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QUESTION 1



Select the correct answer.

A cuboidal box has the dimensions
 $14 \text{ cm} \times 6.0 \text{ cm} \times 2.5 \text{ cm}$

. A sheet of paper with dimensions
 $6.0 \text{ cm} \times 2.5 \text{ cm}$

is placed inside the cuboidal box with a total
surface charge density of

$$1.1 \times 10^{-2} \text{ C/m}^2$$

. What is the amount of charge enclosed in the cuboidal box?

☐ $0.85 \times 10^{-5} \text{ C}$ ☒ $1.7 \times 10^{-5} \text{ C}$ ☐ $3.7 \times 10^{-5} \text{ C}$ ☐ $2.6 \times 10^{-5} \text{ C}$

QUESTION 2

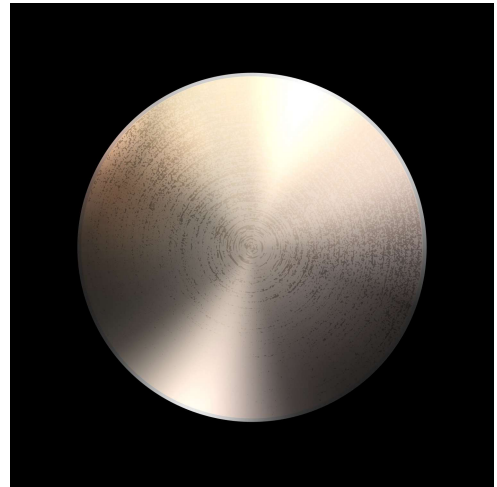


Select the correct answer.

A 2D disk with a radius of 12 cm has a uniform charge density of

$$14 \text{ C} / \text{m}^2$$

. What is the amount of charge distributed over the surface of this disk?



☒ 0.63 C



☐ 0.12 C

☐ 0.49 C

☐ 0.35 C

QUESTION 3



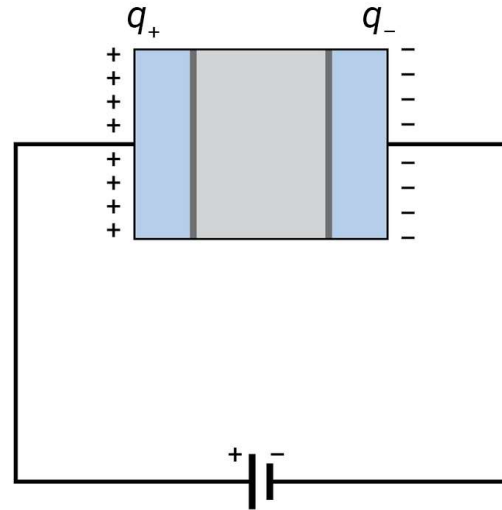
Select the correct answer.

A parallel-plate capacitor has an area

$$A = 1.25 \times 10^{-5} \text{ m}^2$$

. An electric charge of
1.45 nC

is distributed over the positive plate, what is
the charge density of this plate?



☐ $8.62 \times 10^3 \text{ C / m}^2$

☐ $1.25 \times 10^{-5} \text{ C / m}^2$

☐ $4.36 \times 10^{-4} \text{ C / m}^2$

☒ $1.16 \times 10^{-4} \text{ C / m}^2$



QUESTION 4



Select the correct answers from the drop-down menus.

If the charge is distributed over a three-dimensional volume, the charge of an element is

$$dq = \rho dV$$



. If the charge is distributed over a two-dimensional area, the charge

of an element is

$$dq = \sigma dA$$



. If the charge is distributed over a one-dimensional

length, the charge of an element is

$$dq = \lambda dx$$



QUESTION 5



Select the correct answer.

A total charge of 12 mC has been distributed along a long thin rod of length 42 cm. What is the linear charge density of the rod?

☒ $2.9 \times 10^{-2} \text{ C / m}$



35 C / m



$4.3 \times 10^{-2} \text{ C / m}$



44 C / m

QUESTION 6



Select the correct answer.

Sami calculated the charge density of some objects. Which of the charge densities below is correct for a 2D disk?



50 C m³



50 C/m²



50 C m



50 C/m³

QUESTION 7



Drag and drop the correct answer in the blank below.

