

QUESTION 1

Select the correct answer.

Hospital personnel must wear special conductive shoes when they work in the oxygen operating room. What is the reason behind this?



☐ If the hospital personnel did not wear special conducting shoes, nothing is going to happen.

☐ If the hospital personnel did not wear special conducting shoes, an explosion might happen in the flammable room due to the charging by induction with the floor which may lead to sparks.

☐ If the hospital personnel did not wear special conducting shoes, an explosion might happen in the flammable room due to the electromagnetic induction with the floor which may lead to sparks.

☒ If the hospital personnel did not wear special conducting shoes, an explosion might happen in the flammable room due to the friction with the floor which may lead to sparks. ✓

QUESTION 2

Select the correct answer.

What is the role of the corona wire in laser printers?

- ☐ negatively charges the surface of the mirror with electrons
- ☐ positively charges the surface of the mirror with protons
- ☐ positively charges the surface of the drum with protons
- ☒ negatively charges the surface of the drum with electrons ✓

QUESTION 3



Select the correct answer.

In order to build up a laser printer, you have to collect the materials needed first. Which of the below materials is not used in a laser printer?



- ☐ drum
- ☐ mirror
- ☒ cathode ✓

QUESTION 4



Select from the drop-down menu the best answer.

A corona wire is held at a **high voltage** ✓ ▼. Electrostatic charge is induced in the drum due to the electric field of the wire's **current** ✓ ▼.

QUESTION 5



Select the correct answer.

In laser printers, ink droplets are repelled by the charged parts of the drum. What is the charge of the ink droplets?

