2024

Term 2

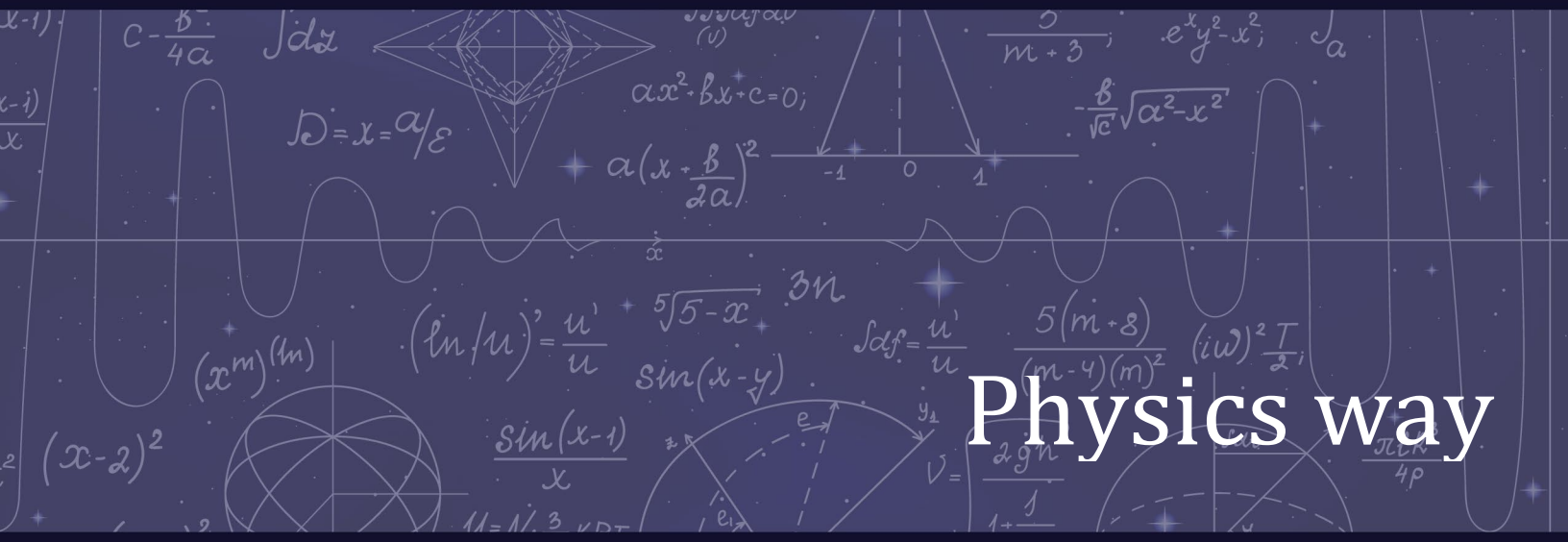
Final Revision

PHYSICS

12 Adv

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0505084733



Physics way

Final Revision Physics 12 ADV – T2

2024

At a critical junction in a supercomputer, the current as a function of time is given as $i(t) = 3t^2 - 2t$, where i is measured in milliamps and t is measured in seconds. How much charge passes through this critical junction during the interval $0 < t < 5.00$ s?

a. 28.0 mC
b. 65.0 mC
c. 100 mC
d. 150 mC

$$q = \int_0^t i\,dt$$

Q. **A typical rechargeable AA battery is rated at 700 mAh.**

How long can this battery provide a current of 100 µA ?

$$\frac{700\text{ mAh}}{0.1\text{ mA}} = 7000\text{ h} \approx 292\text{ days.}$$

Q. **A typical rechargeable AA battery is rated at 700 mAh.**

How much charge can this battery provide?

$700 \times 10^{-3} \times 60 \times 60 = 2520$ C

A rod is 4.0 m long and has a square cross-section that is 1.5 cm on each side.

