

1

An electric device with power of (2400 W) has a resistance of (5.0 Ω). What is the **potential difference** needed to operate the device ?

(Neglect the effect of temperature change)

An electrical device has a capacity of (2400W) and a resistance of (5.0 Ω). What is the amount of **electrical potential difference** required to operate the device

(neglecting the effect of temperature change)

Wherever necessary, use the following formulas

أينما لزم استخدم العلاقات التالية

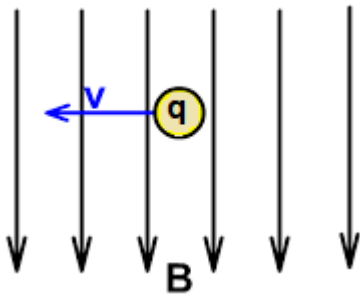
$J = \frac{i}{A}$	$i = \frac{dq}{dt}$	$i = \frac{dq}{dt} = -nev_d A$
$1 S = \frac{1}{1 \Omega}$	$\rho = \frac{E}{J}$	$\sigma = \frac{1}{\rho}$
$R = \rho \frac{L}{A}$	$V_{emf} = iR$	$V_{emf} = iR_1 + iR_2 = iR_{eq}$
$dU = i dt \Delta V$	$i = i_1 + i_2 = \frac{V_{emf}}{R_1} + \frac{V_{emf}}{R_2} = V_{emf} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$	$R = \frac{\Delta V}{i}$
$R = \frac{\Delta V}{i}$	$P = \frac{dU}{dt} = \frac{i dt \Delta V}{dt} = i \Delta V$	$E = \frac{\Delta V}{L}$
$dU = i dt \Delta V$	$\sum_{j=1}^m V_{emf,j} - \sum_{k=1}^n i_k R_k = 0$	$q(t) = q_{max} (1 - e^{-t/\tau})$
$\sum_{k=1}^n i_k = 0$	$i = \frac{dq}{dt} = \left(\frac{V_{emf}}{R} \right) e^{-t/RC}$	$q(t) = q_{max} e^{-t/RC}$
$R_u = \frac{R_1}{R_3} R_v$	$i(t) = \frac{dq}{dt} = - \left(\frac{q_{max}}{RC} \right) e^{-t/RC}$	$\vec{F}_B = q\vec{v} \times \vec{B}$
$r = \frac{mv}{ q B}$	$\vec{F}_B = i\vec{L} \times \vec{B}$	$\tau = N\tau_1 = NiAB \sin \theta$
$d\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^3} \vec{r} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^2} \hat{r}$	$d\vec{B} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \vec{r}}{r^3} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \hat{r}}{r^2}$	$\mu_0 = 4\pi \times 10^{-7} \frac{T m}{A}$

1. 220 V
2. 12000 V
3. 55.0 V
4. 110 V

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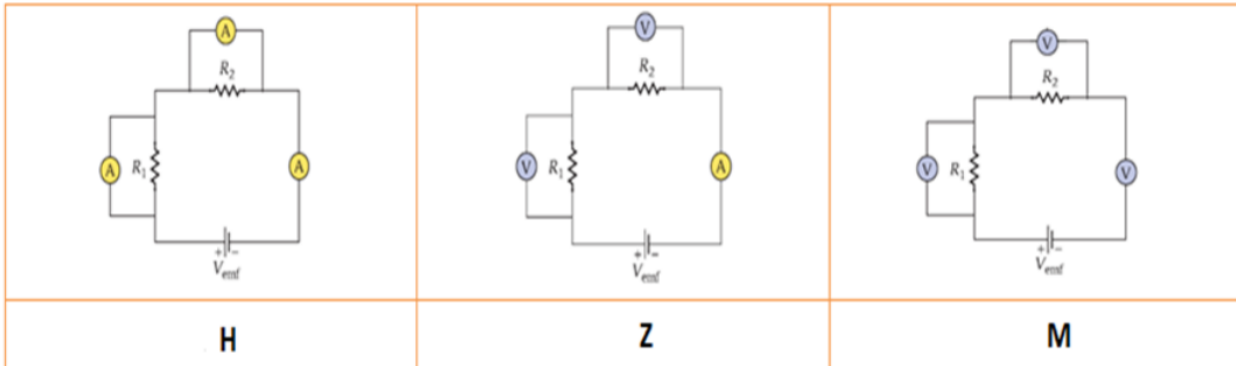
- 2 A particle has a positive charge and moves to the left at constant velocity, enters a uniform magnetic field of (B) downward,
as seen in the figure . What is the direction of the magnetic force on the particle?

According to the figure , a positively charged particle moving at a constant speed to the left enters a magnetic field (B) downward . What is the direction of the magnetic force acting on the particle ?



