تم تحميل هذا الملف من موقع المناهج الإماراتية	
	

الملف الخطة الأسبوعية للأسبوع الخامس الحلقة الثانية في مدرسة أبو أيوب الأنصاري
موقع المناهج ⇦ المناهج الإماراتية ⇦ ملفات مدرسية ⇦ المدارس ⇦ الفصل الأول

روابط مواقع التواصل الاجتماعي بحسب ملفات مدرسية			
			
روابط مواد ملفات مدرسية على تلغرام			
التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب ملفات مدرسية والمادة المدارس في الفصل الأول	
1	توجيهات بدء الدراسة للعام الدراسي الجديد
2	امتحانات منتصف الفصل الأول للصفين الحادي عشر والثاني عشر في مدرسة الشعلة الخاصة
3	امتحانات منتصف الفصل الأول للصفين التاسع والعاشر في مدرسة الشعلة الخاصة
4	امتحانات منتصف الفصل الأول للصفوف الخامس حتى الثامن في مدرسة الشعلة الخاصة
5	امتحانات منتصف الفصل الأول للصفوف الأول حتى الرابع في مدرسة الشعلة الخاصة

هيكل اختبار الفيزياء
12ADV 2022-2023

شرح الهيكلة متوفر على ون نوت
للإشتراك الرجاء التواصل على واتس آب
0504350429

One note Link:
https://shorturl.at/mzHW8

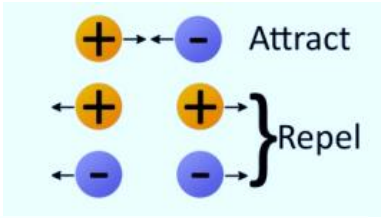
One note QR code

للتواصل عبر الواتساب

21.2 Electric Charge

Law of Electric Charges

Like charges repel and opposite charges attract.



Elementary Charge الشحنة الأولية (الأساسية)

Electric charge occurs only in integral multiples of a minimum size. This is expressed by saying that charge is **quantized.** The smallest observable unit of electric charge is the charge of the electron, which is $-1.602 \cdot 10^{-19}$ C (as defined in equation 21.3).

q = e n و يمكن إيجاد شحنة الجسم باستخدام المعادلة

Number of electrons — Elementary charge

$Q = N \times e$

Charge quantity

where $e = 1.602 \times 10^{-19}$ C is the elementary charge.

Concept Check 21.1

How many electrons does it take to make 1.00 C of charge?

a) $1.60 \cdot 10^{19}$
b) $6.60 \cdot 10^{19}$
c) $3.20 \cdot 10^{16}$
d) $6.24 \cdot 10^{18}$
e) $6.66 \cdot 10^{17}$

What is the total charge on 3.72×10^{19} electrons?

a. 5.00 C
b. 6.78 C
c. 5.95 C
d. 0.430 C
e. 2.33 C

How many electrons does it take to make (-2.00 C) of charge?

كم عدد الإلكترونات اللازم للحصول على شحنة مقدارها (-2.00C)؟

21.3 Insulators, Conductors, Semiconductors, and Superconductors

1- **Insulators:**

Materials that don`t conduct electricity are called Insulators. (Electrons can`t move through it.)
Typical insulators are glass, plastic and cloth.

2- **Conductors:**

Materials that conduct electricity well are called conductors. (Electrons can move through it.)
Typical solid conductors are metals like copper. Electrolytes and organic tissue are also conductors.

3- **Semiconductors:**

A class of materials called **semiconductors** can change from being an insulator to being a conductor and back to an insulator again.

4- **Superconductors:**

Superconductors are materials that have zero resistance to the conduction of electricity.
- Materials are superconducting only at very low temperatures.

Which of the following statements is **correct** about electrical conductivity?
أي من العبارات التالية **صحيحة** عن التوصيل الكهربائي؟

Electrical resistance of superconductors is zero at very low temperatures.
تكون المقاومة الكهربائية للموصلات فائقة التوصيل تساوي صفر عند درجات حرارة منخفضة جداً

Metals are bad conductors of electricity.
تعتبر الفلزات موصلات رديئة للكهرباء

Insulators have low electrical resistance.
العوازل لديها مقاومة كهربائية متدنية

Silicon and germanium are examples of superconductors.
يعتبر السيليكون والجيرمانيوم من المواد فائقة التوصيل للكهرباء

Which of the following are materials that have zero resistance to the conduction of electricity?	أي من المواد التالية لها مقاومة صفرية من حيث الموصلية الكهربائية؟

21.4 Electrostatic Charging

Methods of Charging

Charging by Friction	Charging by Conduction	Charging by Induction
The process in which a body gets charged when it is rubbed against other body.	The process in which a body gets charged by making contact with a charged object.	The process in which a body gets charged by a charged object without contact.