An ohmmeter measures 0.040 Ω across its ends. What is the resistivity of the material from which this rod is made?

A) 0.023 Ω · m

B) 0.015 Ω · m

C) 1.5×10^{-4} Ω · m

D) 2.3×10^{-6} Ω · m

A cylindrical wire has a resistance *R* and resistivity *ρ*. If its length and diameter are BOTH cut in half, what will be its resistivity?

A) 4ρ

B) 2ρ

C) ρ

D) $\rho/2$

A wire has a diameter of 0.2mm and a length of 50cm. The specific resistance of it's material is 40×10^{-6}ohmcm. The current through it, when a potential difference of 2V is applied across it, is

A 3.14A

B 31.4A

C 0.314A

D 0.0314A

Two wires made of different materials have the same uniform current density. They carry the same current only if:

A. the electric fields in them are the same

B. their cross-sectional areas are the same

C. both their lengths and cross-sectional areas are the same

D. the potential differences across them are the same

A wire with a length of 150 m and a radius of 0.15 mm carries a current with a uniform current density of 2.8×10^7 A/m^2 . The current is:

A. 0.63 A

B. 2.0 A

C. 5.9 A

D. 3.9 A

Concept Check 25.1

If the diameter of the wire in Example 25.2 is doubled, its resistance will

a) increase by a factor of 4.

b) increase by a factor of 2.

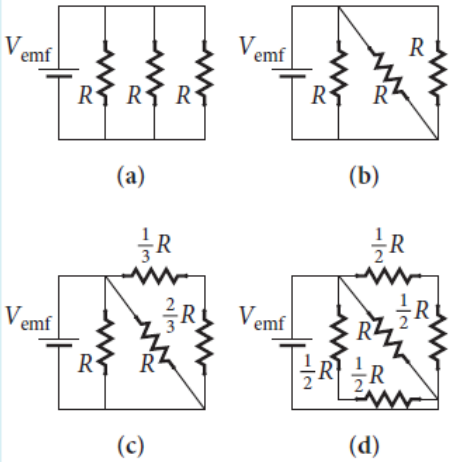
c) stay the same.

d) decrease by a factor of 2.

e) decrease by a factor of 4.

Concept Check 25.6

Which combination of resistors has the highest equivalent resistance?



a) combination (a)

b) combination (b)

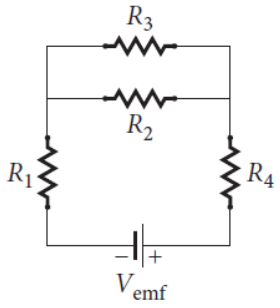
c) combination (c)

d) combination (d)

e) The equivalent resistance is the same for all four.

PROBLEM

The circuit shown in Figure 25.20a has four resistors and a battery with $V_{emf} = 149$ V. The values of the four resistors are $R_1 = 17.0\ \Omega$, $R_2 = 51.0\ \Omega$, $R_3 = 114.0\ \Omega$, and $R_4 = 55.0\ \Omega$. What is the magnitude of the potential drop across R_2?

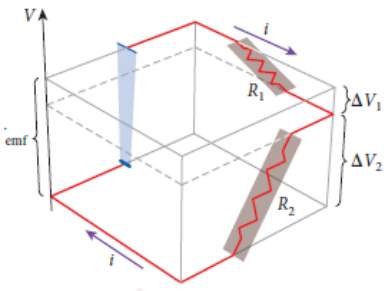


The emf (electromotive force) is an

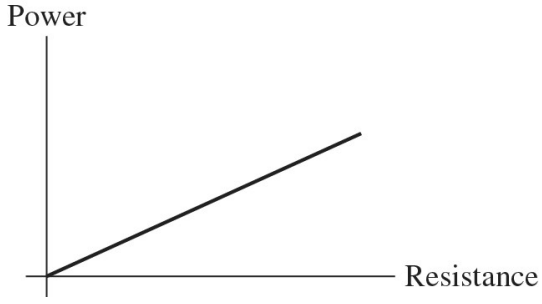
a. electric force vector.
b. electric force magnitude.
c. electric field magnitude.
d. the voltage supplied by a battery

If the current through a resistor is decreased by a factor of 4, how does this affect the power dissipated?

a. It decreases by a factor of 4.
b. It decreases by a factor of 16.
c. It decreases by a factor of 8.
d. It increases by a factor of 16.

