

AQA, Edexcel, OCR

A Level

A Level Physics

Electric Fields 1

Name:

M M E

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Total Marks: /30

1.

Total for Question 1: 13

(a) Define the electric field strength at a point in space.

[1]

(b) State one similarity and one difference between the electric fields produced by charges and the gravitational fields produced by masses.

[2]

(c) Which two of the following statements are true?

[2]

- i. The direction of an electric field is that in which a negative charge would move.
- ii. Electric field lines are always perpendicular to the surface of a conductor.
- iii. The spacing of electric field lines is directly proportional to the field's strength.
- iv. The direction of an electric field is that in which a positive charge would move.

- (d) Sketch the electric fields produced by the following:
- i. A negative point charge.

[1]

- ii. A positively charged sphere.

[1]

- iii. Two parallel plates with opposite charges.

[2]

iv. Two spheres with opposite charges.

[2]

v. A positively charged sphere and a negatively charged plate.

[2]

2. A metal sphere has a radius, r , of 1.0 m and a positive charge of 5.0×10^{-7} C.

Total for Question 2: 9

(a) Calculate the electric field strength at a distance, d , of 1.0 m from the surface of the sphere. [3]

(b) Without repeating the full calculations you performed in the previous part, determine how the calculated field strength would change in the following circumstances.

i. The charge doubles. [1]

ii. r triples. [2]

iii. d is five times larger. [3]

3. An electron is accelerated from rest by a uniform electric field. Given that the field strength is $1.2 \times 10^5 \text{ NC}^{-1}$, calculate the following:

Total for Question 3: 8

(a) The force experienced by the electron.

[2]

(b) Its speed after 4 ns.

[3]

(c) Its displacement after 8 ns.

[3]