☐ zero charge

☒ negative ✓

☐ positive

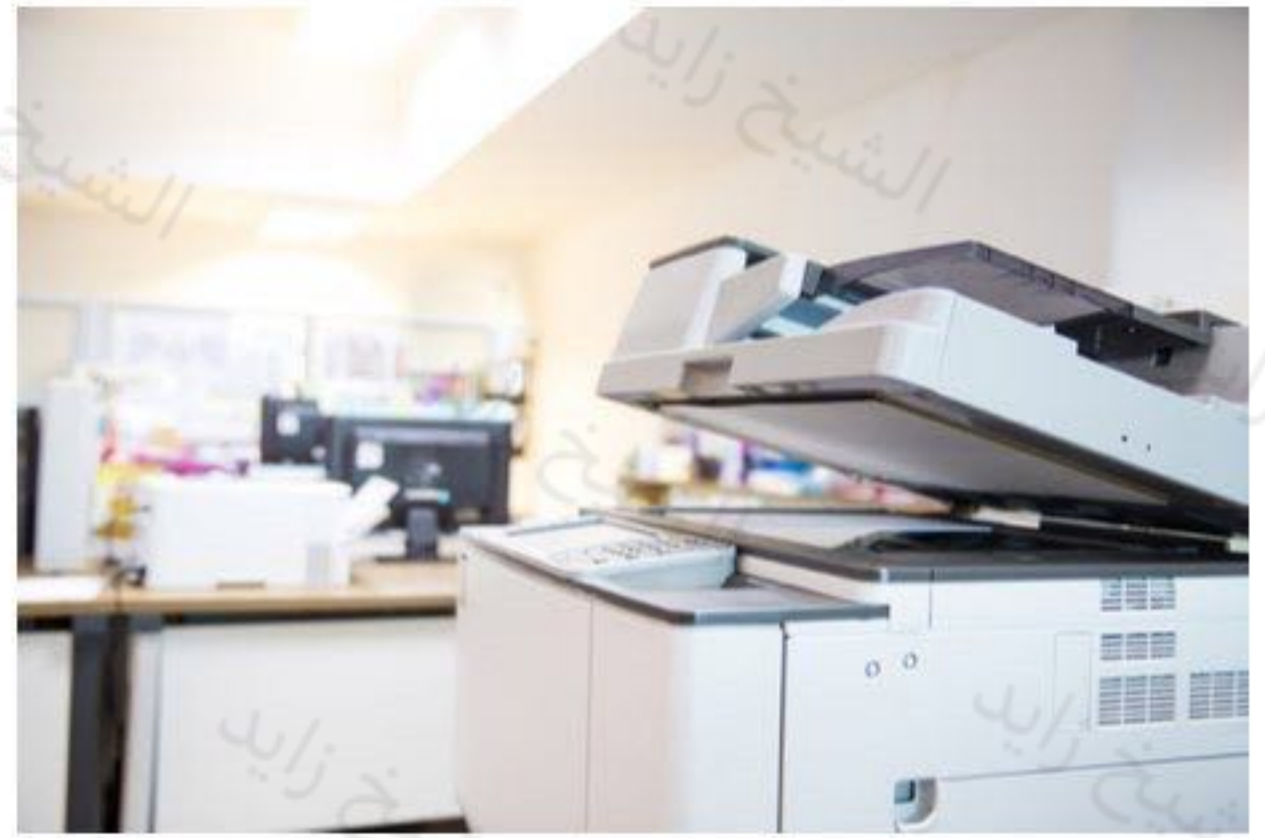
☐ neutral

QUESTION 6



Select the correct answer.

Most photocopy machines use xerography as an electrostatic process to print out some texts. Choose the best steps to produce this image.



A paper is taken from the paper tray.



The paper passes through a fuser.



The paper passes over a drum.



The fuser melts the toner on the paper.

A paper is taken from the paper tray.



The fuser melts the toner on the paper.



The paper passes over a drum.



The paper passes through a fuser.

A paper is taken from the paper tray.



The fuser melts the toner on the paper.



The paper passes through a fuser.



The paper passes over a drum.

A paper is taken from the paper tray.

→

The paper passes over a drum.

→

The paper passes through a fuser.

→

The fuser melts the toner on the paper.



QUESTION 7



Select the correct answer.

Two motors are found by Khalifa in his storehouse, one electrostatic and the other electromagnetic. Some data are written on these motors. Which of the following data best describes the electrostatic and electromagnetic motor?

$N_{\text{electrostatic}} = 100 \text{ turns}$

$N_{\text{electromagnetic}} = 3 \text{ turns}$

$I_{\text{electrostatic}} = 25 \text{ A}$

$I_{\text{electromagnetic}} = 1.0 \text{ A}$

$N_{\text{electrostatic}} = 100 \text{ turns}$

$N_{\text{electromagnetic}} = 3 \text{ turns}$

$I_{\text{electrostatic}} = 1.0 \text{ A}$

$I_{\text{electromagnetic}} = 25 \text{ A}$

$N_{\text{electrostatic}} = 3 \text{ turns}$

☒ $N_{\text{electromagnetic}} = 100 \text{ turns}$

$I_{\text{electrostatic}} = 1.0 \text{ A}$

$I_{\text{electromagnetic}} = 25 \text{ A}$

☐ $N_{\text{electrostatic}} = 3 \text{ turns}$

$N_{\text{electromagnetic}} = 100 \text{ turns}$

$I_{\text{electrostatic}} = 25 \text{ A}$

$I_{\text{electromagnetic}} = 1.0 \text{ A}$

QUESTION 8

Select the correct answer.

Khaled was exposed to

$1.4 \mu\text{Sv} / \text{h}$

for 1 year of sun radiations. What is the total cumulative dose for this year?