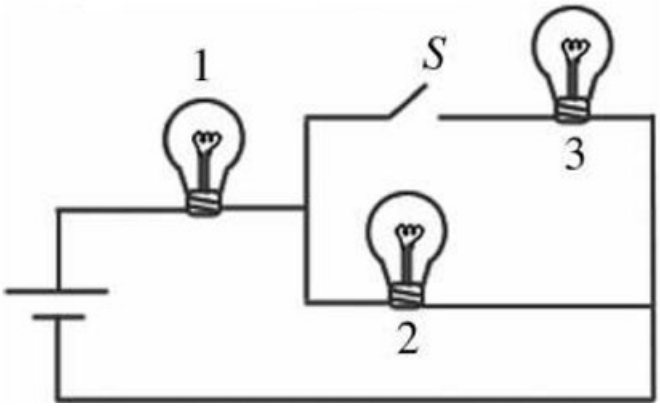
Which of the following is true for the two resistors in the given figure?		أي العلاقات التالية صحيحة بالنسبة للمقاومين في الشكل الموضح ؟
$R_1 > R_2$		$R_1 = R_2$
لا يمكن تحديدها		$R_1 < R_2$

The figure shows a graph of the power dissipated in a resistor as a function of the resistance. What quantity does the slope of this graph represent?



A) the current in the resistor
B) the potential difference across the resistor
C) the reciprocal of the current in the resistor
D) the square of the current in the resistor

The figure shows three identical lightbulbs connected to a battery having a constant voltage across its terminals. what happens to the brightness of lightbulb 1 when the switch S is closed



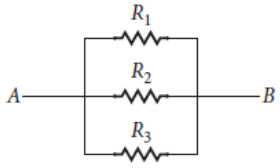
A) The brightness will increase momentarily then return to its previous level.
B) The brightness increases permanently.
C) The brightness will decrease momentarily then return to its previous level.
D) The brightness remains the same as before the switch is closed.

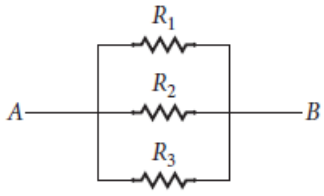
A potential difference of 2.0 V is applied across a wire of cross-sectional area 2.5 mm^2. The current which passes through the wire is 3.2×10^{-3} A.
What is the resistance of the wire?

a. $2.8 \times 10^2\ \Omega$
b. $3.6 \times 10^2\ \Omega$
c. $4.2 \times 102\ \Omega$
d. $6.3 \times 10^2\ \Omega$

Three identical resistors, R_1, R_2, and R_3, are wired together as shown in the figure. An electric current is flowing from point A to point B. The current flowing through R_2

a) is the same as the current through R_1 and R_3.
b) is a third of the current through R_1 and R_3.
c) is twice the sum of the current through R_1 and R_3.
d) is three times the current through R_1 and R_3.
e) cannot be determined.





The equivalent resistance of the circuit shown if R_{eq} = 2.3 Ω. If R_2 = 40 Ω and R_3 = 16 Ω, what is the resistance of R_1?

a. 11 Ω
b. 2.9 Ω
c. 4.1 Ω
d. 5.2 Ω

You make a series combination using a resistor A having a very large resistance and a resistor B having a very small resistance. The equivalent resistance of this combination will be

a. slightly greater than the resistance of the resistor A.
b. slightly less than the resistance of the resistor A.
c. slightly greater than the resistance of the resistor B.
d. slightly less than the resistance of the resistor B.