Concept Check 21.2

The hinged conductor moves away from the fixed conductor if a charge is applied to the electroscope, because

a) like charges repel each other.

b) like charges attract each other.

c) unlike charges attract each other.

d) unlike charges repel each other.

FIGURE 21.8 A typical electroscope used in lecture demonstrations.

FIGURE 21.9 Inducing a charge: (a) An uncharged electroscope. (b) A negatively charged paddle is brought near the electroscope. (c) The negatively charged paddle is taken away.

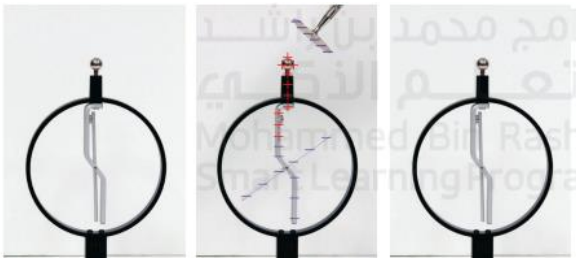
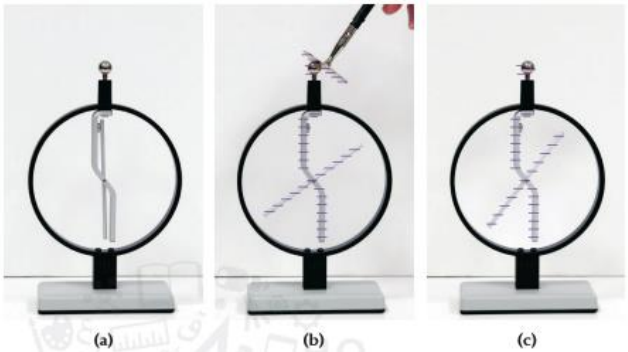


FIGURE 21.10 Charging by contact: (a) An uncharged electroscope. (b) A negatively charged paddle touches the electroscope. (c) The negatively charged paddle is removed.



paddle. This process is called **charging by induction** and yields an electroscope charge that has the opposite sign from the charge on the paddle.

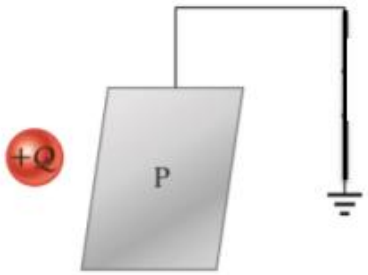
ملاحظة : دائما في عملية الشحن بالحث ينشحن الجسم بشحنة مخالفة لشحنة الجسم المؤثر

(a) (b) (c) (d) (e)

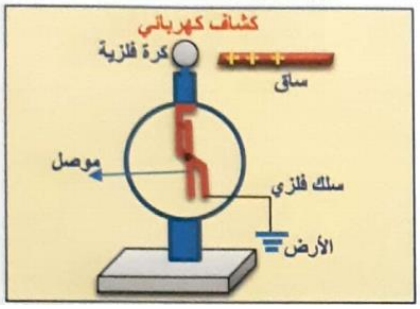
6- If a positively charged particle is brought close to a neutral conducting grounded plate shown in the figure, what is the charge of the plate after disconnecting the grounding and taking the charged particle away from the plate?

إذا قرب جسيم مشحون بشحنة موجبة من الصفيحة الموصلة المأرضة والمتعادلة المبينة في الشكل، فما هي شحنة الصفيحة بعد فصل سلك التأريض وإبعاد الجسيم المشحون عنها؟

A- Positive.
B- Negative.
C- Neutral.
D- We can't determine.



2- في الشكل المجاور قربت ساق تحمل شحنة موجبة من كشاف كهربائي غير مشحون دون أن تلمسه ،
عند قطع اتصال الكشاف بالأرض وإبعاد الساق، أي من الآتية صحيح ؟

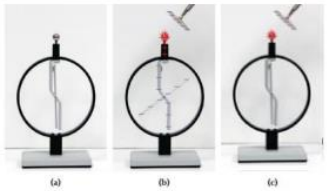


- ☐ يشحن كل من الكرة والموصل بشحنة سالبة.
- ☐ يشحن كل من الكرة والموصل بشحنة موجبة.
- ☐ تشحن الكرة بشحنة موجبة ويشحن الموصل بشحنة سالبة.
- ☐ تشحن الكرة بشحنة موجبة ويبقى الموصل بدون شحنة.