1. Into the page
to the inside of the page
2. Out of the page
off page
3. Downward
Down
4. To the left
To the left

- 3 Which of the following electric circuits is/are working properly ?
Which of the following electrical circuits works correctly ?



1. M
2. H&Z

	3. Z & M 4. Z
4	An RC circuit consisting of a resistance ($R=1000\ \Omega$) and a capacitor and battery. The charge on the capacitor as a function of time is given by: $q(t) = 1.0 \times 10^{-4}(1 - e^{-t/0.001})$ What is the electric potential difference of the battery ? An RC circuit contains a resistor) $R=1000\ \Omega$, (a capacitor, and a battery . The charge on the capacitor is given as a function of time by the following equation) $q(t) = 1.0 \times 10^{-4}(1 - e^{-t/0.001})$ What is the voltage difference of the battery ? 1. 1000 V 2. 0.001 V 3. 0.01 V 4. 100 V
5	Three resistors (R, $3R$, $6R$) are connected in parallel . What is the equivalent resistance of the three resistors? Three electrical resistors (R, $3R$, $6R$) are connected together in parallel . What is the equivalent resistance of the three resistors

Wherever necessary, use the following formulas

أيضا لزم استخدام العلاقات التالية

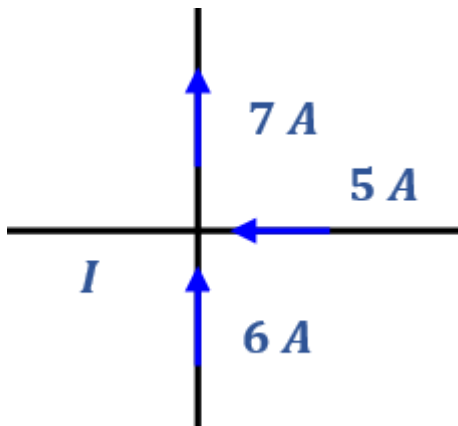
$J = \frac{i}{A}$	$i = \frac{dq}{dt}$	$i = \frac{dq}{dt} = -nev_d A$
$\frac{1}{S} = \frac{1}{\Omega}$	$\rho = \frac{E}{J}$	$\sigma = \frac{1}{\rho}$
$R = \rho \frac{L}{A}$	$V_{\text{emf}} = iR$	$V_{\text{emf}} = iR_1 + iR_2 = iR_{\text{eq}}$
$dU = i dt \Delta V$	$i = i_1 + i_2 = \frac{V_{\text{emf}}}{R_1} + \frac{V_{\text{emf}}}{R_2} = V_{\text{emf}} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$	$R = \frac{\Delta V}{i}$
$R = \frac{\Delta V}{i}$	$P = \frac{dU}{dt} = \frac{i dt \Delta V}{dt} = i \Delta V$	$E = \frac{\Delta V}{L}$
$dU = i dt \Delta V$	$\sum_{j=1}^m V_{\text{emf},j} - \sum_{k=1}^n i_k R_k = 0$	$q(t) = q_{\text{max}} (1 - e^{-t/\tau})$
$\sum_{k=1}^n i_k = 0$	$i = \frac{dq}{dt} = \left(\frac{V_{\text{emf}}}{R} \right) e^{-t/RC}$	$q(t) = q_{\text{max}} e^{-t/RC}$
$R_u = \frac{R_1}{R_3} R_v$	$i(t) = \frac{dq}{dt} = - \left(\frac{q_{\text{max}}}{RC} \right) e^{-t/RC}$	$\vec{F}_B = q\vec{v} \times \vec{B}$
$r = \frac{mv}{ q B}$	$\vec{F}_B = i\vec{L} \times \vec{B}$	$\tau = Nr_1 = NIAB \sin \theta$
$\vec{d}\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^3} \vec{r} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^2} \hat{r}$	$d\vec{B} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \vec{r}}{r^3} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \hat{r}}{r^2}$	$\mu_0 = 4\pi \times 10^{-7} \frac{\text{T m}}{\text{A}}$

- A. $\frac{3}{2R}$
 B. $\frac{2}{3R}$
 C. $\frac{3R}{2}$
 D. $\frac{2R}{3}$

6

The figure shows a part of a junction in an electric circuit. What is the **magnitude and direction** of current (I) ?

