حل مراجعة وفق الهيكل الوزاري الجزء الالكتروني منهج انسباير

موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف العاشر المتقدم ⇦ فيزياء ⇦ الفصل الأول ⇦ حلول ⇦ الملف

تاريخ إضافة الملف على موقع المناهج: 2024-11-26 17:07:30

المزيد من مادة فيزياء:	ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس
	إعداد: كمال عبد العظيم

التواصل الاجتماعي بحسب الصف العاشر المتقدم

صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف العاشر المتقدم والمادة فيزياء في الفصل الأول

1	أسئلة الامتحان النهائي منهج انسباير القسم الكتابي
2	حل تجميعة أسئلة وفق الهيكل الوزاري منهج انسباير
3	حل أسئلة الامتحان النهائي منهج انسباير القسم الكتابي للعام 2023-2024
4	حل أسئلة الامتحان النهائي منهج انسباير العام 2023-2024
5	حل الكراسة التدريبية للاختبار النهائي وفق الهيكل الوزاري

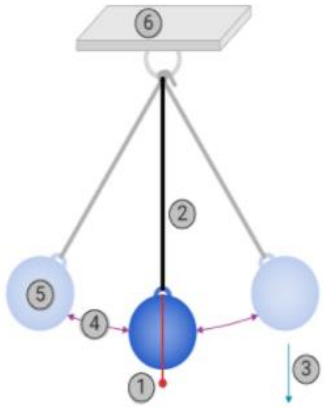
كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

1	Apply the equation ($T=2\pi\sqrt{l/g}$) to calculate the period of a simple pendulum for small-angle oscillations.	Student Book Q.(5-8 & 11)	P.(7-8) P.8

period of a pendulum

T=period (s)
l=string length (m)
g=acceleration due to gravity (m/s^2)

- **It's important to know the following:**
- **The period does not depend upon the bob's mass.**
- **The equation only applies for small oscillation amplitudes, when it is displaced for less than an angle of 15°**



What will be the period of a simple pendulum that has a string length of 1 m?

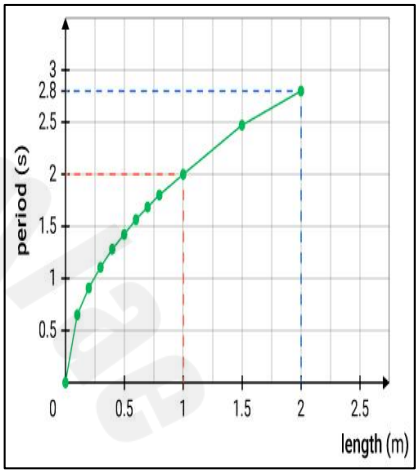
$$T = 2\pi\sqrt{\frac{l}{g}} \qquad T = 2 \times 3.14\sqrt{\frac{1}{9.81}} \qquad \boxed{T = 2.0s}$$

What will be the period of a simple pendulum that has a string length of 2 m?

$$T = 2\pi\sqrt{\frac{l}{g}} \qquad T = 2 \times 3.14\sqrt{\frac{2}{9.81}} \qquad \boxed{T = 2.8s}$$

What is the period of a simple pendulum that has a string length of 2.5 m?

$$T = 2\pi\sqrt{\frac{l}{g}}$$
$$T = 2 \times 3.14\sqrt{\frac{2.5}{9.81}}$$
$$\boxed{T = 3.2\,s}$$



What is the period of a simple pendulum that has a string length of 2.5 m?

$$T = 2\pi\sqrt{\frac{l}{g}}$$
$$T = 2 \times 3.14\sqrt{\frac{3.0}{9.81}}$$
$$\boxed{T = 3.5\,s}$$

5. What is the period on Earth of a pendulum with a length of 1.0 m?

6. How long must a pendulum be on the Moon, where g = 1.6 N/kg, to have a period of 2.0 s?

7. CHALLENGE On a certain planet, the period of a 0.75-m-long pendulum is 1.8 s. What is g for this planet?

5- $T = 2 \times 3.14\sqrt{\frac{1.0}{9.81}}$

$T = 2s$

6- $2.0 = 2 \times 3.14\sqrt{\frac{l}{16}}$

$l = 0.16\text{m}$

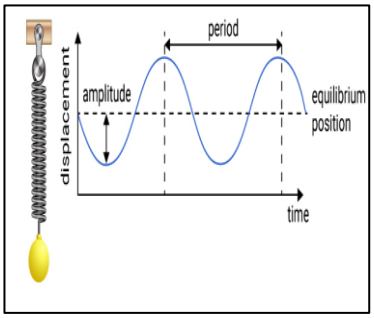
7- $1.8 = 2 \times 3.14\sqrt{\frac{1.0}{g}}$

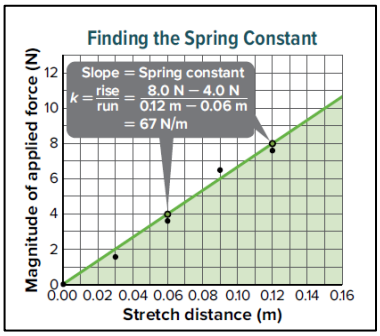
$g = 9.1N/Kg$

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

2	Apply Hooke's law to calculate the force exerted by a spring, the spring constant, or the distance by which a spring is stretched or compressed.	Student Book	P.(4-6)
		Q.(1-4)	P.6

force	F	N
Displacement	x	m
spring constant	K	N/m
Work	W	J
potential energy	P	J





$$F = -kx$$

$$Work = \frac{x \times F}{2}$$

$$PE = \frac{K\ x^2}{2}$$

A 40 N force on a spring expands it by 70 cm. What is the work done on the spring?

$$Work = \frac{x \times F}{2} = \frac{0.70 \times 40}{2} = 14\ j$$

A mass is suspended from a spring with a constant of 0.15 N/m. The spring is stretched 25 cm.

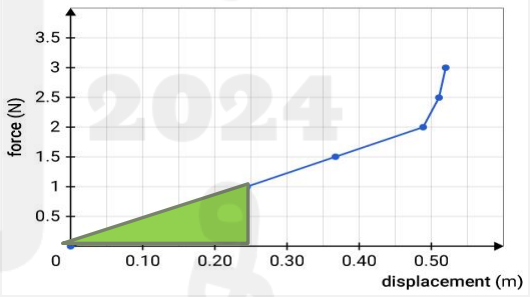
How much potential energy is stored in the spring?

$$PE = \frac{K\ x^2}{2} = \frac{0.15 \times 0.25^2}{2} = 4.7\times10^{-3}\ j$$

The following graph represents the relationship between the force and displacement of a spring.

What is the value of the spring constant ?

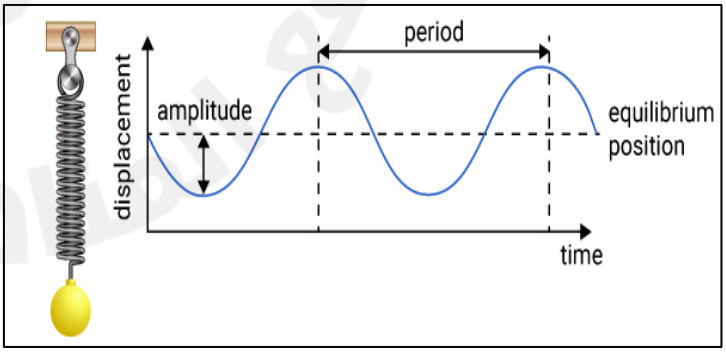
$$K = \text{slop} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-0}{0.49-0} = 4.0\ \text{N/m}$$



What is the work done on the spring to stretch it by 0.25 m ?

$$\text{Work} = \text{area} = \frac{base \times height}{2} = \frac{0.25 \times 1}{2} = 0.125\ j$$

	Maximum height up	Equilibrium	Lower down
X	+	0	-
F Spring	- greatest	0	+ greatest
PE	greatest	0	greatest
KE	0	greatest	0
v	0	greatest	0



كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

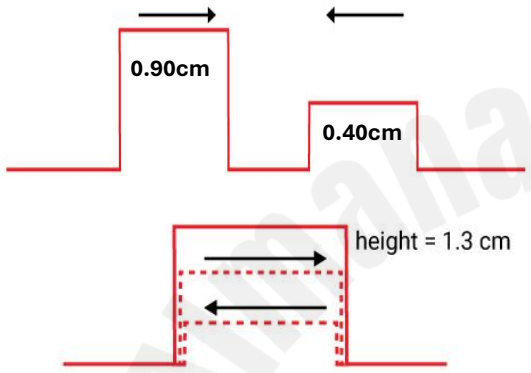
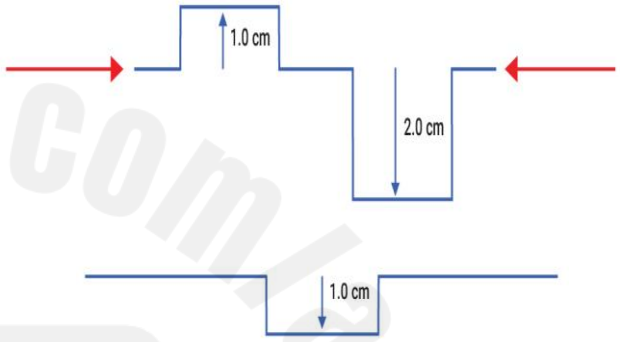
3	Sketch snapshots for the superposition of two overlapping wave pulses (same wavelength) traveling in opposite directions showing the resultant wave.	Student Book Q.31	P.(16-17) P.20

Interference happens when two or more waves move through each other in the same medium

principle of superposition states that the displacement of a medium where waves interfere is the algebraic sum of the waves' displacements

An antinode is a point in wave interference that has the largest displacement

A node is a point in wave interference that has zero displacement

Constructive interference	Destructive interference
	
happens when the crests of two waves overlap when they cross. The waves are **in phase**	happens when the crest and the trough of two waves coincide. The waves are **out of phase**

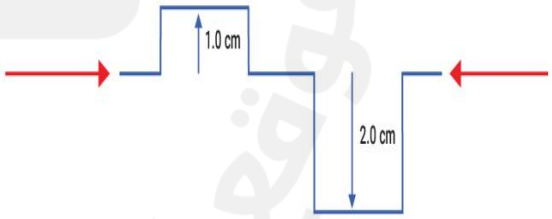
What is the type of the Interference?

Destructive interference

What is the sum of the two waves' displacements ?

-1cm

are the waves in phase or out of phase? **out of phase**



What is the type of the Interference?

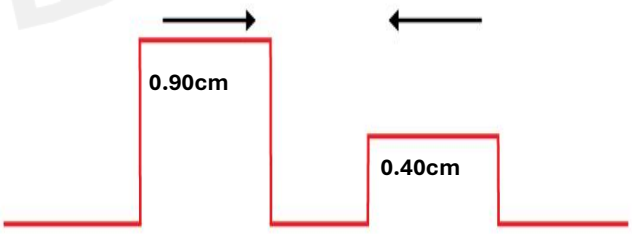
Constructive interference

What is the sum of the two waves' displacements ?