☐ $14000 \mu\text{Sv}$

☐ $18000 \mu\text{Sv}$

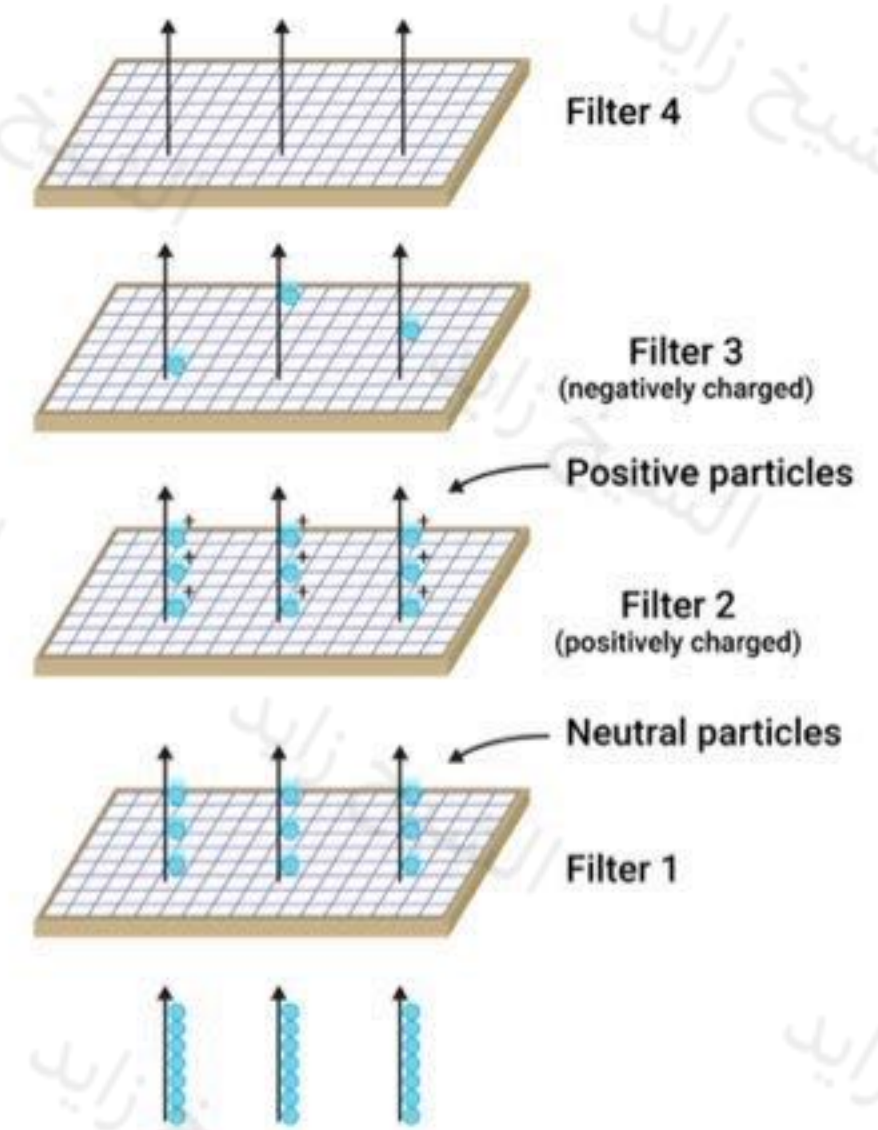
☒ $12000 \mu\text{Sv}$

☐ 16000 μSv

QUESTION 9

Select the correct answer.

Electric precipitators are used in industries to remove a high percentage of dust and gas particulates that are associated with the burning of oil and coal. How can you describe this process?



☐ Air passes through grids of the same charges. Filter number two charges the airborne particles, filter number three attracts and collects them to prevent them from continuing to the final filter.

☐ Air passes through grids of opposite charges. Filter number two charges the airborne particles, filter number three repels and spreads them to prevent them from continuing to the final filter.

☒ Air passes through grids of opposite charges. Filter number two charges the airborne particles, filter number three attracts and collects them to prevent them from continuing to the final filter. ✓