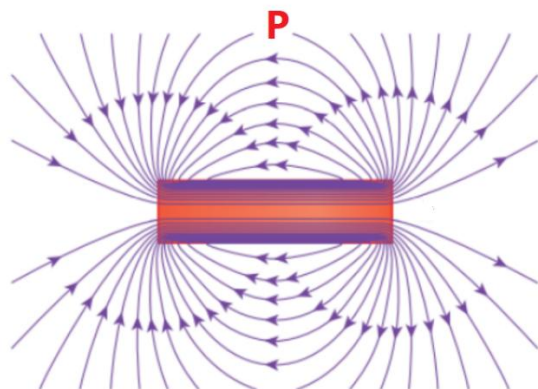
The figure shows a connection in an electric circuit. What is **the magnitude and direction of the current** (I)



1. 8A right
 8A to the right

	2. 8A left 8A to the left 3. 4A right 4A right 4. 4A left 4A to the left
7	If $B = \frac{\mu_o i}{x r_{\perp}}$ for the magnetic field at a perpendicular distance $r_{\perp}$ from a long straight wire carrying a current i What is x If there is $B = \frac{\mu_o i}{x r_{\perp}}$ a magnetic field at a perpendicular distance $r_{\perp}$ from a long straight wire carrying a current i. What is the x? magnitude of 1. $4\pi r$ 2. 4π 3. π 4. 2π
8	According to the figure shows a permanent magnet, if you put a compass needle at the point P. Which of the following represents the correct direction of the compass needle ? According to the figure showing the magnetic field lines of a magnet, if a compass needle is placed at point P , which of the following represents the correct direction for the ? compass needle

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1.



2.



3.



4.

9 Which of the following is **true** regarding **resistivity and resistance of a wire** ?

? Which of the following **is true** regarding **the resistivity and resistance of a wire**

1. The resistance of the wire is directly proportional to its cross-sectional area

The resistance of a wire is directly proportional to its cross-sectional area.

2. The resistance of the wire is inversely proportional to its length

The resistance of a wire is inversely proportional to its length.

3. Per unit length and per unit cross-sectional area for any material the same resistance

For each unit of length and for each unit of cross-sectional area of any material the resistance is the same.

4. The resistivity of the wire depends on its material type

The resistance of a wire depends on the type of its material.

10	If the given equation between the charge in coulomb and the time in second is $(q = xt^2 + 2)$, When the current is equal to 10 milli-ampere at $t=2s$. What is the value of x in C/s^2 unit ? If the given relationship between charge in coulombs and time in seconds is , and the ? electric current is 10 milliamperes at time $t=2s$. What is the value of x in C/s^2 $(q = xt^2 + 2)$ <table border="1" data-bbox="147 655 1495 1472"> <tr> <td data-bbox="147 655 358 856">A</td><td data-bbox="358 655 1495 856">$5.0 \times 10^{-3} \frac{C}{s^2}$</td></tr> <tr> <td data-bbox="147 856 358 1058">B</td><td data-bbox="358 856 1495 1058">$2.5 \times 10^{-2} \frac{C}{s^2}$</td></tr> <tr> <td data-bbox="147 1058 358 1260">C</td><td data-bbox="358 1058 1495 1260">$4.0 \times 10^{-2} \frac{C}{s^2}$</td></tr> <tr> <td data-bbox="147 1260 358 1472">D</td><td data-bbox="358 1260 1495 1472">$2.5 \times 10^{-3} \frac{C}{s^2}$</td></tr> </table>	A	$5.0 \times 10^{-3} \frac{C}{s^2}$	B	$2.5 \times 10^{-2} \frac{C}{s^2}$	C	$4.0 \times 10^{-2} \frac{C}{s^2}$	D	$2.5 \times 10^{-3} \frac{C}{s^2}$
A	$5.0 \times 10^{-3} \frac{C}{s^2}$								
B	$2.5 \times 10^{-2} \frac{C}{s^2}$								
C	$4.0 \times 10^{-2} \frac{C}{s^2}$								
D	$2.5 \times 10^{-3} \frac{C}{s^2}$								
11	Two wires X and Y, X with cross-sectional area equal to $(5.0 \times 10^{-5} m^2)$ and Y with cross-sectional area equal to $(3.0 \times 10^{-5} m^2)$. If the two wires are carrying the same current, which of the following is correct about the current density J in the wires ? Two conducting wires X and Y Cross-sectional area of wire X $(5.0 \times 10^{-5} m^2)$ The cross-sectional area of the wire is Y. If the same current flows through the two wires, which of the $(3.0 \times 10^{-5} m^2)$?following is true regarding the electric current density J in the two wires								

	A	$J_X = \frac{5J_Y}{3}$
	B	$J_X = \frac{9J_Y}{25}$
	C	$J_X = \frac{25J_Y}{9}$
	D	$J_X = \frac{3J_Y}{5}$
12	Depending on the circuit, if the reading of ammeter is 1.0 A. What is the potential difference of the battery V ? Depending on the circuit , if the ammeter reads 1.0A , what is the battery voltage V ? ? 1.0 A 15 A 67 A 37 V	

13

A **coil** (What is the **ratio** of the torques $(\frac{\tau_X}{\tau_Y})$?