1 من 24

The figure shows .....charging by

يوضح الشكل الشحن بواسطة.....



One way to charge a **neutral** metallic object with a **negative** charge is to do one of the following;

افترض ان هناك جسم فلزي **متعادل الشحنة**. أحد طرق إكسابه شحنة **سالبة** هي:

Remove some electrons
انتزاع بعض الالكترونات من الجسم

Add some electrons
إضافة بعض الالكترونات الى الجسم

Cut out a part of the object
قطع جزء من الجسم

Add some neutral atoms
إضافة بعض الذرات المتعادلة

21.5 Electrostatic Force—Coulomb's Law

$$F = k\frac{|q_1 q_2|}{r^2},$$

$$k = 8.99 \cdot 10^9 \ \frac{\mathrm{N\,m^2}}{\mathrm{C^2}}$$ **Coulomb's constant**

Evaluate the **magnitude** of the **electrostatic force** exchanged between the two charges $q_1 = +30\mu C$ and $q_2 = -40 \times 10^{-6}$C separated by a distance of **9.0 cm**.

(Use $k = 9 \times 10^9 \frac{N.m^2}{C^2}$, $1.0\ \mu = 1.0 \times 10^{-6}$).

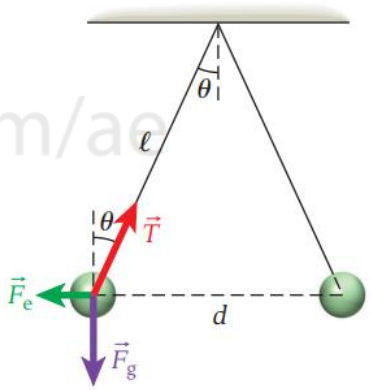
أوجد **مقدار القوة الكهربائية** المتبادلة بين الشحنتين $q_1 = +30\mu C$ و $q_2 = -40 \times 10^{-6}$ اللتان تفصل بينهما مسافة **9.0 cm** . (استخدم $k = 9 \times 10^9 \frac{N.m^2}{C^2}$ ، $1.0\ \mu = 1.0 \times 10^{-6}$).

21.2 The force between a charge of 25 μC and a charge of −10 μC is 8.0 N. What is the separation between the two charges?

a) 0.28 m
b) 0.53 m
c) 0.45 m
d) 0.15 m

According to the figure, what is the magnitude of net force on q_1?

1.83 Two balls have the same mass, 0.9680 kg, and the same charge, 29.59 μC. They hang from the ceiling on strings of identical length, ℓ, as shown in the figure. If the angle of the strings with respect to the vertical is 29.79°, what is the length of the strings?



Concept Check 21.3

You place two charges a distance r apart. Then you double each charge and double the distance between the charges. How does the force between the two charges change?

a) The new force is twice as large.

b) The new force is half as large.

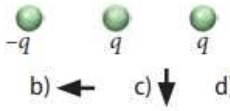
c) The new force is four times larger.

d) The new force is four times smaller.

e) The new force is the same.

Concept Check 21.6

Three charges are arranged on a straight line as shown in the figure. What is the direction of the electrostatic force on the *middle* charge?



a) → b) ← c) ↓ d) ↑

e) There is no force on that charge.

An electric field, E(r), is defined at any point in space, as the net electric force on a charge, divided by that charge:

$$\vec{E}(\vec{r}) = \frac{\vec{F}(\vec{r})}{q}$$

A negative charge of 5.0×10-9C is placed at a point where the electric field is 1200 N/C to the right, what is the force exerted on charge at that point?

وضعت شحنة سالبة مقدارها 5.0×10^{-9} C في نقطة داخل مجال كهربائي شدته 1200 N/C ويتجه نحو اليمين عند تلك النقطة، ما القوة المبذولة على الشحنة في ذلك الموضع؟

Concept Check 2.6

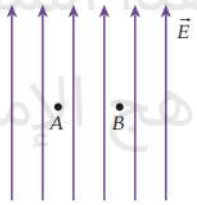
A small positively charged object could be placed in a uniform electric field at position *A* or position *B* in the figure. How do the electric forces on the object at the two positions compare?

a) The magnitude of the electric force on the object is greater at position *A*.

b) The magnitude of the electric force on the object is greater at position *B*.

c) There is no electric force on the object at either position *A* or position *B*.

