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What is the value of the integral

$\int_{(1,0,1)}^{(2,0,2)} \vec{\nabla} f \cdot d\vec{l}$ for $f = x^2 + y^2 + z^2$?

Select one:

- a. 2

- b. 6

- c. 4

- d. 8

Your answer is incorrect.

The correct answer is: 6

Consider a uniformly charged sphere of radius R carrying a charge +Q. In such a case divergence of the electrostatic field produced by the sphere is

Select one:

- ○ a. zero everywhere

- ○ b. zero inside the sphere and non zero outside the sphere

- ○ c. zero outside the sphere and non zero inside the sphere

- ○ d. non zero everywhere

Your answer is incorrect.

The correct answer is: zero outside the sphere and non zero inside the sphere

Consider a uniformly charged sphere of radius R carrying a charge $+Q$. The electrostatic flux passing through a sphere of radius r and concentric with the charge distribution will

Select one:

- a. Is independent of r only for $0 < r < R$

- b. Depends on r for all values of r

- c. Is independent of r only for $r > R$

- d. Be independent of r for all values of r

Your answer is Incorrect.

The correct answer is: Is independent of r only for $r > R$

Question 4

Not answered

Marked out of 1.00

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If a point charge +q is located at the center of a sphere of radius 'r', what is the electric flux passing through a portion of the surface of the sphere defined by $0 < \theta < \frac{\pi}{2}$ and $0 < \phi < \frac{\pi}{2}$?

Select one:

- a. $\frac{q}{8\epsilon_0}$
- b. $\frac{q}{4\epsilon_0}$
- c. $\frac{q}{8\pi\epsilon_0}$
- d. $\frac{q}{4\pi\epsilon_0}$

Your answer is incorrect.

The correct answer is: $\frac{q}{8\epsilon_0}$

Question 5

Not answered

Marked out of 1.00

A circular disc of radius R is placed in the xy-plane and it carries a surface charge density $\rho = \frac{k}{r}$, where k is a constant. What is the total electric flux passing through a closed surface enclosing this disc?

Select one:

- a. $\frac{k}{\epsilon_0} \pi R$

- b. $\frac{k}{\epsilon_0} \pi R^2$

- c. $-\frac{k\pi}{\epsilon_0 R^2}$

- d. $\frac{k}{\epsilon_0} 2\pi R$

Your answer is incorrect.

The correct answer is: $\frac{k}{\epsilon_0} 2\pi R$

Four charges of same sign and magnitude +Q are placed on a ring of radius 'R' at equal distances. The axis of the ring is taken to be along z-axis. A charge +q is placed at a height 'z' on the axis of the ring. What is the force on the charge q?

Select one:

○ a. $\dfrac{Qq}{4\pi\epsilon_0} \dfrac{4R}{(z^2+R^2)^{3/2}} \hat{z}$

○ b. 0

○ c. $\dfrac{Qq}{4\pi\epsilon_0} \dfrac{R}{(z^2+R^2)^{3/2}} \hat{z}$

○ d. $\dfrac{Qq}{4\pi\epsilon_0} \dfrac{4z}{(z^2+R^2)^{3/2}} \hat{z}$

Your answer is incorrect.

The correct answer is: $\dfrac{Qq}{4\pi\epsilon_0} \dfrac{4z}{(z^2+R^2)^{3/2}} \hat{z}$

Two point charges +Q and -Q are placed at points with Cartesian coordinates (1,0,0) and (-1,0,0) respectively. The force on a charge +Q kept at a point with coordinates (0,1,0) will be

Select one:

- ○ a. Along the +y direction
- ○ b. Along the +x direction
- ○ c. Along the -x direction
- ○ d. Along the -y direction

Your answer is incorrect.

The correct answer is: Along the -x direction

The electrostatic potential in a region of space is given by $V(x, y, z) = 10x + 5$. The magnitude of the electrostatic field at $x = 2$ is

Select one:

- a. +25
- b. 0
- c. -10
- d. +10

Your answer is incorrect.

The correct answers are: +10, -10

Question 9

Not answered

Marked out of 1.00

⚑ Flag question

Calculate the divergence $\nabla \cdot \vec{E}$ of the vector $\vec{E} = \frac{\hat{r}}{r^n}$, where n is an integer and $\vec{r}$ is the position vector.

Select one:

- a. $\frac{n-2}{r^{n+1}}$
- b. $\frac{2-n}{r^{n-1}}$
- c. $\frac{2-n}{r^{1-n}}$
- d. $\frac{2-n}{r^{n+1}}$

Your answer is Incorrect.

The correct answer is: $\frac{2-n}{r^{n+1}}$

A point charge Q is located at a point with Cartesian coordinates (2,0,0). The potential difference between two points with coordinates (0, 2, 0) and (0, -2, 0) will be

Select one:

- a. $\dfrac{Q}{16\pi\epsilon_0}$

- b. $\dfrac{Q}{8\pi\epsilon_0}$

- c. Zero

- d. $\dfrac{Q}{\epsilon_0}$

Your answer is incorrect.

The correct answer is: Zero

Calculate the work done in carrying a 4 C charge from point a(1,0,0) to point b(0,2,0) along the straight line connecting the two points in the electrostatic field

$\vec{E} = 5x\hat{x} + 5y\hat{y}$ V/m.

Select one:

○ a. -7.5 J

○ b. + 30 J

○ c. +7.5 J

○ d. - 30 J

Your answer is incorrect.

The correct answer is: - 30 J

A positively charged particle is released from rest in an uniform electrostatic field. The electric potential energy of the charge

Select one:

- a. decreases because the charge moves opposite to the electrostatic field
- b. remains a constant because the electrostatic field is uniform
- c. decreases because the charge moves along the electrostatic field
- d. increases because the charge moves along the electrostatic field

Your answer is incorrect.

The correct answer is: decreases because the charge moves along the electrostatic field

100 Joule of work is performed in carrying a charge of -5 coulomb from infinity to a particular point in an uniform electrostatic field. The potential of this point is

Select one:

○   a. 5 V

○   b. 100 V

○   c. -20 V

○   d. +20 V

Your answer is incorrect.

The correct answer is: -20 V

The electrostatic field has magnitude 1000 N/C between two parallel conducting plates separated by 5 mm. The potential difference between the plates is

Select one:

- a. 50 V
- b. 5000 V
- c. 5 V
- d. 200 V

Your answer is incorrect.

The correct answer is: 5 V

A dipole with dipole moment given by $\vec{p} = p_0\hat{z}$ is placed at the origin. A negative charge -Q is placed at the point with Cartesian coordinates (5,0,0). The electrostatic force on the charge will be along

Select one:

○ a. -z direction

○ b. +x direction

○ c. +z direction

○ d. -x direction

Your answer is Incorrect.

The correct answer is: +z direction