1.3 cm

are the waves in phase or out of phase?

in phase



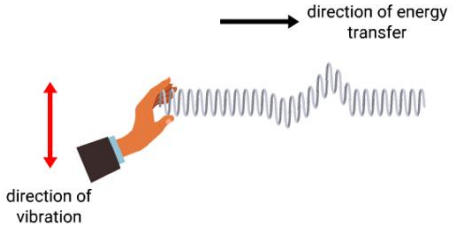
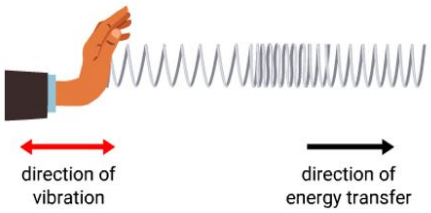
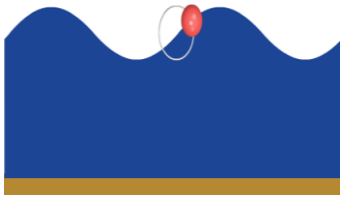
كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

4	Differentiate between transverse, longitudinal, and surface waves and give examples.	Student Book Q.(25-27)	P.(9-10) P.14

Types of Waves

Mechanical: they need matter to travel through, like sound waves

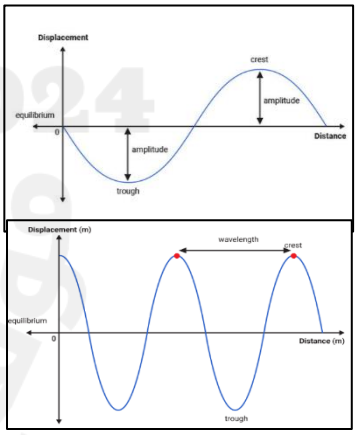
Electromagnetic: they can travel through empty space, like light waves

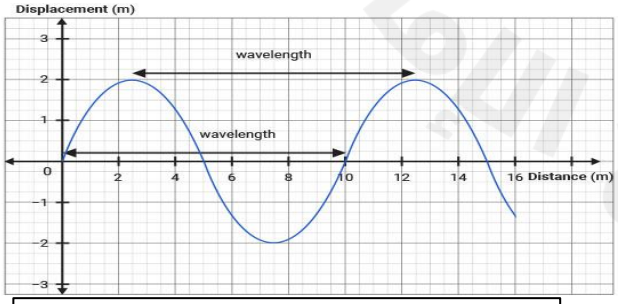
Transverse Wave	Longitudinal Wave	Surface Waves
		
If you vibrate a spring or a rope up and down or side to side, you can make a transverse wave. Notice how the vibration is at 90° to wave travel (or energy transfer)	If you compress and release a spring repeatedly, you can make a longitudinal wave. Notice how the energy moves through the slinky parallel to the direction of vibration. A longitudinal wave vibrates particles back and forth, parallel to the direction of wave travel **sound**	Surface waves move particles in a circular path, sometimes parallel, sometimes perpendicular to the direction of travel. Because particles sometimes move up and down and sometimes move sideways

Wave amplitude is the maximum displacement of a wave. It is measured from its equilibrium position to the crest, the highest point on the wave, or the trough, the lowest point

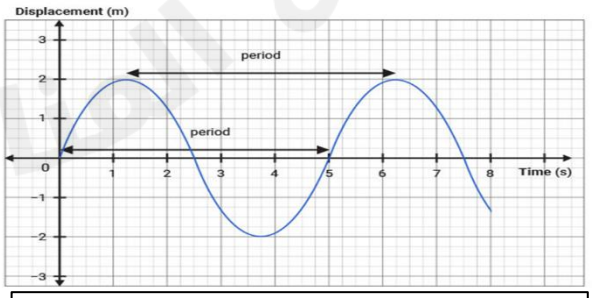
wavelength (λ) is measured between neighbouring wave crests. It is measured in meters.

The frequency (f) is the number of complete oscillations it makes per second. It is measured in hertz (Hz).





$$v = \frac{d}{t}$$



The Wavelength graph (λ) λ = 10 m

Time period (T) T = 5 s

$f = \frac{1}{T} = \frac{1}{5\,s} = 0.2\ Hz$ **v = λ × f= 10 × 0.2 = 2 m/s** or $v = \frac{\lambda}{T} = \frac{10}{5} = 2$ **m/s**

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

5	Explore through an experiment, like using a number of musical instruments, the perception of sound depending on its different physical quantities like amplitude and frequency, and relate them to loudness and pitch.	Student Book	P. (29-30)
		Q.6	P.33

4-Students use a sound with a frequency of 256 Hz to measure the speed of sound in their playground. The sound wave travels 80.0 m in 0.180 s.

$$v = \frac{d}{t}$$
$$v = \lambda \times f$$
$$f = \frac{1}{T}$$
$$v = \frac{\lambda}{T}$$

a-What is the speed of the wave?

$$v = \frac{d}{t} = \frac{80.0\ m}{0.180\ s} = 444\ m/s$$

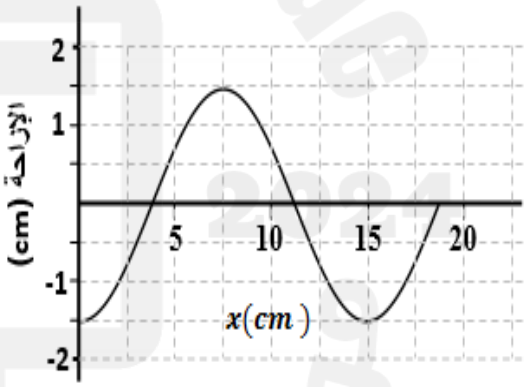
b-What is the wavelength of the wave?

$$\lambda = \frac{v}{f} = \frac{444\ m/s}{256\ Hz} = 1.7\ m$$

c-What is the period of the wave?

$$T = \frac{1}{f} = \frac{1}{256\ Hz} = 0.004\ s$$

5-The figure shows a wave with a frequency of 8 Hz



a-What is the Wave amplitude ?

1.5 cm = 0.015 m

b-What is the wavelength of the wave?

15 cm = 0.15 m

c-What is the period of the wave?

$$T = \frac{1}{f} = \frac{1}{8\ Hz} = 0.125\ s$$

d-What is the speed of the wave?

$$v = \lambda \times f = 0.15 \times 8 = 1.2\ m/s$$

What type of a wave is a sound wave?

a) longitudinal wave b) transverse wave

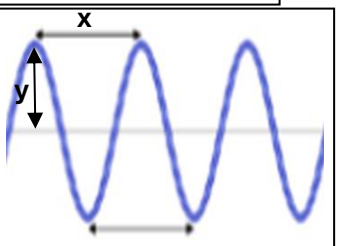
c) surface wave d) electromagnetic wave

a) x frequency y wavelength

b) y frequency x wavelength

c) y amplitude x wavelength

d) x amplitude y wavelength

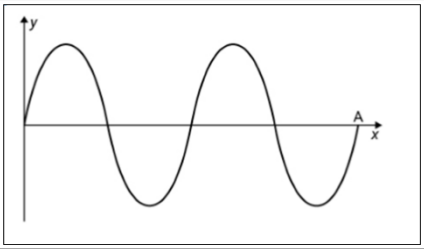


This is a plot of a sound wave. Point A represents 3.2 m along the x -axis.

Choose the correct statement.

a) The frequency is 1.6 Hz. b) The wavelength is 1.6 m.

c) The amplitude is 3.2 m. d) The wavelength is 0 m.



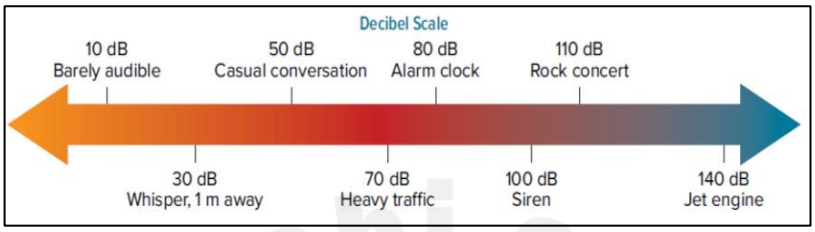
6	Describe the sound level and define the decibel (dB) as a unit of measuring sound level.	Student Book	P.(29-30)
		Figure 4	P.30

Sound level is a logarithmic scale of sound intensity. It is measured with decibel units (dB)
The sound level is a relative scale of sound intensity

The sound level is measured with ..... units

a) Hz b) N

c) J **d) dB**



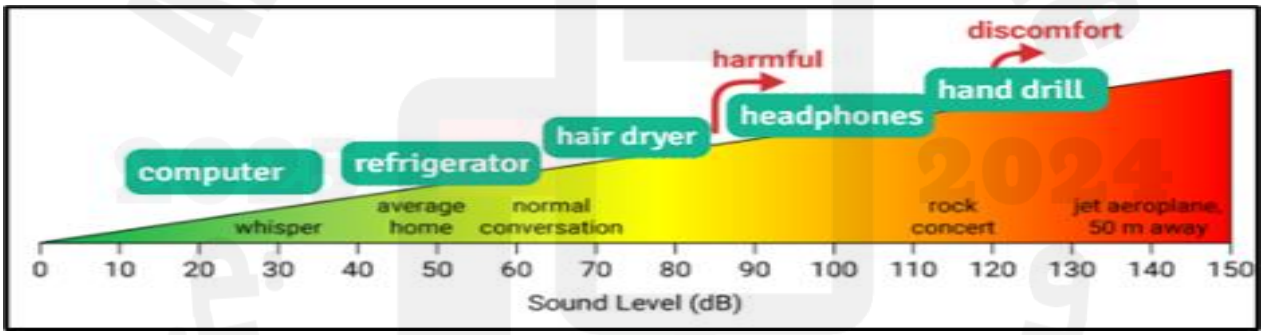
How many times louder does rock concert sound than casual conversation

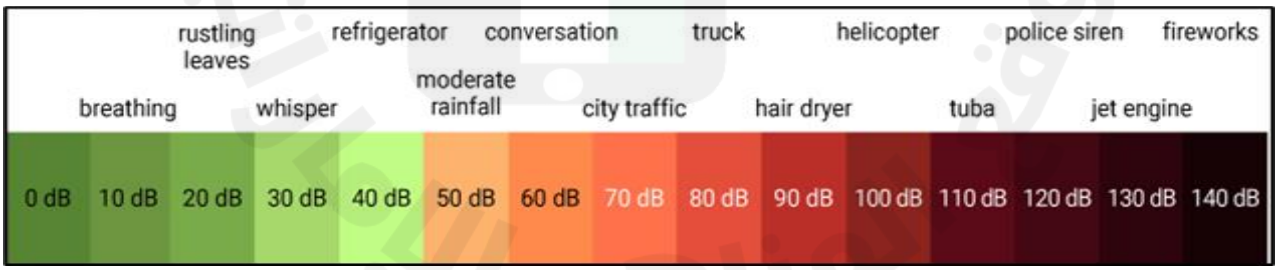
a) 10 times b) 100 times

c) 1000 times d) 10000 times

$$\frac{110\ dB\ -\ 50\ dB}{20} = 3 = n$$

$$10^n = 10^3 = 1000\ \text{times}$$





The sound from hair dryer is 10000 times more than breathing $\frac{90dB - 10\ dB}{20} = 4 \quad 10^4 = 10000\ \text{times}$

The sound from truck is 100 times more than refrigerator $\frac{80\ dB - 40\ dB}{20} = 2 \quad 10^2 = 100\ \text{times}$

The sound from helicopter is ..... times more than refrigerator $\frac{100dB\ -\ 40\ dB}{20} = 3 \quad 10^3 = 1000\ \text{times}$