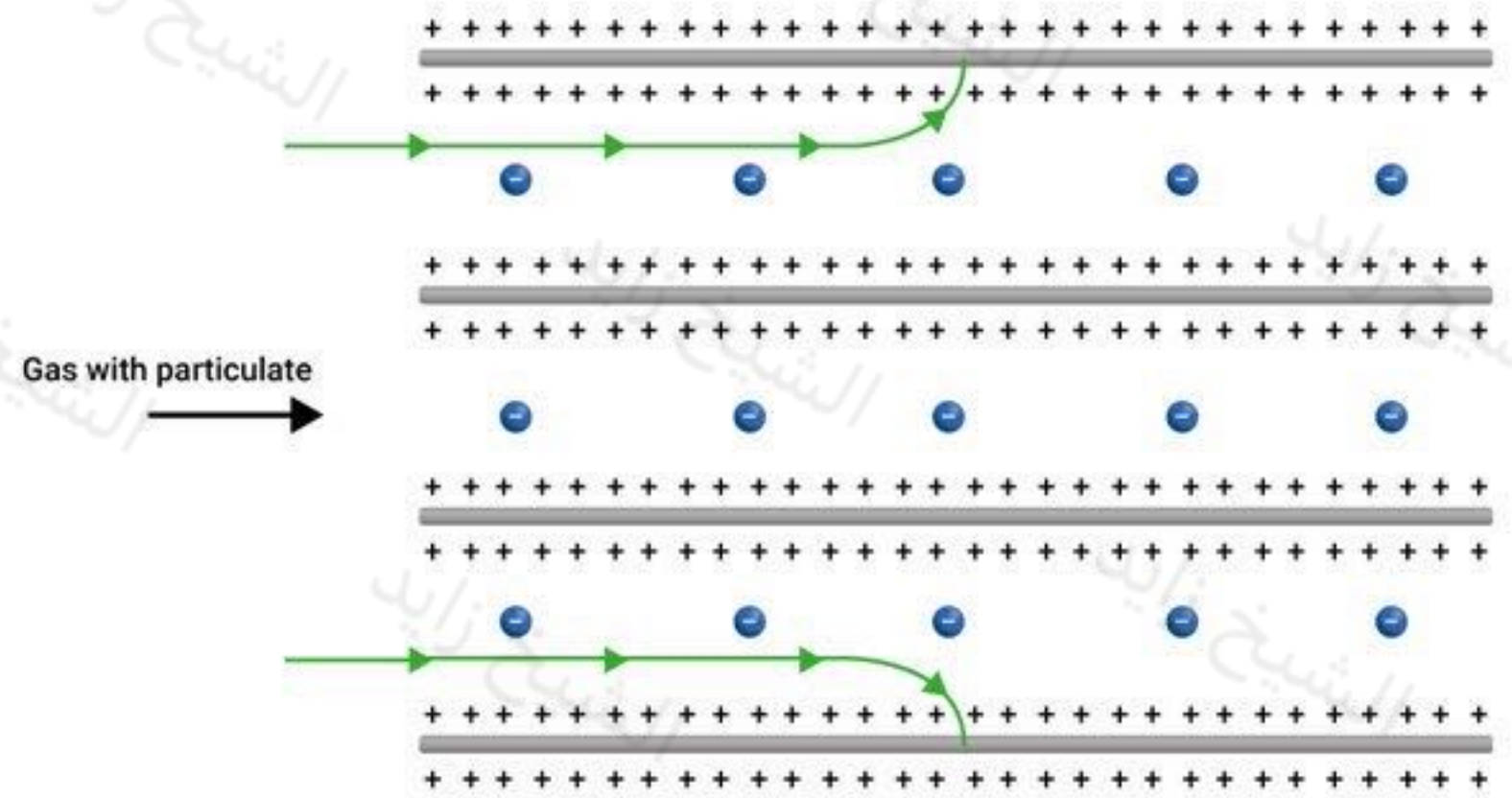
☐ Air passes through grids of opposite charges. Both filters two and three attract the airborne particles to prevent them from continuing to the final filter.

QUESTION 10



Select the best answers.

An electrostatic precipitator is usually used in coal-fired power plants. Which of the following choices best described the process of this precipitator?

☐

Second, the ashes and particulates are attracted to the neutral plates above and below it, so the ash and other particulates will stay behind.

☐

First, the gas enters the precipitator, then the ashes and particulates becomes neutral due to picking up protons from the wires.

☐

First, the gas enters the precipitator, then the ashes and particulates become positively charged due to picking up protons from the wires.

☒

First, the gas enters the precipitator, then the ashes and particulates become negatively charged due to picking up electrons from the wires.

☒

Second, the ashes and particulates are attracted to the positively charged plates above and below it, so the ash and other particulates will stay behind.

☐

Second, the ashes and particulates are attracted to the negatively charged plates above and below it, so the ash and other particulates will stay behind.

QUESTION 11

Select the best answer from the drop-down menu.

Old monitors use a cathode-ray tube inside them. When an electric current is passed through the heating element