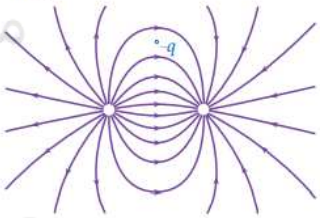
d) The electric force on the object at position *A* has the same magnitude as the force on the object at position *B* but is in the opposite direction.



e) The electric force on the object at position *A* is the same nonzero electric force as that on the object at position *B*.

Concept Check 2.7

A negative charge $-q$ is placed in a nonuniform electric field as shown in the figure. What is the direction of the electric force on this negative charge?



a) →

b) ↑

c) ←

d) ↓

e) The force is zero.

A proton is placed in the **uniform electric field** of magnitude **E = 0.25 V/m**. Find the **acceleration** of the proton (in m/s²). Hint: Proton mass is **1.6×10^{-27}kg** and proton charge is **1.6×10^{-19} C**.

وُضِع بروتون في مجال كهربائي منتظم مقداره **E = 0.25 V/m**. أوجد **تسارع** البروتون بوحدة (m/s²) نتيجة وجوده في المجال الكهربائي. كتلة البروتون تساوي **1.6×10^{-27}kg** وشحنته تساوي **1.6×10^{-19} C** .

What is the **unit** of measuring the **surface charge density** (σ) on a thin metallic sheet?

ما هي **وحدة قياس كثافة الشحنة السطحية** (σ) الموجودة على صفيحة فلزية رقيقة؟

What does X represent in the formula $(E_y = \frac{2kX}{y})$ **of an infinitely long wire and what is its unit?**

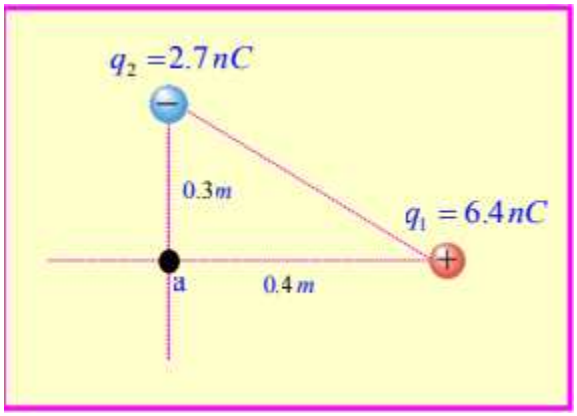
ماذا تمثل X في الصيغة $(E_y = \frac{2kX}{y})$ **للسلك لانهائي الطول وما هي وحدة قياسها؟**

4. A point charge $q = 4.00 \times 10^{-9}\ C$ is placed on the x-axis at the origin. What is the electric field produce at $x = 40.0\ cm$?

5. A point charge is placed on the x-axis at the origin. The electric field produce at $x = 40.0\ cm$ is $157\ N/C$. What is the point charge?

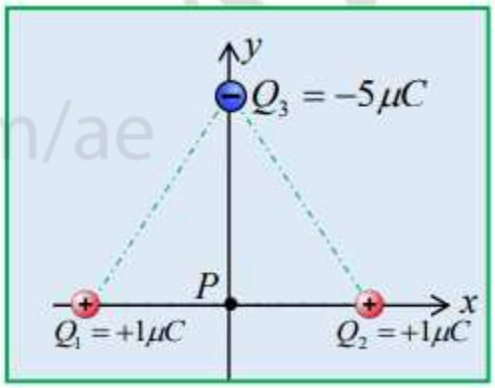
Example: In the figure created

Electric field at point **a**



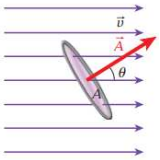
Depending on the data on the adjacent shape, an equilateral triangle with a side length of 2cm will The electric field at point P is equal to

- 1.35×10^{7} N/C باتجاه محور x الموجب ❒
- 5.39×10^{8} N/C باتجاه محور y الموجب ❒
- 1.50×10^{8} N/C باتجاه محور y الموجب ❒
- 1.50×10^{8} N/C باتجاه محور y السالب ❒