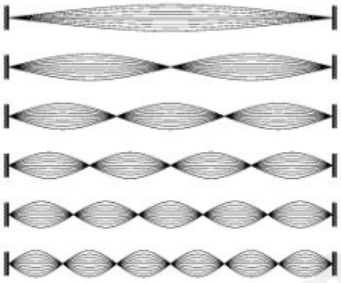
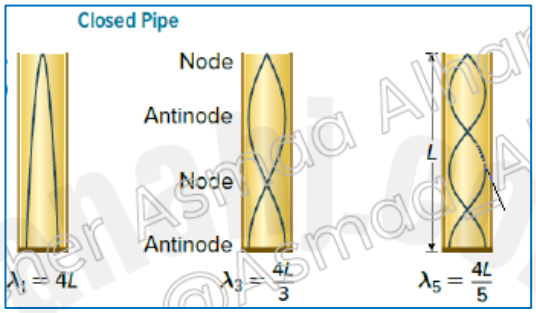
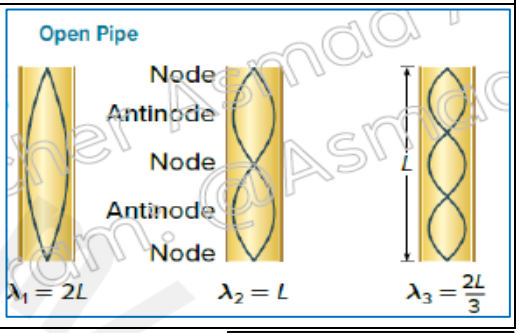
The sound from helicopter is ..... times more than conversation $\frac{100\ dB\ -\ 60\ dB}{20} = 2 \quad 10^2 = 100\ \text{time}$

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

7	Explore the meaning of resonance and understand how musical instruments work.	student Book	P.(35-40)
		Q.(13-16)	P.40

Resonance is the vibration of an object at the same frequency of vibration of a nearby object or a surrounding medium.

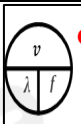
standing wave is the interference of two waves of the same amplitude and frequency, traveling in opposite directions, that seem to vibrate vertically without traveling horizontally

Standing Wave on a String	Standing Wave on a closed pipe	Standing Wave on an open pipe
$v = \lambda \times f \quad f_n = \frac{n v}{2L} \quad \lambda = \frac{2L}{n}$ **n=1,2,3,4.**	$v = \lambda \times f \quad f_n = \frac{n v}{4L} \quad \lambda = \frac{4L}{n}$ **n=1,3,5,7.**	$v = \lambda \times f \quad f_n = \frac{n v}{2L} \quad \lambda = \frac{2L}{n}$ **n=1,2,3,4.**
		

string is plucked and the speed of the vibration is 150 m/s. If the length of the string is 75 cm, what is the harmonic frequency of the string?

$\lambda = \frac{2L}{n} = \frac{2 \times 0.75}{4} = 0.375m$

$f_n = \frac{n v}{2L} = \frac{4 \times 150}{2 \times 0.75} = 400\ Hz$ or $f = \frac{v}{\lambda} = \frac{159}{0.375} = 400\ Hz$



open pipe

$v = \lambda \times f$

$f_n = \frac{n v}{2L}$

$\lambda = \frac{2L}{n}$

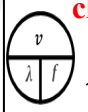
n=1,2,3,4...

This piccolo is a short open-pipe instrument. It has a length of 32 cm.

What is the lowest frequency sound it makes,

Remember, the speed of sound in air is 343 m/s (calculate the next frequency)

$\lambda = \frac{2L}{n} = \frac{2 \times 0.32}{1} = 0.64m \quad f_n = \frac{n v}{2L} = \frac{1 \times 343}{2 \times 0.50} = 536\ Hz \quad f_2 = \frac{n v}{2L} = \frac{2 \times 343}{4 \times 0.50} = 1072\ Hz$



closed pipe

$v = \lambda \times f$

$f_n = \frac{n v}{4L}$

$\lambda = \frac{4L}{n}$

n=1,3,5,7...

For a closed-pipe instrument that is 50.0 cm long, what is the wavelength of the wave, and what is the lowest frequency sound the instrument can make? Assume the speed of sound is 343 m/s (calculate the next frequency)

$\lambda = \frac{4L}{n} = \frac{4 \times 0.50}{1} = 2m \quad f_n = \frac{n v}{4L} = \frac{1 \times 343}{4 \times 0.50} = 171.5\ Hz \quad f_3 = \frac{n v}{4L} = \frac{3 \times 343}{4 \times 0.50} = 514.5\ Hz$

A guitar string length 0.65 m is played If the speed of the wave in the string is 410 m/s, what is its **fundamental frequency**?

a) 267 Hz

$f_n = \frac{n v}{2L} = \frac{1 \times 410}{2 \times 0.65} = 315Hz$

b) 513 Hz

c) 631 Hz

d) 315 Hz

A qanun string is plucked and the speed of the vibration is **405 m/s**. If the length of the string is **35 cm**, what is the **second harmonic** frequency of the string?

a) 2067 Hz

$f_n = \frac{n v}{2L} = \frac{2 \times 405}{2 \times 0.35} = 1157Hz$

b) 5513 Hz

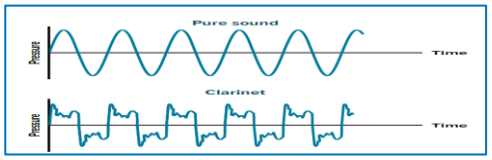
c) 1157 Hz

d) 1315 Hz

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

8	Discuss sound quality, and explain beats.	Student Book	P. (41-42)
		Figure 17 & 18; Q.22	P.44

Figure 17 The pure sound produced by a tuning fork is represented by a simple sine wave. The more complex sound produced by a clarinet is represented in the bottom graph.



Pitch (التردد) درجة الصوت

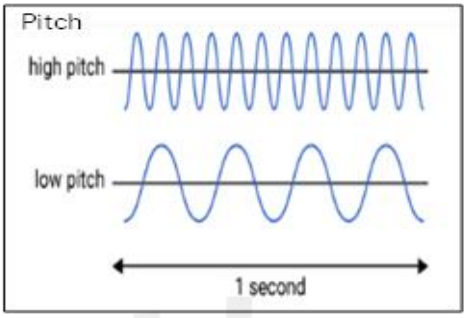
Loudness (شدة الصوت) علو الصوت

sound level مستوى الصوت

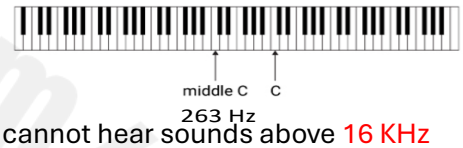
Decibel الديسيبل

Frequency التردد

Wavelength طول الموجة

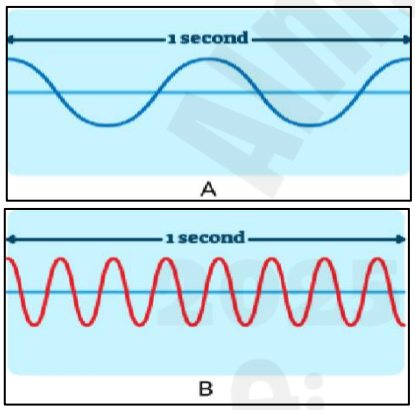


Pitch (التردد) درجة الصوت



Pitch : how high or low the frequency of a sound wave is

The human ear can detect sounds between 20 Hz and 20 KHz, but most people cannot hear sounds above 16 KHz

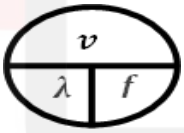


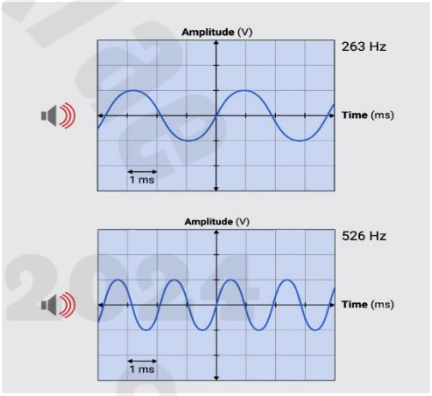
$V = f \times \lambda$

f frequency in Hz

λ wavelength in m

V wave speed in m/s





Infrasound < 20 Hz | 20 Hz and 20 KHz | Ultrasound > 20 KHz

Ultrasound is used in medical to see the internal organs of patient. It is useful because

1-it does not involve surgery

2- it does not disturb the patient or doctor's ears because it is ultrasound > 20 KHz above of human hearing

If the distance between the speaker and the ear is 1200 cm and the speed of sound is 343 m/s.

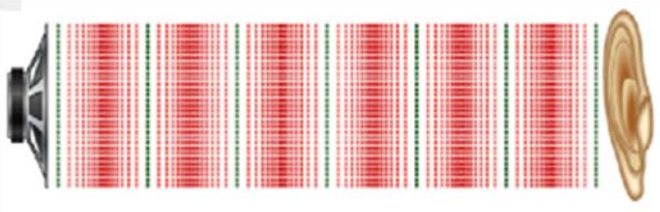
what is the frequency of this sound wave? (6 waves) 1200 cm = 12 m

a) 5.83×10^{-3} Hz

b) 1.72 Hz

c) 172 Hz

d) 686 Hz



$$\lambda = \frac{12}{6} = 2\ m$$

$$f = \frac{V}{\lambda} = \frac{343}{2} = 172\ Hz$$

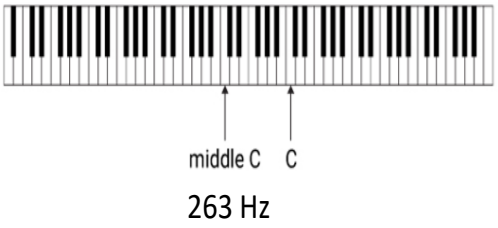
1- **The middle C on a piano has a frequency of 263 Hz. Knowing that the speed of sound in air is 343 m/s, the note has a wavelength of ..... m**

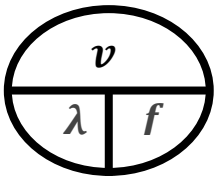
a) 0.65 m

b) 0.77 m

c) 1.5m

d) 1.3 m





$V = f \times \lambda$

f frequency in Hz

λ wavelength in m

v wave speed in m/s

2- What is the frequency of the next C in the image?

a) 122 Hz

b) 526 Hz

c) 1,052 Hz

d) 789 Hz

3- What is the wavelength of the next C note indicated, which has twice the frequency of middle C, is .....

a) 0.65 m

b) 0.77 m

c) 1.5m

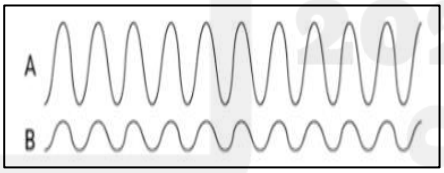
d) 1.3 m

Loudness (شدة الصوت) علو الصوت

Sounds are not just high-pitched or low-pitched. They can be loud or soft too. This is related to the amplitude

The **higher the amplitude**, the **louder the sound**

Loudness is the intensity of sound heard by the ear



Sound level is a logarithmic scale of sound intensity. It is measured with decibel units (dB)

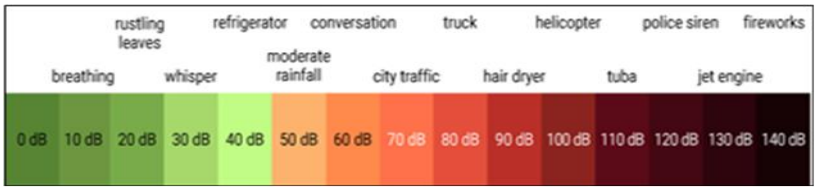
The sound level is a relative scale of sound intensity

The sound from hair dryer is 10000 times more than breathing $\frac{90dB - 10\ dB}{20} = 4 = 10000$ **times**

The sound from truck is 100 times more than refrigerator $\frac{80\ dB - 40\ dB}{20} = 2 = 100$ **times**

The sound from helicopter is ..... times more than refrigerator $\frac{100dB - 40\ dB}{20} = 3 = 1000$ **times**

The sound from helicopter is ..... times more than conversation $\frac{100\ dB - 60\ dB}{20} = 2 = 100$ ***time***



كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

9	Distinguish between electrical conductors and insulators giving typical examples	Student Book	P. (53-54)
		Q. (2-4)	P.54

Insulators

-kind of material resists the flow of electricity.