of the cathode-ray tube, it will

heat it up ✓ ▼

This cathode-ray tube will create

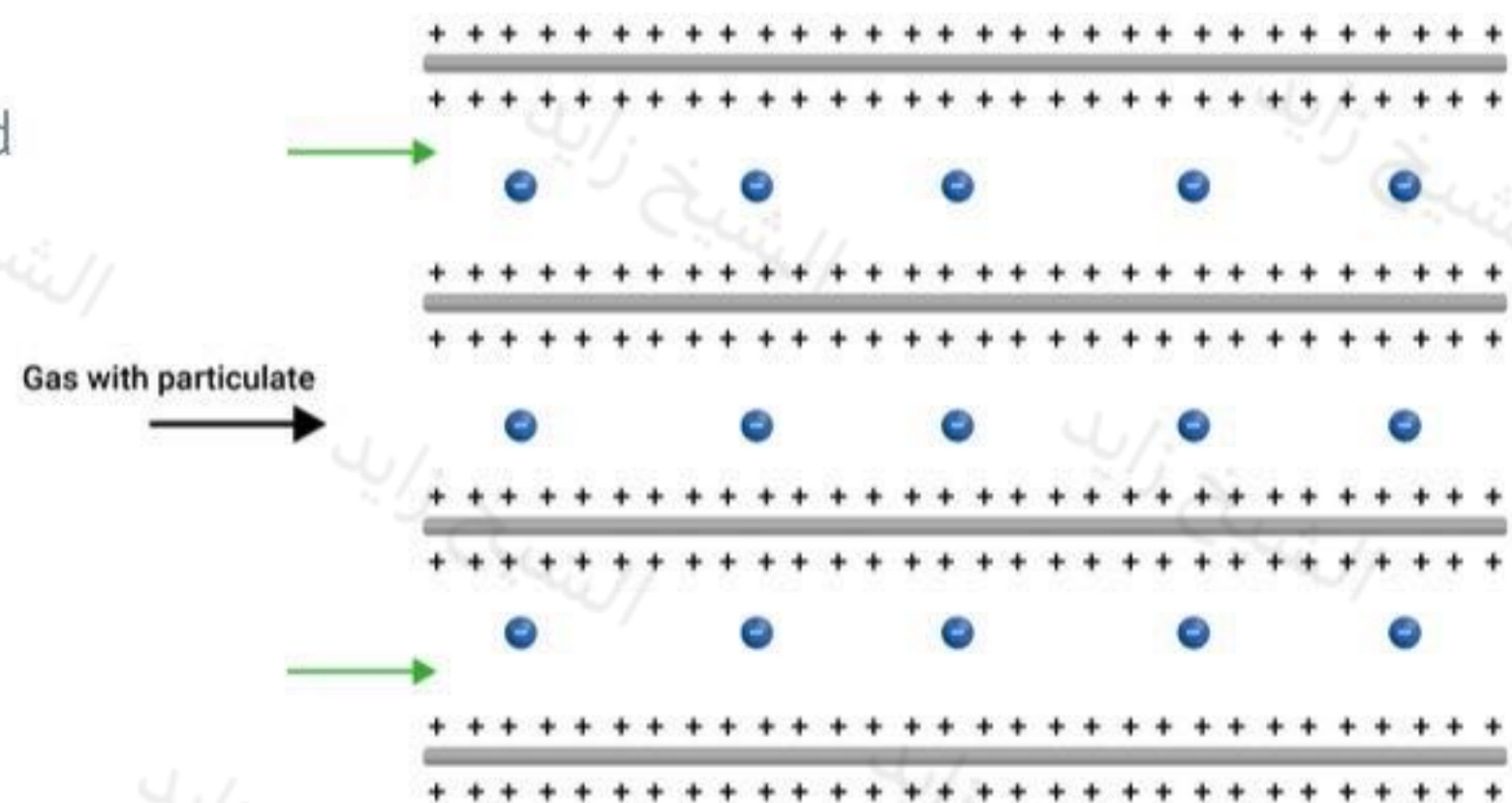
electrons ✓ ▼



QUESTION 12

Select the correct answer.

Electrostatic precipitators are used in coal-fired power plants. If gases are entered from the left side as shown in the schematic, what will be the direction of the ashes and particulates while entering the charged region?



☐ towards the exit on the right side of the precipitator

☐ towards the upper positive plate only

☐ towards the negatively charged wires

☒ towards the positively charged plates



QUESTION 13

Select from the drop-down menu the best answer.

The metal cylindrical drum of a laser printer is coated with a special photosensitive material that retains charge in the

absence of light and **discharges** quickly if the light is incident on the surface.



QUESTION 14

Select the correct answers.

Sami wants to design a tool to show to his friends. He fixes two beads at the ends of a horizontal rod as shown in the figure. The beads are separated by a distance, r , and the big bead has a charge double the small bead.

He wants to know where to put a third bead that has a charge of $+q$ and is free to move on the rod such that it experiences zero net force. If the rod represents the x -axis and the big bead represents the origin, which of the following positions will the bead reach equilibrium?



☐ $x = 0.87r$

☐ $x = 0.11 r$

☐ $x = 0.35 r$

☒ $x = 0.58 r$ ✓

QUESTION 15



Select the correct answer.

Two identical point charges each of charge

$4.1 \mu\text{C}$

are placed 18 cm apart. What is the magnitude of the electrostatic force exerted on each other?

☐ 1.1 N

☐ 2.1 N

☒ 4.7 N ✓

☐ 3.5 N