Question #31258, Physics, Other

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

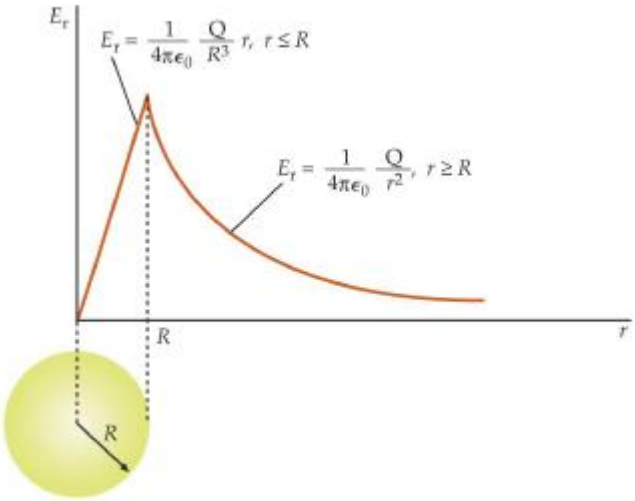
a. $\vec{E}$ is maximum at the surface of the sphere

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) .

$$E_r = \frac{1}{4\pi\varepsilon_0}\frac{Q}{R^3}r$$

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 surface of the sphere ($r > R$) - **c** is true ;

$$E_r = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$$

But E_r not decreases as a square of the distance from the centre of the sphere, so **d** is not true.

Answer: d. E_r *decreases as a square of the distance from the centre of the sphere* – **is not true.**