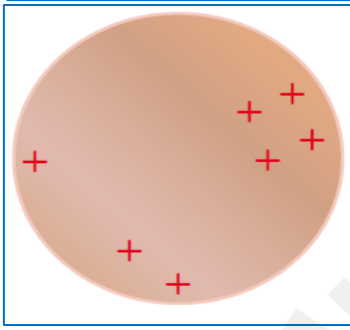
-limits the movement of electrical charge.

-localize charge.

-rubber, plastics glass, diamond, cloth, silk, and dry air

-electrons cannot move freely.

-strong electrostatic force



Rubber & plastics

diamond

glass

dry air

cloth & silk

Conductors

-material that allows the movement of electrical charge

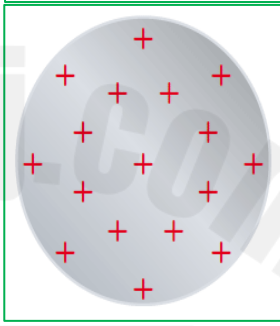
-mobile electron cloud

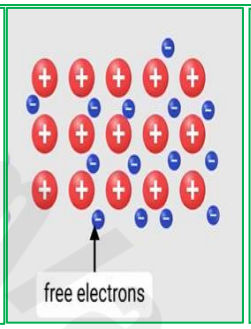
-distributed charge

-metals, graphite, water, humid air, and plasma

- mobile electron cloud. transfer charge

-weak electrostatic force





Metals

Graphite

Water

humid air

plasma

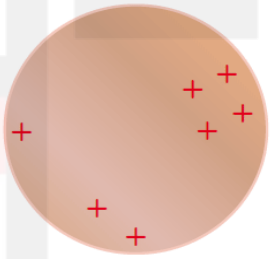
1- The adjacent figure shows

A- conductor charged by losing electrons

B- conductor charged by gaining electrons

C- insulator charged by losing electrons

D- insulator charged by gaining electrons



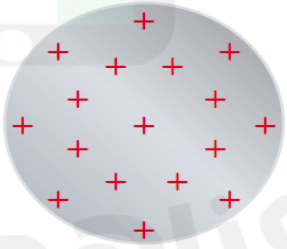
2- The adjacent figure shows

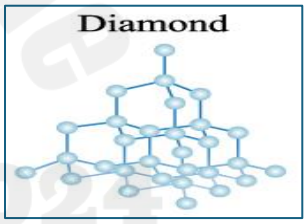
A- conductor charged by losing electrons

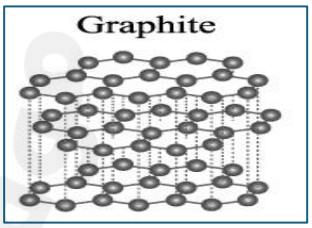
B- conductor charged by gaining electrons

C- insulator charged by losing electrons

D- insulator charged by gaining electrons







Diamond and graphite are both made of pure carbon,

but diamond is ... **Insulators**. and

the graphite is... **Conductors**...

Classify into Electrical Insulators or Electrical Conductors

Electrical Insulators	Electrical Conductors

Rubber andplastics	graphite	diamond	plasma	electrons cannot move freely

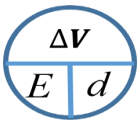
electrons can move freely	humid air	dry air	distributed charge	localize charge

10	Demonstrate an understanding that the work performed in moving a charged particle in an electric field can result in the particle gaining electric potential energy or kinetic energy or both.	Student Book Q.(43 - 52)	P. (74 - 75) P. (74 - 75)

43. The electric field intensity between two large, charged parallel metal plates is 6000 N/C. The plates are 0.05 m apart. What is the electric potential difference between them?

$$\Delta V = Ed$$
$$\Delta V = 6000 \times 0.05 = 300V$$

44. A voltmeter reads 400 V across two charged, parallel plates that are 0.020 m apart. What is the magnitude of the electric field between them?



$$E = \frac{\Delta V}{d} = \frac{400}{0.020} = 2000 N/C$$

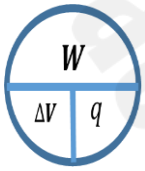
45. What electric potential difference is between two metal plates that are 0.200 m apart if the electric field between those plates is 2.50×10^3 N/C?

$$\Delta V = Ed$$
$$\Delta V = 2.5 \times 10^{3} \times 0.200 = 500V$$

46. When you apply a potential difference of 125 V between two parallel plates, the field between them is 4.25×10^3 N/C. How far apart are the plates?

$$d = \frac{\Delta V}{E} = \frac{125}{4.25 \times 10^{3}} = 0.029m$$

48. What work is done on a 3.0-C charge when you move that charge through a 1.5-V electric potential difference?



$$W = q\Delta V$$
$$W = 3.0 \times 1.5$$
$$= 4.5j$$

49. What is the magnitude of the electric field between the two plates shown in **Figure 26**?

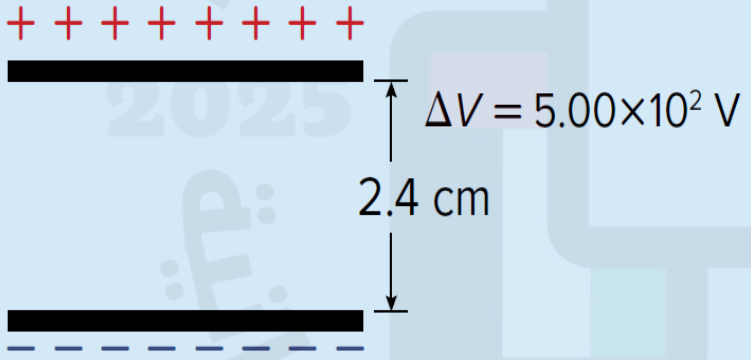
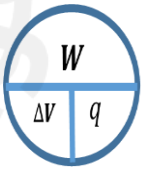


Figure 26

$$E = \frac{\Delta V}{d} = \frac{500}{0.024} = 20833 N/C$$



50. An electron in an old television picture tube passes through a potential difference of 18,000 V. How much work is done on the electron as it passes through that potential difference?

$$W = q\Delta V$$
$$W = 1.6 \times 10^{-19} c \times 18000$$
$$= 2.88 \times 10^{-15} j$$

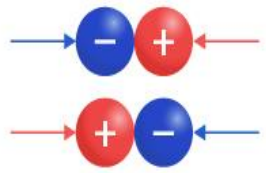
51. The electric field in a particle accelerator has a magnitude of 4.5×10^5 N/C. How much work is done to move a proton 25 cm through that field?

$$\Delta V = Ed$$
$$\Delta V = 4.5 \times 10^{35} \times 0.25 = 112500V$$
$$W = q\Delta V$$
$$W = 1.6 \times 10^{-19} c \times 112500$$
$$= 1.8 \times 10^{-14} j$$

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

11	1. Use vector addition to calculate the net force on a charge due to other point charges. 2. Solve problems involving the electrostatic force acting on charged particles by making use of Coulomb's Law.	Student Book	P.(59-62)
		Q.(15-17, 22-23)	P.63

unlike charges: force of attraction



الشحنات الكهربائية المختلفة تتجاذب

Coulomb's Law

$$F_e = k\frac{|q_A q_B|}{r^2}$$

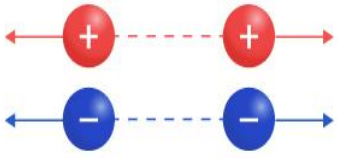
F_e = Electrostatic force (Newton N)

K = Coulomb's constant ($K = 9 \times 10^9$ $N.m^2/c^2$)

$q_A q_B$ = charges (coulomb C)

r = Distance between charges (m)

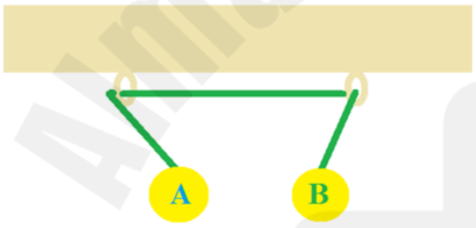
like charges: force of repulsion



الشحنات الكهربائية المتشابهة تتنافر

In the figure, two isolated bodies (A and B) are suspended freely. Which of the following can be correct about the charge type on the two bodies?

يبين الشكل جسمين (A و B) معزولين معلقين بشكل حر، أي مما يلي قد يكون صحيحا بشأن شحنة الجسمين ؟



	A	B
1	موجبة positive	موجبة positive
2	سالبة negative	موجبة positive
3	سالبة negative	سالبة negative
4	متعادلة neutral	متعادلة neutral

Which of the diagrams shown in the adjacent figures is correct to show the electric force between the two charges

أي مخطط من المخططات الظاهرة في الأشكال المجاورة صحيح ليوضح القوة الكهربائية بين الشحنتين

1	
2	
3	
4	

Two charges, $q_A = -3.0 \times 10^{-6}$ C and $q_B = 4.0 \times 10^{-6}$ C

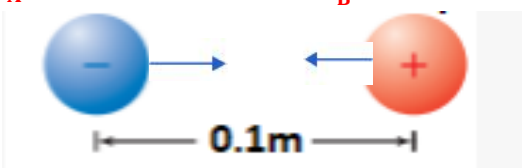
at 0.1m apart each other with a force of Attraction

What is the electrostatic force?

Remember, $K = 9.0 \times 10^9$ $N.m^2/C^2$

$$F_e = k\frac{|q_A q_B|}{r^2}$$

$q_A = -3.0 \times 10^{-6}$ C $\quad q_B = 4.0 \times 10^{-6}$ C



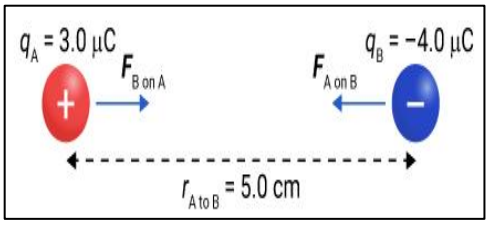
$$F = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.1^2}$$

$F = 10.8$ N Attraction تجاذب

Two charges, q_A = 3.0 µC and q_B = -4.0 µC

at 5.0 cm apart each other with a force of Attraction

What is the electrostatic force?



