and zero electric potential at the point labelled P?



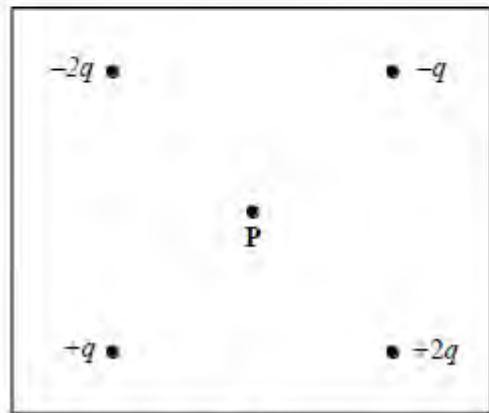
A



B



C



D

(Total 1 mark)

4 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)

5 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)

6 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)

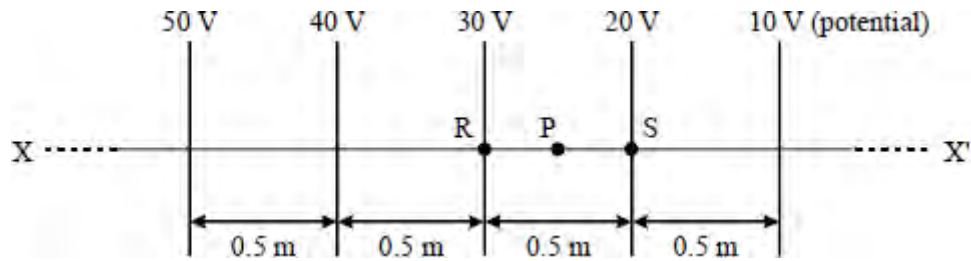
7 If the potential difference between a pair of identical, parallel, conducting plates is known, what is the only additional knowledge required to determine the electric field strength between the plates?

- 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)



8



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)



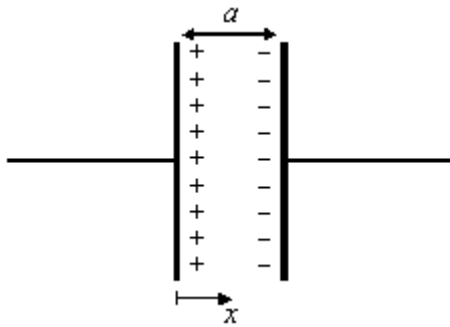
- 9 Two horizontal parallel plate conductors are separated by a distance of 5.0 mm in air. The lower plate is earthed and the potential of the upper plate is + 50 V.

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

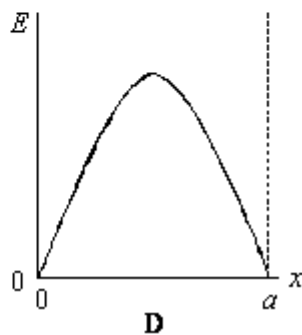
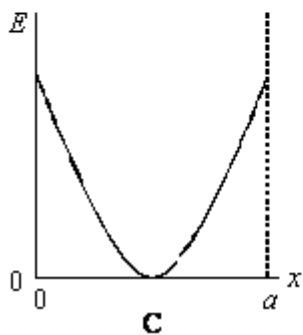
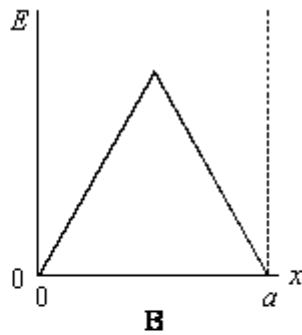
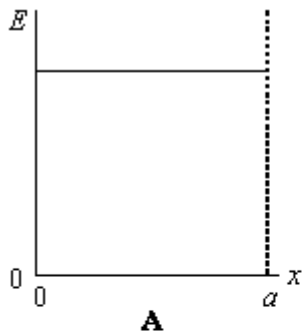
	<i>electric field strength $E/V\ m^{-1}$</i>	<i>potential V/V</i>
A	1×10^4 upwards	25
B	1×10^4 downwards	25
C	1×10^4 upwards	50
D	1×10^4 downwards	50

(Total 1 mark)

10



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?



(Total 1 mark)

11 The force between two point charges is F when they are separated by a distance r . If the separation is increased to $3r$ 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)

12 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)