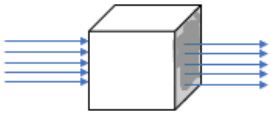


Flux for surface =

$$\Phi = EA\cos\theta$$

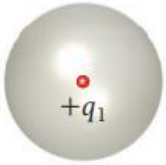


Flux for closed surface without charge = 0



Flux for closed surface with charge =

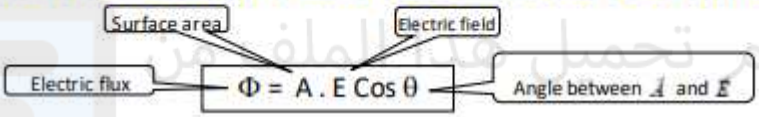
$$\Phi = \frac{q}{\varepsilon_0}$$



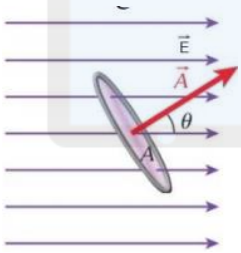
Electric flux: Φ

"The scalar product of the electric field vector into the surface area vector."

where:



what is the electric flux through the circular area 0.04m² is placed in a electric field (200N/C) where the angle in the figure is equal to 37 degrees.



What is the flux through the circular area with radius of 0.30 m placed in an external electric field has a strength of 1200 N/C and makes an angle of 60.° with the plane of the circle?

Closed surface (3D)

For a **closed surface** the net flux is the **integral** of the electric field over the closed surface. $\Phi = \oiint \vec{E} \cdot d\vec{A}$

$$\Phi = \oiint \vec{E} \cdot d\vec{A}$$

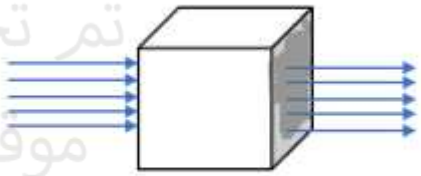
$\Phi_{total} = 0$

Example: Place a cube of rib length (0.4m) in a uniform electric field (60N/C) as in the figure find

.1 Total Flux

.2 low through the upper surface

.3 Flux through the Black surface



Three isolated charges of +2q, −2q, and +3q are placed in a 3D vacuum space, where they are **surrounded by a Gaussian surface**, as shown in the figure. What is the **total electrical flux** through that surface? Hint: ϵ_0 represents permittivity of vacuum.

وضعت **ثلاث شحنات معزولة** (+2q و −2q و +3q) في حيّز ثلاثي الأبعاد ويحيط بها **سطح جاوس** كما هو موضح في الشكل. ما مقدار **التدفق الكهربائي** عبر هذا السطح؟ تمثل ϵ_0 السماحية الكهربائية للفراغ.

$\varphi = {}^{+3q}/_{\epsilon_0}$

$\varphi = {}^{+7q}/_{\epsilon_0}$

$\varphi = +3q$

$\varphi = {}^{+5q}/_{4\pi\epsilon_0}$

What is the magnitude of the electric flux through the sphere shown in the figure that contains an electron and tow protons?

$1.6\times10^{-8}Nm^2/C$

$5.4\times10^{-8}Nm^2/C$

$3.6\times10^{-8}Nm^2/C$

$1.8\times10^{-8}Nm^2/C$

According to the figure, a cube that has (5.0cm) side length in a uniform electric field (E=200N/C), that is perpendicular to the plane of one face of the cube. What Is the magnitude of electric flux passing through the black face?

Electric field for infinite sheet

conducting sheet

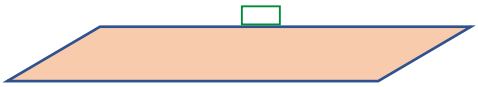
$$E = \frac{\sigma}{\varepsilon_0}$$

insulator) (, nonconducting sheet

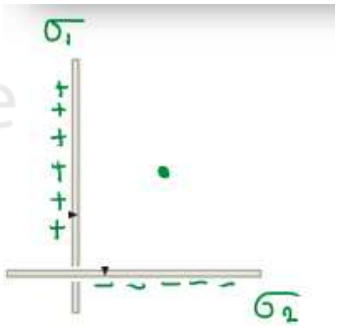
$$E = \frac{\sigma}{2\varepsilon_0}$$

Example: Infinite nonconducting sheet with a charge ($5x10^{-7}$ C/m^2),

Find 1 – electric field at point a at a distance (4cm)



2.76 Two infinite, uniformly charged, flat, nonconducting surfaces are mutually perpendicular. One of the surfaces has a charge distribution of +30.0 pC/m^2, and the other has a charge distribution of −40.0 pC/m^2. What is the magnitude of the electric field at any point not on either surface?