Remember, K = 9.0×10^9 $N.m^2/C^2$

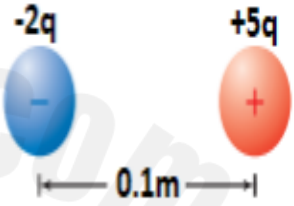
Remember ميكرو كلوم µC × 10^{-6} = كولوم C

سنتيمتر cm ÷ 100 = متر m

$$F_e = k\frac{|q_A\, q_B|}{r^2} \qquad F = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.05^2}$$

$F = 43.2$ N Attraction تجاذب

According to the figure, the force acting between the two charged balls is (



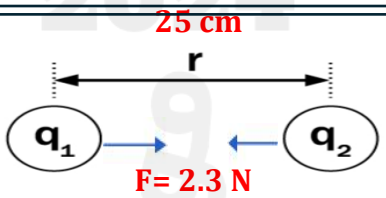
$$F_e = k\frac{|q_A\, q_B|}{r^2} \qquad 0.28 = \frac{9.0 \times 10^9 \times 2q \times 5q}{0.05^2} \qquad q = 1.76 \times 10^{-7}\ c$$

positive charge = 5q = $5 \times 1.76 \times 10^{-7}$ c = 8.8×10^{-7} c

negative charge = 2q = $2 \times 1.76 \times 10^{-7}$ c = 3.5×10^{-7} c

An electrostatic force of attraction of 2.3 N acts on two charged spheres with their centers 25 cm apart. One sphere has a charge of 4 µC,

what is the charge of the second sphere?



Remember, K = 9.0×10^9 $N.m^2/C^2$

Remember ميكرو كلوم µC × 10^{-6} = كولوم C

سنتيمتر cm ÷ 100 = متر m

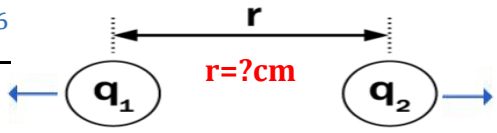
$$F = \frac{kq_1q_2}{r^2}$$

$q_1 = 4.0 \times 10^{-6}$ C q_2 = ? C

شحنة كل من الكرتين

$$F_e = k\frac{|q_A\, q_B|}{r^2} \qquad 2.3 = \frac{9.0 \times 10^9 \times 4.0 \times 10^{-6} \times q_2}{0.25^2} \qquad q_2 = 3.99 \times 10^{-6}\ c$$ negative

$$F_e = k\frac{|q_A\, q_B|}{r^2} \qquad 2.3 = \frac{9.0 \times 10^9 \times 4.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.\, r^2}$$

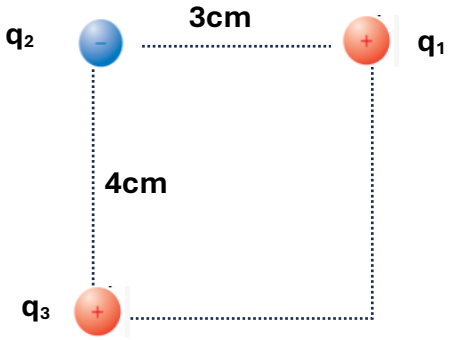


$r = 0.25$ m

$$F = \frac{kq_1q_2}{r^2}$$

$q_1 = 4.0 \times 10^{-6}$ C $q_2 = 4.0 \times 10^{6}$

Which of the following arrows shows the correct direction of the net force on the charge Q_2?



a) 

B) 

c) 

d) 

q_1 = 3.0 μC and q_2 = -4.0 μC and q_2 = 3.0 μC calculate $F_{net\ on\ q_2}$

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

$$F_{12} = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.03^2} = 120\ N \quad +X$$

$$F_{32} = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.04^2} = 67.5\ N \quad -Y$$

$$F_{net} = \sqrt{F_x^2 + F_y^2}$$

$$F_{net} = \sqrt{120^2 + 67.5^2}$$

$$F_{net} = 138N$$

$$\theta = tan^{-1}\left(\frac{y}{x}\right)$$

$$= tan^{-1}\left(\frac{67.5}{120}\right)$$

$$\theta = 29^0$$

$$\theta = 360^0 - 29^0 = 331^0 \text{ with +x}$$

q_1 = 3.0 μC and q_2 = -4.0 μC and q_2 = 3.0 μC

calculate $F_{net\ on\ q_2}$

$$F_{12} = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.03^2} = 120\ N \quad +X$$

$$F_{32} = \frac{9.0 \times 10^9 \times 3.0 \times 10^{-6} \times 4.0 \times 10^{-6}}{0.04^2} = 67.5\ N \quad -X$$

$$F_{net} = 120 - 67.5 = 52.5 \quad +X$$

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

12	1. State and apply Coulomb's law to charges separated by finite distances. 2. Conduct an experiment to demonstrate charging of objects and the electrostatic force between charged objects.	Student Book	P.(59-62)
		Physics Challenge, Q.(9-17, 22-23)	P.(62-63)

EXAMPLE Problem 1

COULOMB'S LAW IN TWO DIMENSIONS Sphere A, with a charge of +6.0 μC, is located near another charged sphere, B. Sphere B has a charge of −3.0 μC and is located 4.0 cm to the right of A.

a. What is the force of sphere B on sphere A?

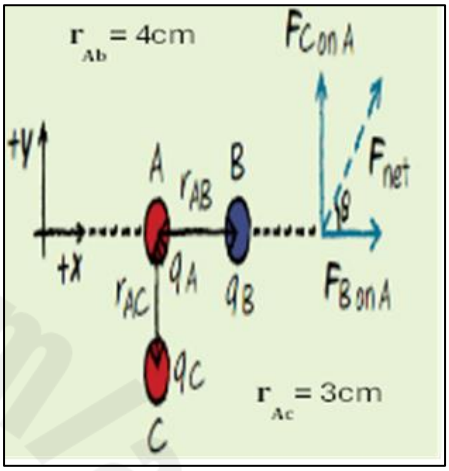
b. A third sphere, C, with a +1.5-μC charge, is added. If it is located 3.0 cm directly beneath A, what is the new net force on sphere A?

$q_A = +6.0\ \mu C$ and $q_B = -3.0\ \mu C$ and $q_C = 1.5\ \mu C$ $r_{Ab} = 4cm$ $r_{Ac} = 3cm$

1- **calculate $F_{B\ on\ A}$ & $F_{C\ on\ A}$**

2- **calculate F_{net} on A**

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



$$F_{BA} = \frac{9.0 \times 10^9 \times 6.0 \times 10^{-6} \times 3.0 \times 10^{-6}}{0.04^2} = 101\ N \quad +X$$

$$F_{CA} = \frac{9.0 \times 10^9 \times 6.0 \times 10^{-6} \times 1.5 \times 10^{-6}}{0.03^2} = 90\ N \quad +Y$$

$$F_{net} = \sqrt{F_x^2 + F_y^2}$$

$$F_{net} = \sqrt{101^2 + 90^2}$$

$$F_{net} = 135N$$

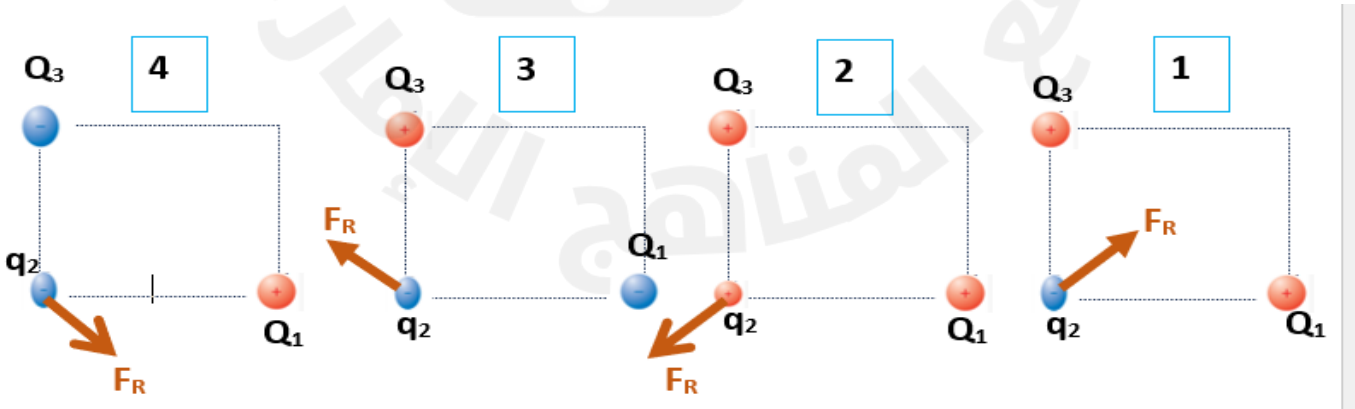
$$\theta = tan^{-1}\left(\frac{y}{x}\right)$$

$$= tan^{-1}\left(\frac{90}{101}\right)$$

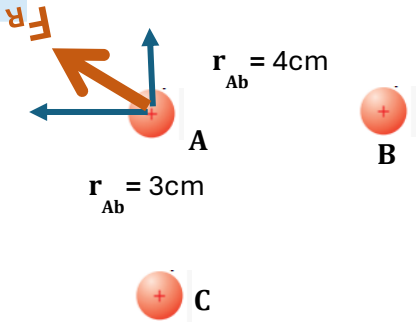
$$\theta = 42^0 \text{ with +x}$$

وضعت ثلاث شحنات كما في الرسم التالي حدد على كل الأشكال اتجاه محصلة القوة الكهربائية على الشحنة q_2

Three charges are placed as in the following diagram. Determine on all shapes the direction of the net electric force on the charge q_2



11. Suppose you replace the charge on B in Example Problem 1 with a charge of +3.00 μC. Diagram the new situation, and find the net force on A.



q_A = +6.0 µC and q_B = 3.0 µC and q_C = 1.5 µC

1- calculate $F_{B\ on\ A}$ & $F_{C\ on\ A}$

2- calculate F_{net} on A

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

$$F_{BA} = \frac{9.0 \times 10^9 \times 6.0 \times 10^{-6} \times 3.0 \times 10^{-6}}{0.04^2} = 101\ N \quad -X$$

$$F_{CA} = \frac{9.0 \times 10^9 \times 6.0 \times 10^{-6} \times 1.5 \times 10^{-6}}{0.03^2} = 90\ N \quad +Y$$

$$F_{net} = \sqrt{F_x^2 + F_y^2}$$

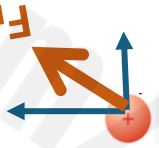
$$F_{net} = \sqrt{101^2 + 90^2}$$

$$\theta = tan^{-1}\left(\frac{y}{x}\right)$$

$$= tan^{-1}\left(\frac{90}{101}\right)$$

$$\theta = 42^0$$

$F_{net} = 135N$



$\theta = 180^0 - 42^0 = 138^0$ with +x

12. Describe how the electrostatic force between two charges changes when the distance between those two charges is tripled.

$$F_e = k\frac{|q_1 q_2|}{r^2} \qquad \frac{F_2}{F_1} = \frac{r_1^2}{r_2^2}$$

When distance between two charges is doubled the force will be decrease to $\frac{1}{4}F$

$$\frac{F_2}{F_1} = \frac{r_1^2}{r_2^2} \qquad \frac{F_2}{F_1} = \frac{1^2}{2^2} \qquad F_1 = 4F_2 \qquad \frac{1}{4}F_1 = F_2$$

When distance between two charges is tripled the force will be decrease to $\frac{1}{9}F$

$$\frac{F_2}{F_1} = \frac{r_1^2}{r_2^2} \qquad \frac{F_2}{F_1} = \frac{1^2}{3^2} \qquad F_1 = 9F_2 \qquad \frac{1}{9}F_1 = F_2$$

The electric force between two charges is 90 N what the force when the distance is tripled

a) 90 N **b) 10N**

c) $\frac{1}{9}$ **N** d) 3 N

قوة التنافر بين شحنتين هي 2700 N والمسافة بين الشحنتين r إذا زادت المسافة بين الشحنتين ثلاثة أضعاف 3r

كم تصبح القوة بين الشحنتين؟

The force of repulsion between two charges is 2700 N and the distance between the two charges is r if the distance between the two charges is increased three times 3r

What is the force between the two charges?

d) 2700 N C) 7100 N **b) 300 N** 900 N (a

قوة التنافر بين شحنتين هي 2400 N والمسافة بين الشحنتين r إذا زادت المسافة بين الشحنتين أربعة أضعاف 4r

كم تصبح القوة بين الشحنتين؟

The force of repulsion between two charges is 2700 N and the distance between the two charges is r if the distance between the two charges is increased three times 3r

What is the force between the two charges?

d) 150 N C) 7100 N b) 300 N 900 N (b

قوة التنافر بين شحنتين هي 2700 N والمسافة بين الشحنتين r إذا أنقصت المسافة بين الشحنتين إلى الثلث اف $\frac{r}{3}$

كم تصبح القوة بين الشحنتين؟

The force of repulsion between two charges is 2700 N, and the distance between the two charges is r, if the distance between the two charges is reduced to one-third, r/3.