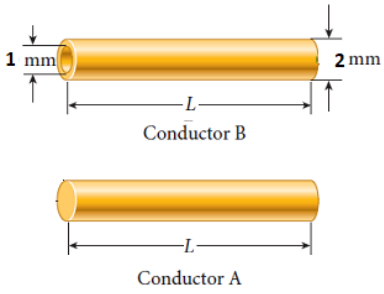
Two conductors are made of the same material and have the same length. Conductor A is solid wire of diameter 1mm. Conductor B is hollow tube of outer diameter 2mm and inner diameter 1mm. The ratio of resistance R_A to R_B.

A 3:1

B 1:3

C 1:1

D 2:1



The resistance of a conductor is 1.08 Ω. To reduce it to 1 Ω, the resistance that must be connected is:

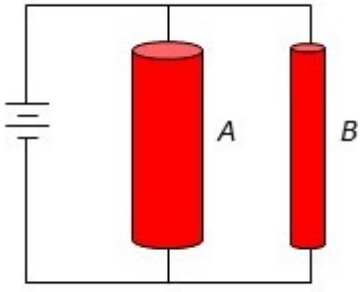
A 0.08 Ω in series

B 13.5 Ω is parallel

C 0.08 Ω in parallel

D 13.5 Ω in series.

The picture shows a battery connected to two cylindrical resistors in parallel. Both resistors are made of the same material and are of the same length, but the diameter of resistor A is twice the diameter of resistor B.



Witch statement is True

A) The power dissipated in resistor A is 16 times the power dissipated in resistor B.

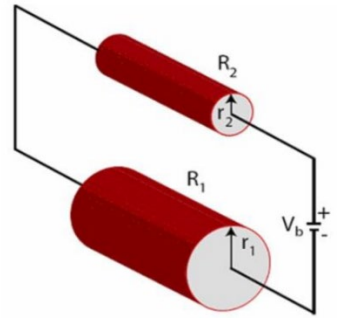
B) The voltage drop across resistor B is larger than the voltage drop across resistor A.

C) The current through the battery is five times larger than the current through wire B.

D) The current through wire A is two times larger than the current through wire B.

E) The resistance of resistor B is twice as large as the resistance of resistor A.

Two cylinders are made out of the same material and are of equal length as shown. The cylinders are connected to a battery with voltage V_b. If the voltage drop across resistor R_2 is 0.810×V_b, what is the ratio of the radii r_1/r_2 of the two cylinders?



A. 1.29

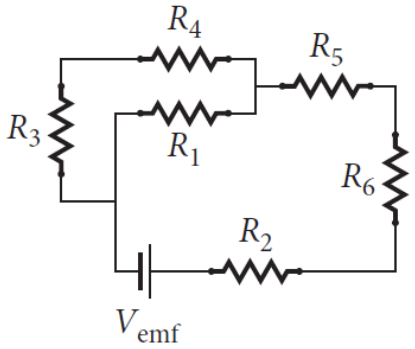
B. 1.51

C. 1.76

D. 2.06

In the following circuit if $R_1 = R_2 = R_3 = R_4 = 3\ \Omega$, $R_5 = 3\ \Omega$ and $R_6 = 4\ \Omega$

