**6** **(a)** Define electric field at a point.

...................................................................................................................................................

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

**(b)** An isolated conducting sphere in a vacuum has a capacitance of 69 pF.
The charge on the sphere is +83 pC.

**(i)** On Fig. 6.1, draw field lines to represent the electric field outside the sphere due to the charge on the sphere.
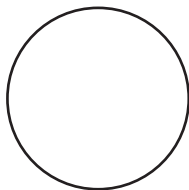
**Fig. 6.1**

[2]

**(ii)** Calculate the electric potential at the surface of the sphere.

electric potential = ..................................................... V [2]

**(iii)** Determine the radius of the sphere.

radius = .................................................. m [2]

**(iv)** Calculate the electric field strength $E$ at the surface of the sphere. Give a unit with your answer.

$E$ = ...................................... unit ............ [2]

**(c)** The sphere in **(b)** is discharged by connecting it to earth (0 V) through a resistor of resistance 120 MΩ.

Calculate the time taken for the charge to fall to 26 pC.