?What is the force between the two charges

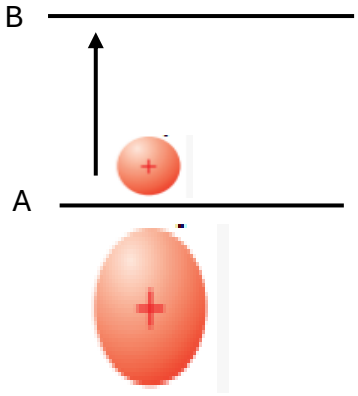
d) 2700 N C) 7100 N b) 300 N **24300** N (a

فرق الجهد بين نقطتين في مجال كهربائي منتظم يساوي (500V) والمسافة بين النقطتين(2.5cm)
ما شدة المجال بين النقطتين؟

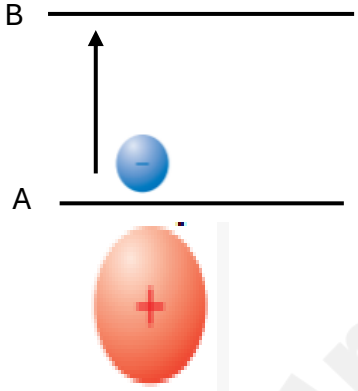
The potential difference between two points in a regular electric field is equal to (500V) and the distance between the two points is (2.5cm)
What is the field strength between the two points?

Known $\Delta V = 500\ V$ $d = 2.5\ cm = 0.025\ m$
Unknown $E = ?\ N/C$

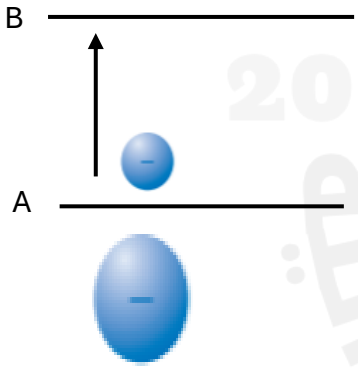
$$E = \frac{\Delta V}{d} = \frac{500}{0.025} = 20000\ \ V/m = 20000\ \ N/C$$



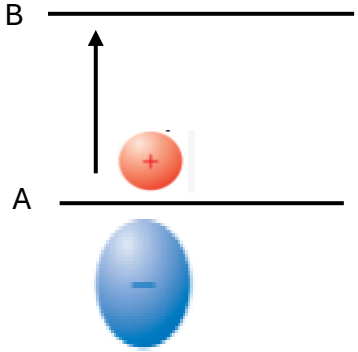
	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
A	موجب positive	موجب positive
B	سالب negative	موجب positive
C	موجب positive	سالب negative
(d)	سالب negative	سالب negative



	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
A	موجب positive	موجب positive
(B)	سالب negative	موجب positive
C	موجب positive	سالب negative
d	سالب negative	سالب negative



	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
A	موجب positive	موجب positive
B	سالب negative	موجب positive
(C)	موجب positive	سالب negative
d	سالب negative	سالب negative



	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
(A)	موجب positive	موجب positive
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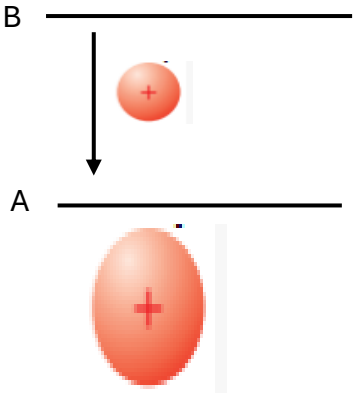
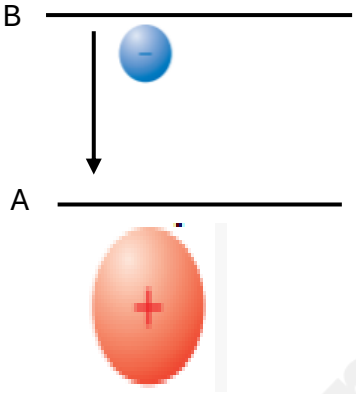
d	سالب negative	سالب negative



	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
(A)	موجب positive	موجب positive
B	سالب negative	موجب positive
C	موجب positive	سالب negative
d	سالب negative	سالب negative



	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
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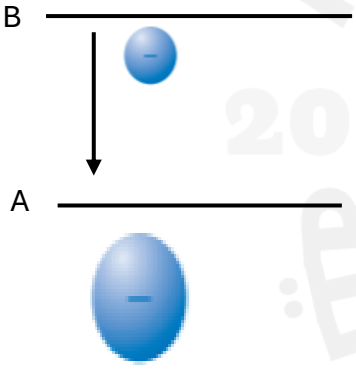
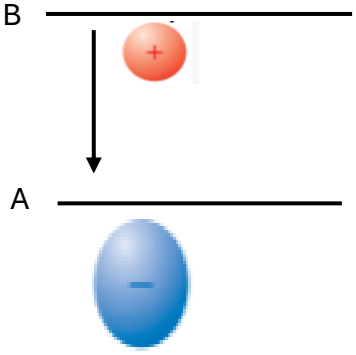


	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
A	موجب positive	موجب positive
(B)	سالب negative	موجب positive
C	موجب positive	سالب negative
d	سالب negative	سالب negative

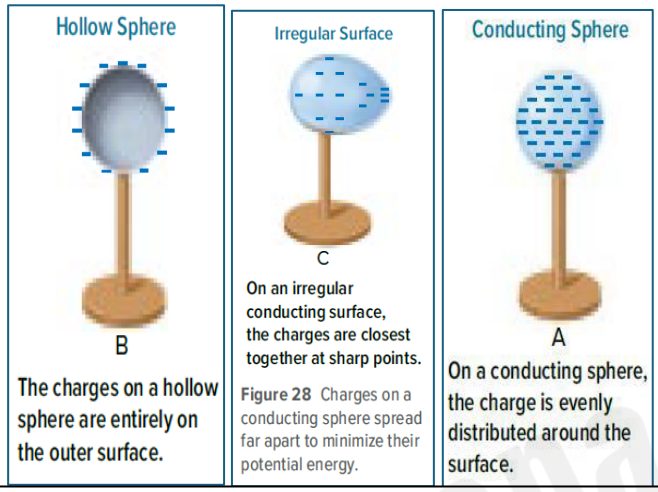


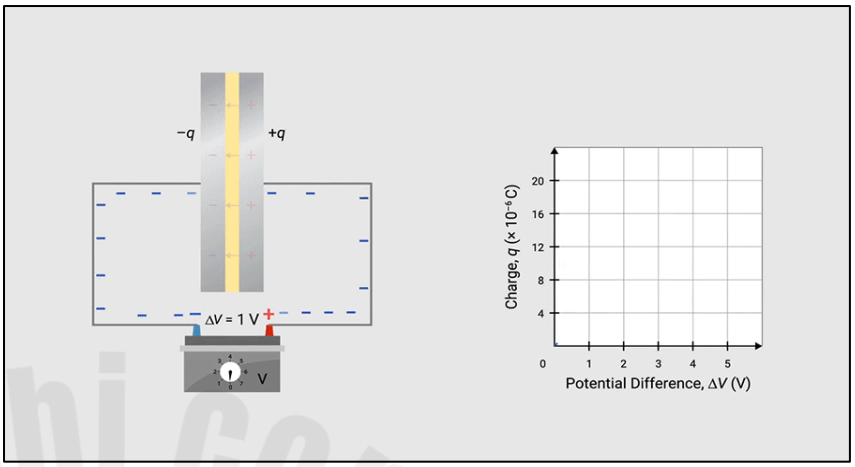
	التغير في فرق الجهد Change in potential difference.	التغير في طاقة الوضع Change in potential energy
A	موجب positive	موجب positive
B	سالب negative	موجب positive
C	موجب positive	سالب negative
(d)	سالب negative	سالب negative

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

13	1. Explain how electric charges are distributed on a spherical conductor, and the effect of this on both the electric field and the electric potential. 2. Explain the meaning of equipotential.	Student Book Figure 28; Q. 61	P.78 P.80

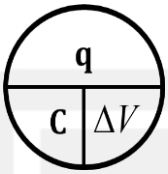
https://phet.colorado.edu/en/simulation/capacitor-lab-basics

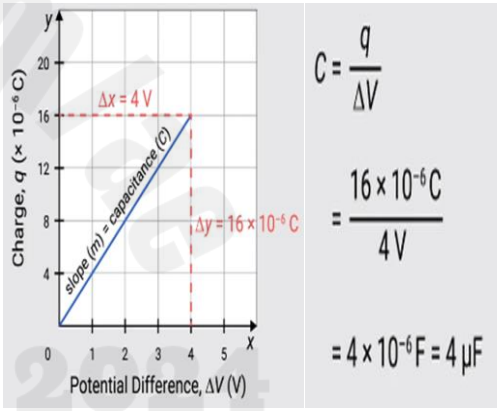




A capacitor is a device that stores electric potential energy in an electric field

Physics quantity	symbol	unit
charge	q	C كولوم
potential difference	ΔV	Vفولت
Capacitance	C	F فاراد



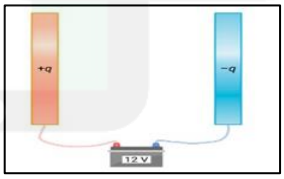


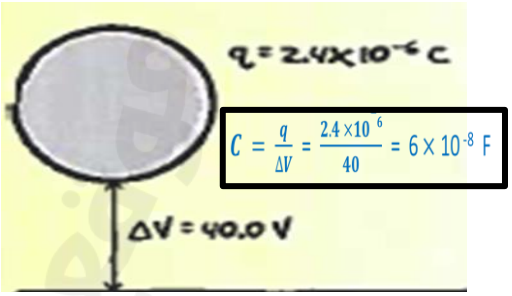
Capacitance is a scalar quantity that is constant for each capacitor. If the potential difference is increased, the amount of charge in the plates increases; the capacitance stays the same.