If **coil (X)** consists of (600) rings and **coil (Y)** consists of (1600) rings. If the torque acting on each ring of coil (X) is equal to the torque acting on each ring of coil (Y). What is **the ratio** between the

$(\frac{\tau_X}{\tau_Y})$? two torques

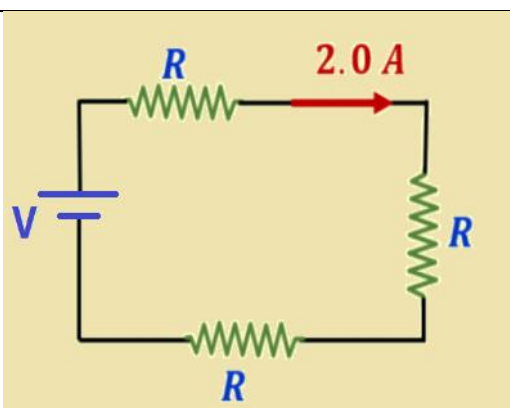
Wherever necessary, use the following formulas أيضا لزم استخدام العلاقات التالية		
$I = \frac{i}{A}$	$i = \frac{dq}{dt}$	$i = \frac{dq}{dt} = -nqv_d A$
$S = \frac{1}{\Omega}$	$\rho = \frac{E}{J}$	$\sigma = \frac{1}{\rho}$
$R = \rho \frac{L}{A}$	$V_{emf} = iR$	$V_{emf} = iR_1 + iR_2 = iR_{eq}$
$dU = i dt \Delta V$	$i = i_1 + i_2 = \frac{V_{emf}}{R_1} + \frac{V_{emf}}{R_2} = V_{emf} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$	$R = \frac{\Delta V}{i}$
$R = \frac{\Delta V}{i}$	$P = \frac{dU}{dt} = \frac{i dt \Delta V}{dt} = i \Delta V$	$E = \frac{\Delta V}{L}$
$dU = i dt \Delta V$	$\sum_{j=1}^n V_{emf,j} - \sum_{k=1}^m I_k R_k = 0$	$q(t) = q_{max} (1 - e^{-t/RC})$
$\sum_{k=1}^n I_k = 0$	$i = \frac{dq}{dt} = \left(\frac{V_{emf}}{R} \right) e^{-t/RC}$	$q(t) = q_{max} e^{-t/RC}$
$R_u = \frac{R_1}{R_2} R_v$	$i(t) = \frac{dq}{dt} = - \left(\frac{q_{max}}{RC} \right) e^{-t/RC}$	$\vec{F}_B = q\vec{v} \times \vec{B}$
$r = \frac{mv}{ q B}$	$\vec{F}_B = i\vec{L} \times \vec{B}$	$\tau = N\tau_1 = NIAB \sin \theta$
$d\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^3} \hat{r} = \frac{1}{4\pi\epsilon_0} \frac{dq}{r^2} \hat{r}$	$d\vec{B} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \vec{r}}{r^3} = \frac{\mu_0}{4\pi} \frac{id\vec{s} \times \hat{r}}{r^2}$	$\mu_0 = 4\pi \times 10^{-7} \frac{T \cdot m}{A}$

1. $\frac{64}{9}$
2. $\frac{9}{64}$
3. $\frac{8}{3}$
4. $\frac{3}{8}$

14

Based on the circuit that shows three resistors, each with a value of $R = 3\Omega$, and a battery of potential difference V . What is the **value of the battery potential difference V** ?

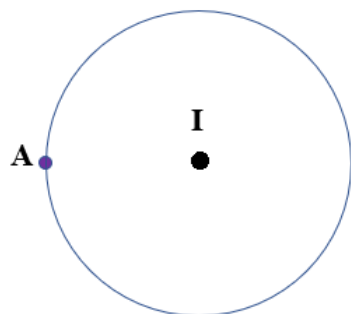
Given the circuit showing three resistors, each with a value of $R = 3\Omega$, and a battery with a potential difference of V , what is the value of **the battery potential difference V** ?



1. 1.5 V
2. 6 V
3. 12 V
4. 18 V

15 The **figure** shows a wire with current (I) running through it out of the page. What is the **direction of the magnetic field** at point (A) due to this current?

The **figure** shows a conducting wire carrying a current (I) out of the page. What is the **direction** of the **magnetic field** resulting from this current at point (A)



A



B



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	C	
	D	
15		