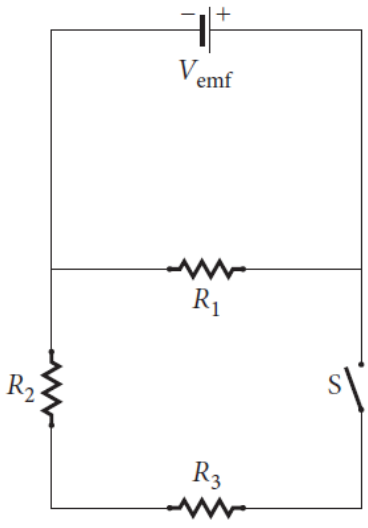
The $V_{emf} = 180$ V



What is the current flowing through resistors R_2 and R_3

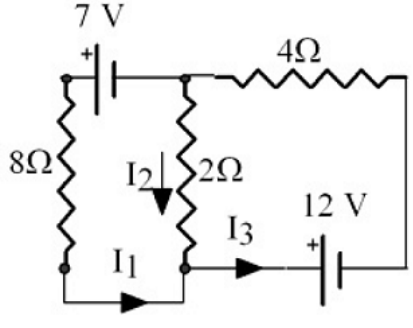
	current flowing through resistor R_2	current flowing through resistor R_3
A	15 A	10 A
B	15 A	6 A
C	10 A	10 A
D	15 A	5 A

In the circuit in the figure, there are three identical resistors. The switch, S, is initially open. When the switch is closed, which statement is TRUE



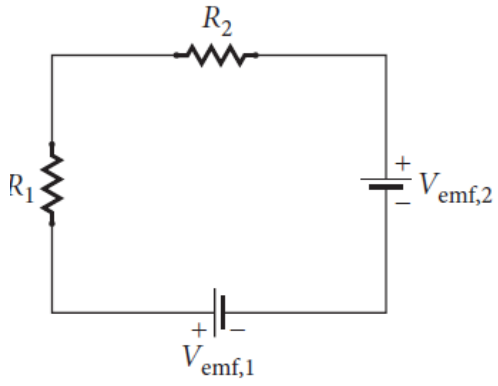
A. The current in R_1 will decrease by a factor of 2
B. The potential drop across R_1 equal to that across R_2
C. The potential drop across R_3 equal to that across R_2
D. The potential drop across R_1 will decrease by a factor of 2

Which one of the equations is incorrect for the circuit below?



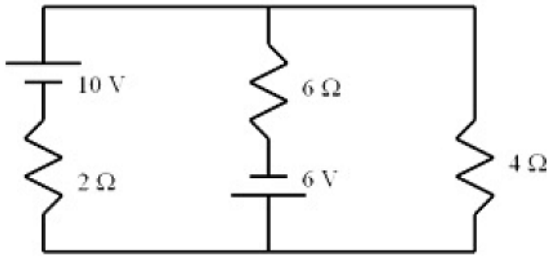
a. $I_1 + I_2 - I_3 = 0$
b. $8I_1 - 2\,I_2 = 7$
c. $2I_2 + 4I_3 = -12$
d. $I_3 - I_1 - I_2 = 0$
e. All of the above are correct.

Th e single-loop circuit shown in the figure has $V_{emf,1}$ = 21.01 V, $V_{emf,2}$ = 10.75 V, R_1 = 23.37 Ω, and R_2 = 11.61 Ω. What is the magnitude and direction current flowing in the circuit?



A. 0.2933 A & counterclockwise
B. 1.2933 A & clockwise
C. 0.2933 A & clockwise
D. 1.2933 A & counterclockwise

What is the current in the 4.0 Ω resistor in the circuit shown in the figure?



a. 1.1 A
b. 1.3 A
c. 1.7 A
d. 2.8 A

Kirchhoff's Junction Rule

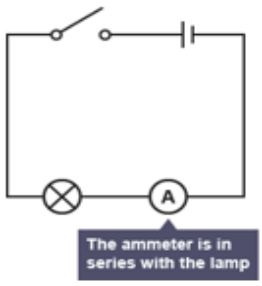
The sum of the currents entering a junction must equal the sum of the currents leaving the junction.