Two plates are connected to a 12V battery as shown. If the capacitor has a charge of 25 µC, what is the capacitance of this capacitor?

a) 4.8 µF
b) 2.1 µF
c) 0.48 MF
d) 2.1 MF

$C = \frac{q}{\Delta V} = \frac{25 \times 10^{-6}}{12} = 2.1 \times 10^{-6}\ F$





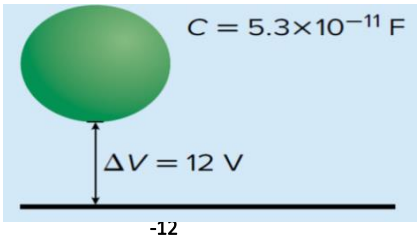
A capacitor is connected to a 12V battery. If the capacitor has a capacitance of 5.0 µF what is the charge?

$$q = C \times \Delta V$$
$$= 5 \times 10^{-6} \times 12 = 6 \times 10^{-5} C$$

Two plates are connected to a 3V battery as shown. If the capacitor has a charge of 10 µC, what is the capacitance of this capacitor?

a) 0.3 MF
b) 0.3 MF
c) 3.0 µF
d) 3.0 MF

what is the net charge on the sphere?



a) 4.42×10^{-12} C
b) 6.36×10^{-6} C
c) 4.42×10^{-6} C
d) 6.36×10^{-10} C

كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

14	Describe Millikan's oil-drop experiment and explain how it confirms that charge exists in discrete amounts, which are integral multiples of the elementary charge.	Student Book	P.(76-77)
		Q.(53-56); Q.66	P.81

الكمية الفيزيائية	الرمز	وحدة القياس
الوزن Weight Downward force $F_g = m\,g$	F_g	نيوتن N
القوة الكهربائية Electric force Upward force $F_e = q\,E = q\,\frac{\Delta V}{d}$	F_e	نيوتن N

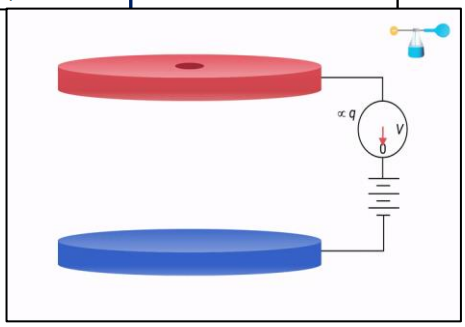
m mass in unit Kg
g = 9.81 N/Kg
الوزن $F_g = m\,g$
$F_g = q\,E$

$\downarrow F_g = F_e \uparrow$

$m\,g = q\,E$

The number of excess electrons

$N = \frac{q}{1.602\times10^{-19}\,C}$



$E = \frac{\Delta V}{d} = \frac{184}{0.0150} = 12000 N/C$

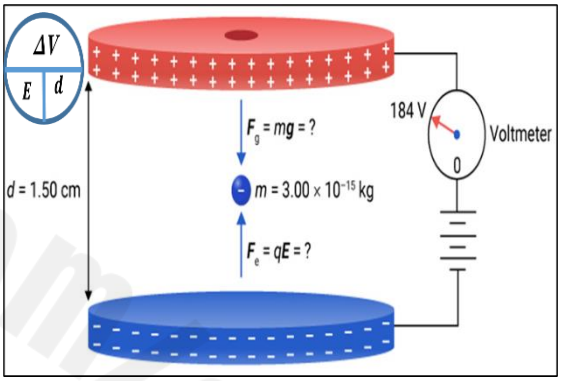
$F_g = m\,g$

$= 3.00\times10^{-15}\times 9.81$

$= 2.9\times10^{-14}\,N$

$\downarrow F_g = \uparrow F_e = 2.9\times10^{-14}\,N$

m	3.00×10^{-15} Kg
ΔV	184V
d	1.50 cm=0.0150m
E	?
F_g	?
q	?
N	?



$F_g = q\,E$

$2.9\times10^{-14}\,N = q\times 12000$

$q = \frac{2.9\times10^{-14}\,N}{12000 N/C} = 2.4\times10^{-18}\,C$

The number of excess electrons

$N = \frac{2.4\times10^{-18}\,C}{1.602\times10^{-19}\,C} = 15$ electrons

53. A drop is falling in a Millikan oil-drop apparatus with no electric field. What forces are acting on the oil drop, regardless of its acceleration? If the drop is falling at a constant velocity, describe the forces acting on it.

1-Weight (Downward force) $F_g = m\,g$

2- Electric force (Upward force) $F_e = qE = q\,\frac{\Delta V}{d}$

54. An oil drop weighs 1.9×10^{-15} N. You suspend it in an electric field of 6.0×10^{3} N/C. What is the net charge on the drop? How many excess electrons does it carry?

$F_g = qE$

$1.9\times10^{-15} = q\times 6.0\times10^{3}$

$q = 3.2\times10^{-19} c$

$N = \frac{3.2\times10^{-19} c}{1.6\times10^{-19} c}$

N=2 electrons

55. An oil drop carries one excess electron and weighs 6.4×10^{-15} N. What electric field strength do you need to suspend the drop so it is motionless?

$F_g = qE$

$6.4\times10^{-15} = 1.6\times10^{-19}\times E$

$E = 40000 N/C$

The negatively charged oil drop has a weight $Fg = 2.0\times10^{-15}\,N$ it suspended with electric field $E = 6.24\times10^{2}$ N/C How many number of excess electrons?

a) 10 b) 30

c) 20 d) 40

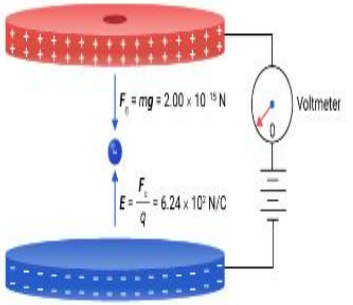
$F_g = qE$

$2.9\times10^{-15} = q\times 6.24\times10^{3}$

$q = 3.2\times10^{-18} c$

$N = \frac{3.2\times10^{-18} c}{1.6\times10^{-19} c}$

N=20 electrons

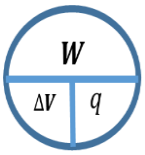


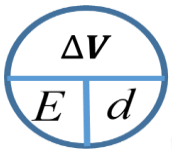
كمال عبد العظيم	EOT Exam 10A	مدرسة بو كرية

15	1. Define capacitance as the ratio of the net charge on one plate of a capacitor to the potential difference across the plates, and it is measured in Farads. 2. Apply the equation for capacitance to solve numerical problems.	Student Book	P.(79-81)
		Q.(57-62, 68)	P.(80-81)

unit	symbol	الكمية الفيزيائية
c	q	الشحنة الكهربائية Electric charge
v	v	فرق الجهد الكهربائي potential difference
m	d	المسافة distance
N/C	E	المجال الكهربائي Electric field
N	F	القوة الكهربائية Electric force
J	W	الشغل Work
J	U	طاقة الوضع الكهربائية EPE
F	C	Capacitance

$W = F \times d$





1- Electric charge is measured in units

a- newton **b- coulomb** c- newton/coulomb d- volt

2- Electric force is measured in units

a- newton b- coulomb c- newton/coulomb d- volt

3- Electric field is measured in units-

a- newton b- coulomb **c- newton/coulomb** d- volt

4 - Electric potential difference is measured in units

a- newton b- coulomb c- newton/coulomb **d- volt**

5- Work and electric potential energy are measured in units

a- newton b- coulomb **c- joule** d- volt

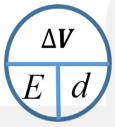
6- Capacitance is measured in units

a- newton **b- Farad** c- joule d- volt

Electric field is measured in units N/C it equivalents to

a) j/c b) q/v

c) N.m **d) v/m**

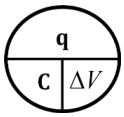


Electric potential difference is measured in units V it equivalents to

a) j/c b) q/v

c) N.m d) v/m

Capacitance is measured in units F it equivalents to



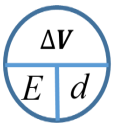
a) j/c **b) q/v**

c) N.m d) v/m

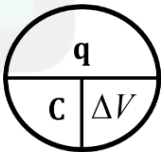
Electric field is measured in units

a) N/C b) q/v

c) N.m **d) v/m**



57. A 27-μF capacitor has an electric potential difference of 45 V across it. What is the amount the net charge on the positively charged plate of the capacitor?



$q = C\Delta V$

$q = 45 \times 27 \times 10^{-6} = 1.2 \times 10^{-3}\, C$

58. Suppose you connect both a 3.3-μF and a 6.8-μF capacitor across a 24-V electric potential difference. Which capacitor has the greater net charge on its positively charged plate, and what is its magnitude?

$q_1 = C_1\Delta V$

$q_1 = 3.3 \times 10^{-6} \times 24$

$q_1 = 7.9 \times 10^{-5}\, C$

$3.3\mu F < 6.8\mu F$

$q_2 = C_2\Delta V$

$q_1 = 6.8 \times 10^{-6} \times 24$

$q_1 = 1.6 \times 10^{-4}\, C$

60. Suppose that you apply an electric potential difference of 6.0 V across a 2.2-μF capacitor. What does the magnitude of the net charge on one plate need to be to increase the electric potential difference to 15.0 V?

$q_1 = C\Delta V1$

$q_1 = 2.2 \times \times 10^{-6} \times 6.0$

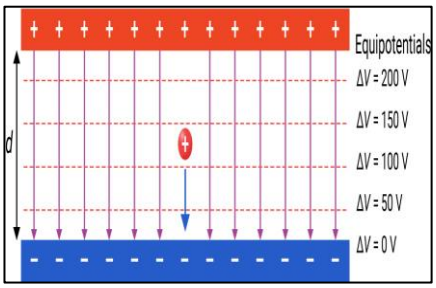
$= 1.3 \times 10^{-5}\, C$

$q_2 = C\Delta V2$

$q_2 = 2.2 \times \times 10^{-6} \times 15.0$

$= 3.3 \times 10^{-5}\, C$

$\Delta q = 3.3 \times 10^{-5} - 1.3 \times 10^{-5} = 2.0 \times 10^{-5}\, C$



1-المجال المنتظم يمكن الحصول عليه من لوحين متوازيين أحداهما مشحون بشحنة موجبة والآخر مشحون بشحنة سالبة

It can be obtained from two parallel plates, one with a positive charge and the other with a negative charge

2- تتجه خطوط المجال الكهربائي من اللوح الموجب (الأعلى جهد) إلى اللوح السالب (الأقل جهدا)

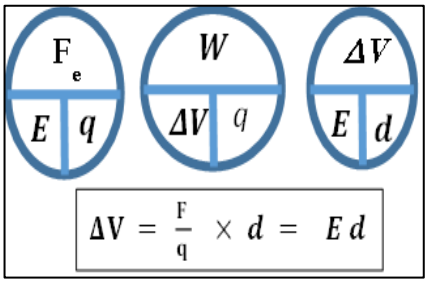
The electric field lines run from the positive (highest voltage) plate to the negative (lowest voltage) plate.

