Answer on Question #45975-Physics-Electromagnetism

Which of the following is not true about the electric field intensity $\vec{E}$ of a uniformly charged solid sphere?

a. $\vec{E}$ is maximum at the surface of the sphere

b. $\vec{E}$ is directly proportional to the distance from the centre of the sphere

c. $\vec{E}$ decreases as a square of the distance from the surface of the sphere

d. $\vec{E}$ decreases as a square of the distance from the centre of the sphere.

Solution

Electric field intensity $E(r)$ of a uniformly charged solid sphere is directly proportional to the distance from the centre of the sphere, when this distance r less then sphere radius R (b. is true).

$$E(r) = \frac{Q}{4\pi\varepsilon_0}\frac{r}{R^3},$$

where Q - is the total charge.

Also $E(r)$ is maximum at the surface of the sphere (a. is true).

And $E(r)$ decreases as a square of the distance from the centre of the sphere ($r > R$) (d. is true).

$$E(r) = \frac{Q}{4\pi\varepsilon_0}\frac{1}{r^2}.$$

But $E(r)$ doesn't decrease as a square of the distance from the surface of the sphere (c is not true).

Answer: c.