A 2D disk of radius, R , has a surface charge density, σ ✓.

surface charge density,

volume charge density,

linear charge density,

λ ρ λ

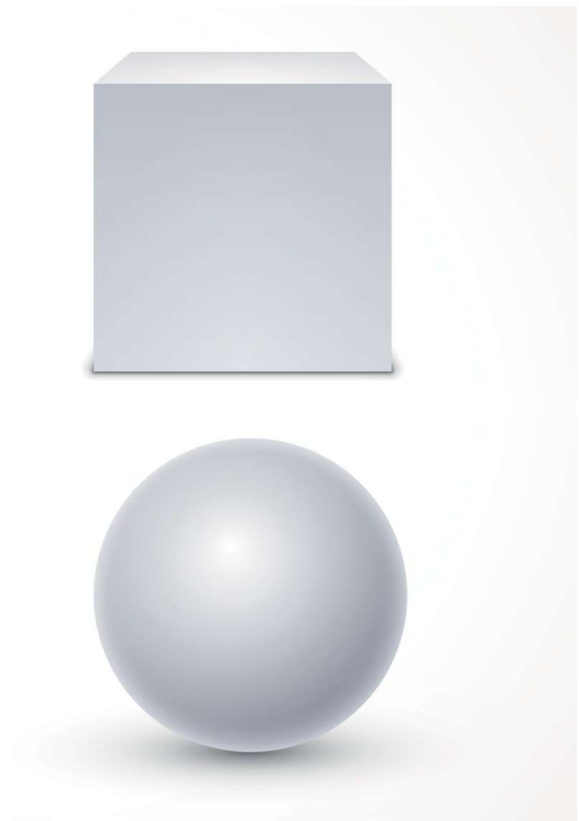
QUESTION 8

**Select the correct answers.**

An amount of charge is carried by a cube of side 1.1 cm such that it has a volume charge density of

$$2.5 \times 10^{-4} \text{ C / m}^3$$

. If the same amount of charge is distributed uniformly on a sphere of radius 1.5 cm. Calculate the value of the charge and the volume charge density of the sphere?



$$q = 5.8 \times 10^{-10} \text{ C}$$



$$\rho_{\text{sphere}} = 4.2 \times 10^{-5} \text{ C / m}^2$$

$$\rho_{\text{sphere}} = 2.4 \times 10^{-5} \text{ C / m}^2$$





$$\rho_{\text{sphere}} = 7.1 \times 10^{-5} \text{ C / m}^2$$



$$q = 3.3 \times 10^{-10} \text{ C}$$



$$q = 4.8 \times 10^{-10} \text{ C}$$

QUESTION 9



Choose the Correct Answer.

A plastic disc with a diameter of 20 cm is charged uniformly with

10^{14}

electrons.

What is its surface charge density?



$$5.1 \times 10^{-4} \text{ C / m}^2$$



$$2.5 \times 10^{-4} \text{ C / m}^2$$



$$1.3 \times 10^{-4} \text{ C / m}^2$$



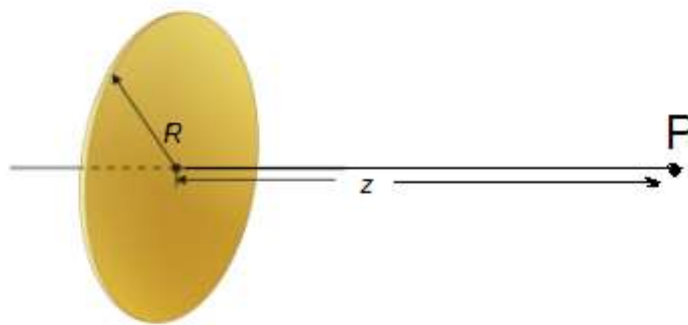
$$5.1 \times 10^{-6} \text{ C / m}^2$$

QUESTION 10



Choose the correct answer.

A charged disc of radius R carries a total charge Q . Which of the following equations represents the electric field strength at a point P at a distance z from its charged surface? The distance z is very large compared to R .



☐ $E_{\text{disc}} \simeq k \frac{dq}{z^2}$

☐ $E_{\text{disc}} \simeq k \frac{Q}{\sqrt{R^2 + z^2}}$

☐ $E_{\text{disc}} \simeq \sigma k \frac{Q}{z^2 + R^2}$

☒ $E_{\text{disc}} \simeq k \frac{Q}{z^2}$



QUESTION 11



Select from the drop-down menu the correct answer.