3- المسافات بين خطوط المجال متساوية

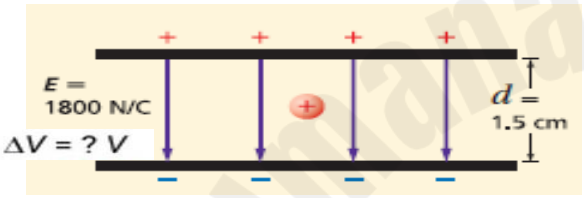
The distances between the field lines are equal

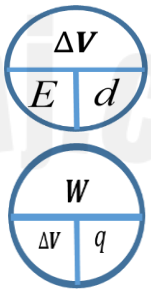
4- قيمة المجال الكهربائي في المجال المنتظم ثابتة

The value of the electric field in a regular field is constant



The charge of proton $=1.6 \times 10^{-19} c$





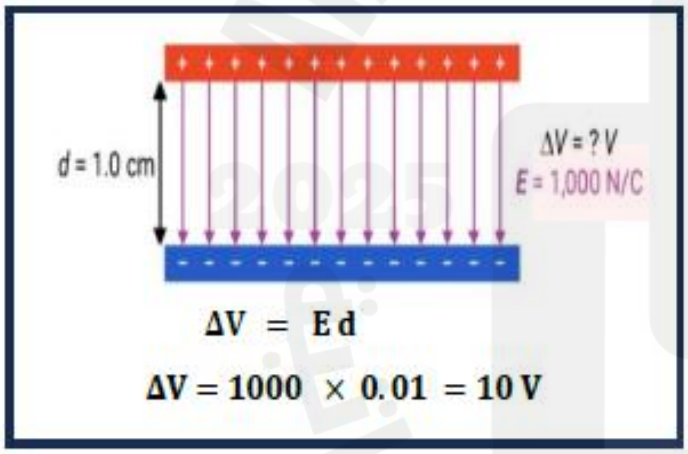
$\Delta V = Ed$

$\Delta V = 1800 \times 0.015 = 27V$

$W = q\Delta V$

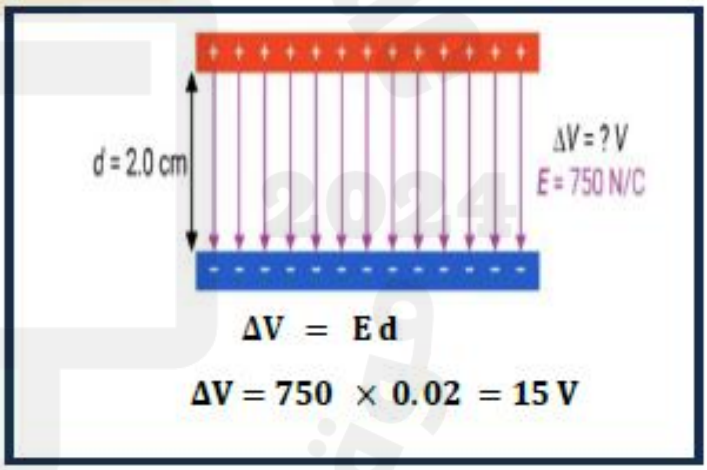
$W = 1.6 \times 10^{-19} c \times 27$

$= 4.3 \times 10^{-18} j$



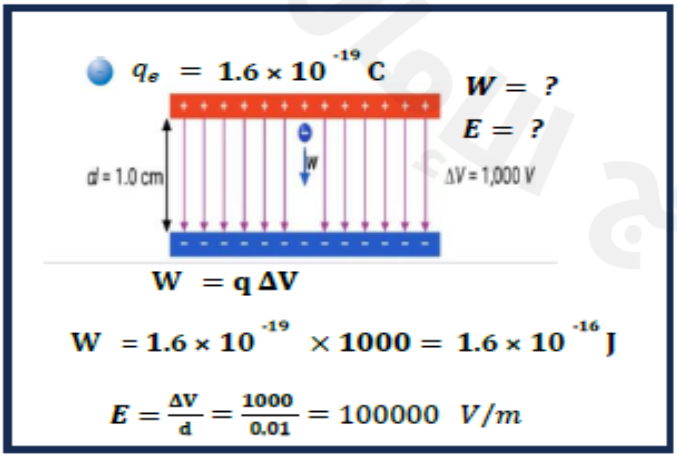
$\Delta V = Ed$

$\Delta V = 1000 \times 0.01 = 10\,V$



$\Delta V = Ed$

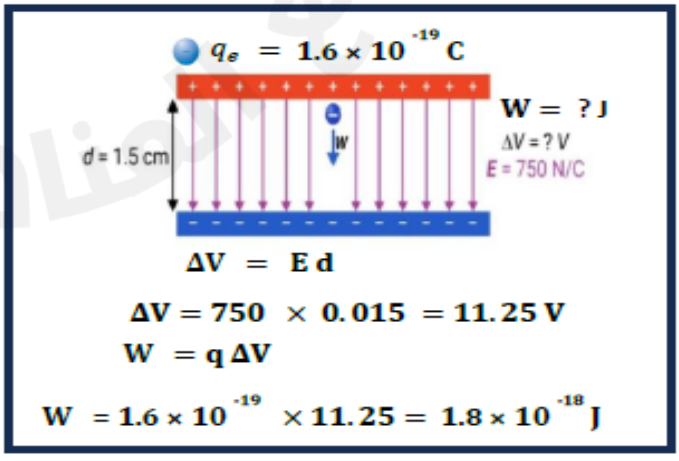
$\Delta V = 750 \times 0.02 = 15\,V$



$W = q\Delta V$

$W = 1.6 \times 10^{-19} \times 1000 = 1.6 \times 10^{-16}$ J

$E = \frac{\Delta V}{d} = \frac{1000}{0.01} = 100000\ V/m$



$\Delta V = Ed$

$\Delta V = 750 \times 0.015 = 11.25\,V$

$W = q\Delta V$

$W = 1.6 \times 10^{-19} \times 11.25 = 1.8 \times 10^{-18}$ J

Q1	1. Determine wave properties such as wavelength, period, frequency, amplitude, and speed using a graphical or a visual representation of a periodic mechanical wave. 2. Explain that transverse and longitudinal waves transfer energy without transferring matter during their propagation.	Student Book	P.(10-14); P.9
		Q.(14-23); Q.25	P.14

Q2	1. Use the relation between resonance length and wavelength to solve problems for closed and open pipes. 2. Define sound pitch and relate it to the frequency of a sound wave. 3. Define resonance and list some examples and consequences. 4. Explain resonance in air columns and give examples on different instruments. 5. Apply the Doppler effect equation to calculate different frequencies and velocities.	Student Book	P.29; P.37; P8; P.(30-33)
		Q.15; Q.(1-12)	P.40

Q3	1. Describe the charge distribution on a solid conducting sphere, a hollow conducting sphere and an irregular conducting surface. 2. Calculate the electric field strength at a point close a single point charge / a conducting charged sphere.	Student Book	P.(65-67), P.78
		Q.(24 - 37)	P.(66-67)

Q4	Demonstrate knowledge of electrostatic charge, differentiate materials based on their electrical conductivity, and describe the methods of electrical charging of objects.	Student Book	P.(52-58),
		Q.(2-7), Q.(18-21)	P.54; P.63

الأسئلة الموضوعية - MCQ	1	Apply the equation (T=2π√(l/g)) to calculate the period of a simple pendulum for small-angle oscillations.	Student Book	P.(7-8)
			Q.(5-8 & 11)	P.8
	2	Apply Hooke's law to calculate the force exerted by a spring, the spring constant, or the distance by which a spring is stretched or compressed.	Student Book	P.(4-6)
			Q.(1-4)	P.6
	3	Sketch snapshots for the superposition of two overlapping wave pulses (same wavelength) traveling in opposite directions showing the resultant wave.	Student Book	P.(16-17)
			Q.31	P.20
	4	Differentiate between transverse, longitudinal, and surface waves and give examples.	Student Book	P.(9-10)
			Q.(25-27)	P.14
	5	Explore through an experiment, like using a number of musical instruments, the perception of sound depending on its different physical quantities like amplitude and frequency, and relate them to loudness and pitch.	Student Book	P. (29-30)
			Q.6	P.33
	6	Describe the sound level and define the decibel (dB) as a unit of measuring sound level.	Student Book	P.(29-30)
			Figure 4	P.30
	7	Explore the meaning of resonance and understand how musical instruments work.	student Book	P.(35-40)
			Q.(13-16)	P.40
	8	Discuss sound quality, and explain beats.	Student Book	P. (41-42)
			Figure 17 & 18; Q.22	P.44
	9	Distinguish between electrical conductors and insulators giving typical examples	Student Book	P. (53-54)
			Q. (2-4)	P.54
	10	Demonstrate an understanding that the work performed in moving a charged particle in an electric field can result in the particle gaining electric potential energy or kinetic energy or both.	Student Book	P. (74 - 75)
			Q.(43 - 52)	P. (74 - 75)
	11	1. Use vector addition to calculate the net force on a charge due to other point charges. 2. Solve problems involving the electrostatic force acting on charged particles by making use of Coulomb's Law.	Student Book	P.(59-62)
			Q.(15-17, 22-23)	P.63
	12	1. State and apply Coulomb's law to charges separated by finite distances. 2. Conduct an experiment to demonstrate charging of objects and the electrostatic force between charged objects.	Student Book	P.(59-62)
			Physics Challenge, Q.(9-17, 22-23)	P.(62-63)
	13	1. Explain how electric charges are distributed on a spherical conductor, and the effect of this on both the electric field and the electric potential. 2. Explain the meaning of equipotential.	Student Book	P.78
			Figure 28; Q. 61	P.80
	14	Describe Millikan's oil-drop experiment and explain how it confirms that charge exists in discrete amounts, which are integral multiples of the elementary charge.	Student Book	P.(76-77)
			Q.(53-56); Q.66	P.81
	15	1. Define capacitance as the ratio of the net charge on one plate of a capacitor to the potential difference across the plates, and it is measured in Farads. 2. Apply the equation for capacitance to solve numerical problems.	Student Book	P.(79-81)
			Q.(57-62, 68)	P.(80-81)

*	Questions might appear in a different order in the actual exam.	قد تظهر الأسئلة بترتيب مختلف في الامتحان الفعلي.
**	As it appears in the textbook, LMS, and (Main_IP).	كما وردت في كتاب الطالب وLMS والخطة الفصلية.
***	Physical units are distinctive for any physical quantity, and a distinguishing mark for it. Therefore, care must be taken to guide students by giving the appropriate physical unit for each quantity.	الوحدات الفيزيائية مميزة لاي كمية فيزيائية، وعلامة فارقة لها، لهذا يجب الاهتمام بتوجيه الطلاب باعطاء الوحدة الفيزيائية المناسبة لكل كمية.
****	Focusing on science processes (scientific thinking skills), especially basic ones.	التركيز على عمليات العلم (مهارات التفكير العلمي) وخاصة الأساسي منها.

الأسئلة المقالية - FRQ	Q1	1. Determine wave properties such as wavelength, period, frequency, amplitude, and speed using a graphical or a visual representation of a periodic mechanical wave. 2. Explain that transverse and longitudinal waves transfer energy without transferring matter during their propagation.	Student Book	P.(10-14); P.9
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	Q2	1. Use the relation between resonance length and wavelength to solve problems for closed and open pipes. 2. Define sound pitch and relate it to the frequency of a sound wave. 3. Define resonance and list some examples and consequences. 4. Explain resonance in air columns and give examples on different instruments. 5. Apply the Doppler effect equation to calculate different frequencies and velocities.	Student Book	P.29; P.37; P8; P.(30-33)
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