4 **(a)** Explain what is meant by a *field of force*.

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.....
.....[1]

(b) State **one** similarity and **one** difference between the fields produced by an isolated point charge and by an isolated point mass.

similarity: .....

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.....
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difference: .....

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.....
[2]

(c) An isolated solid metal sphere A of radius *R* has charge +*Q*, as illustrated in Fig. 4.1.

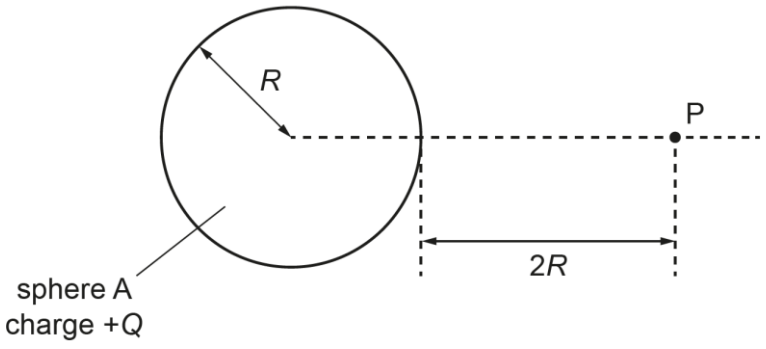

Fig. 4.1

A point P is distance 2*R* from the surface of the sphere.

Determine an expression that includes the terms R and Q for the electric field strength E at
point P.

E = ... [1]

(d) A second identical solid metal sphere B is now placed near sphere A. The centres of the spheres are separated by a distance $6R$, as shown in Fig. 4.2.

Fig. 4.2

Point P lies midway between spheres A and B.

Sphere B has charge $-Q$.

Explain why

(i) the magnitude of the electric field strength at P is given by the sum of the magnitudes of the field strengths due to each sphere.

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.....[1]

(ii) the electric field strength at point P due to the charged metal spheres is not, in practice, equal to 2*E*, where *E* is the electric field strength determined in **(c)**.

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.....[2]

[Total: 7]