A line of charge extends along the x-axis from

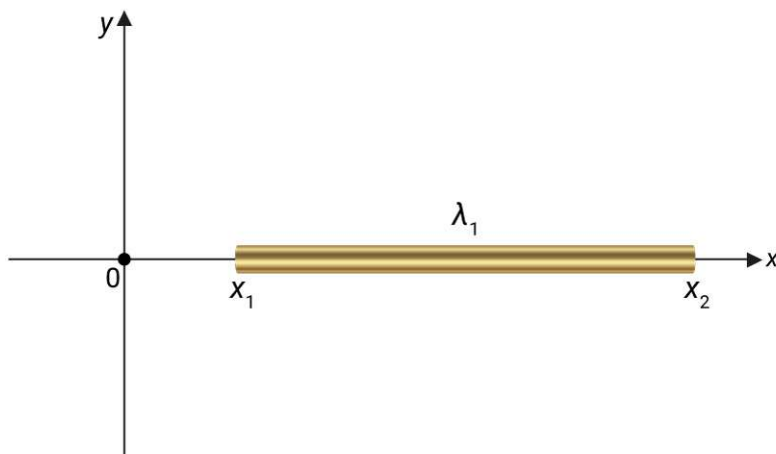
$$x_1 = 2 \text{ cm}$$

to

$$x_2 = 4 \text{ cm}$$

and carries a linear positive charge density

$$\lambda_1$$



. The magnitude of the electric field at the origin is

$$0.25 k\lambda_1 \quad \checkmark \quad \vee$$

QUESTION 12



Select the correct answer.

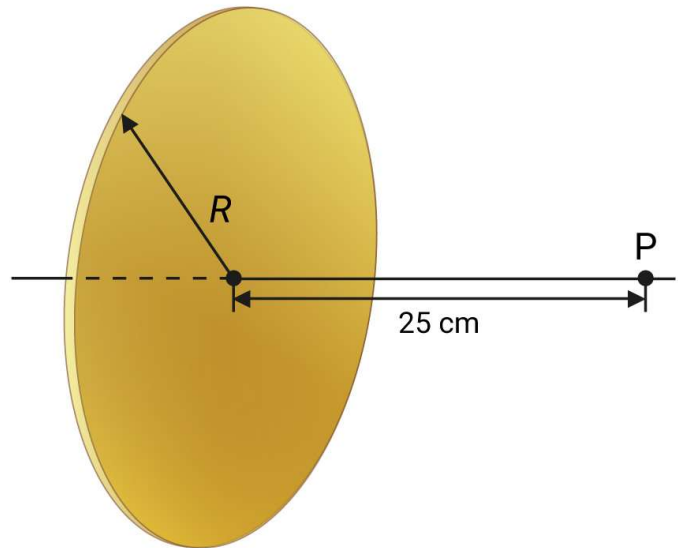
A uniformly charged disk with a radius of 57 cm carries a charge of density

$$1.5 \times 10^{-4} \text{ C / m}^2$$

. Sami found the expression of the electric field due to the charged disk as

$$E = 2\pi k\sigma \left(1 - \frac{x}{\sqrt{x^2 + R^2}} \right)$$

where R is the radius of the disk. What is the electric field strength 25 cm away from the axis of the disk?



☐ $2.6 \times 10^6 \text{ N/C}$

☐ $7.9 \times 10^6 \text{ N/C}$

☐ $9.3 \times 10^6 \text{ N/C}$

☒ $5.1 \times 10^6 \text{ N/C}$ ✓

QUESTION 13



Select the correct answer.

Which of the following equations can be used to determine the magnitude of the electric field from the charge distribution over a 2D surface?

☐ $dE = k \frac{\lambda dA}{r^2}$

☒ $dE = k \frac{\sigma dA}{r^2}$ ✓

☐ $dE = k \frac{dq}{2r}$

☐ $dE = k \frac{\sigma dA}{r^3}$

QUESTION 14



Select the correct answer.

You want to find the magnitude of the electric field due to an object carrying an electric charge. What is your first step?

☐ find the electric field from each element☒ divide the charge into small elements, dq ✓

☐ divide the shape into two equal surfaces☐ find the charge of the elements

QUESTION 15



Select the correct answer.

Which of the below examples is correct about a linear charge density,

λ

?

☐ A charge, q , is uniformly distributed along a cube.☐ A charge, q , is uniformly distributed along a sphere.☒ A charge, q , is uniformly distributed along a rod.☐ A charge, q , is uniformly distributed along a cylinder.