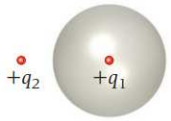
Concept Check 2.11

A hollow, conducting sphere is initially uncharged. A positive charge, $+q_1$, is placed inside the sphere, as shown in the figure. Then, a second positive charge, $+q_2$, is placed near the sphere but outside it. Which of the following statements describes the net electric force on each charge?

a) There is a net electric force on $+q_2$ but not on $+q_1$.

b) There is a net electric force on $+q_1$ but not on $+q_2$.

c) Both charges are acted on by a net electric force with the same magnitude and in the same direction.

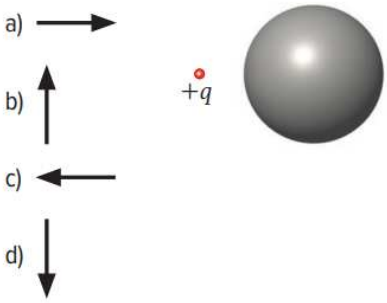


d) Both charges are acted on by a net electric force with the same magnitude but in opposite directions.

e) There is no net electric force on either charge.

Concept Check 2.10

A hollow, conducting sphere is initially given an evenly distributed negative charge. A positive charge $+q$ is brought near the sphere and placed at rest as shown in the figure. What is the direction of the electric field inside the hollow sphere?



e) The field is zero.

A point particle with charge q is placed inside the cube but not at its center. The electric flux through any one side of the cube:

A. is zero
B. is q/ϵ_0
C. is $q/4\epsilon_0$
D. is $q/6\epsilon_0$
E. cannot be computed using Gauss' law

ans: E

A particle with charge 5.0-μC is placed at the corner of a cube. The total electric flux in $\mathrm{N \cdot m^2/C}$ through all sides of the cube is:

A. 0
B. 7.1×10^4
C. 9.4×10^4
D. 1.4×10^5
E. 5.6×10^5

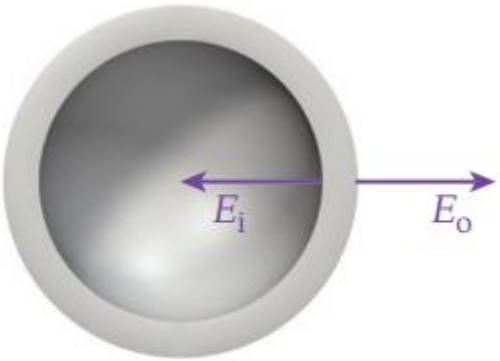
ans: E

•2.83 Consider a uniform nonconducting sphere with a surface charge density $\rho = 3.57 \times 10^{-6}$ C/m^3 and a radius $R = 1.72$ m. What is the magnitude of the electric field 0.530 m from the center of the sphere?

5- موصل كروي مجوف نصف قطره الداخلي (5.0 *cm*) و نصف قطره الخارجي (6.5 *cm*) ويحمل سطحه الخارجي شحنة كهربائية ، وضعت عند مركزه شحنة كهربائية (q) فنتج مجال كهربائي عند السطح الداخلي للموصل (50 *N/C*) باتجاه مركز الموصل كما يوجد مجال كهربائي آخر عند السطح الخارجي للموصل (50 *N/C*) يتجه بعيداً عن مركز الموصل ، ما مقدار و نوع الشحنة q ؟

- ❒ -2.5×10^{-12} C
- ❒ -1.4×10^{-11} C
- ❒ $+2.5 \times 10^{-12}$ C
- ❒ $+1.4 \times 10^{-11}$ C

2.54 A hollow conducting spherical shell has an inner radius of 8.00 cm and an outer radius of 10.0 cm. The electric field at the inner surface of the shell, E_i, has a magnitude of 80.0 N/C and points toward the center of the sphere, and the electric field at the outer surface, E_o, has a magnitude of 80.0 N/C and points away from the center of the sphere (see the figure). Determine the magnitude of the charge on the inner surface and on the outer surface of the spherical shell.



•**2.83** Consider a uniform nonconducting sphere with a surface charge density $\rho = 3.57 \times 10^{-6}$ C/m^3 and a radius $R = 1.72$ m. What is the magnitude of the electric field 0.530 m from the center of the sphere?