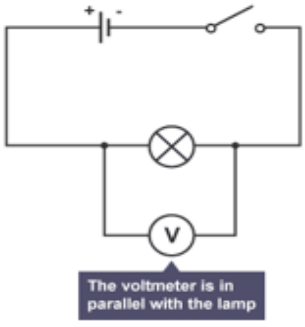
$$\text{Junction: } \sum_{k=1}^{n} i_k = 0$$

Kirchhoff's Loop Rule

The potential difference around a complete circuit loop must sum to zero.

$$\text{Closed loop: } \sum_{j=1}^{m} V_{\text{emf},j} - \sum_{k=1}^{n} i_k R_k = 0$$

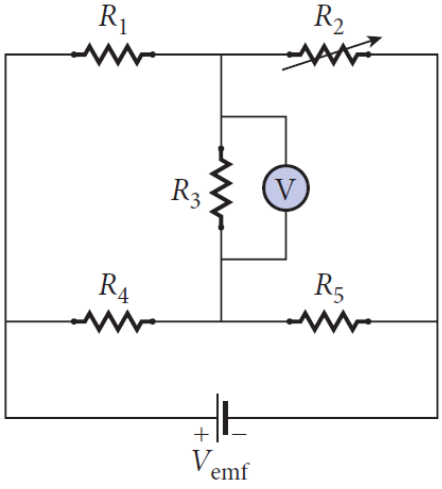




Ammeter	Voltmeter
It is used to measure current	It is used to measure voltage across two points
Resistance is low	Resistance is high
It is connected in series with the circuit and its accuracy is more	It is connected in parallel with the circuit and its accuracy is less
For ideal ammeter, the value of resistance is 0	For ideal voltmeter, the value of resistance is approximately infinity
It is denoted by a symbol A	It is denoted by a symbol V

The current in the circuit decreases slightly	The current in the circuit increases slightly

In the Wheatstone bridge shown in the figure, the known resistances are $R_1 = 8.00\ \Omega$, $R_4 = 2.00\ \Omega$, and $R_5 = 6.00\ \Omega$, and the battery supplies $V_{emf} = 15.0$ V. The variable resistance R_2 is adjusted until the potential difference across R_3 is zero ($V = 0$). Find i_2 (the current through resistor R_2) at this time



12 V battery connected in series with resistance R and capacitor C

The charge on the capacitor as a function of time is given by

$$q(t) = 3.6 \times 10^{-6} \left(1 - e^{\frac{-t}{0.1}}\right)$$

which stamen is Not true

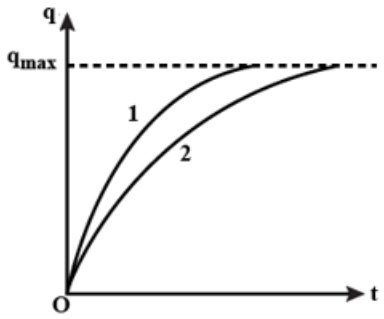
A. the capacitor is charging.

B. the capacitance of the capacitor =0.3 μF

C. the value of the resistance R = 3.33 x10^5 C

D. the time required for the capacitor to reach a charge q = 1.2 μC is t = 0.40 s

The charge across the capacitor in two different RC circuits 1 and 2 are plotted as shown in the figure. Identify the correct statement(s) related to the R_1, R_2, C_1 and C_2 of the two RC circuits.



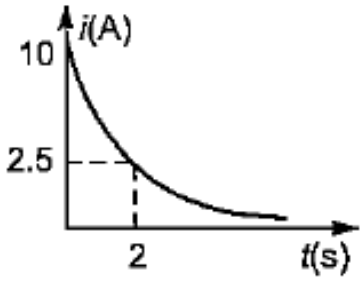
A. $R_1 > R_2$ if $V_{emf1} = V_{emf2}$

B. $C_2 > C_1$ if $V_{emf1} = V_{emf2}$

C. $R_1C_1 > R_2C_2$

D. $\frac{R_1}{R_2} < \frac{C_2}{C_1}$

The figure shows a graph of the current in a discharging circuit of a capacitor through a resistor of resistance 10 Ω



Which statement is NOT true

A. The maximum potential difference across the capacitor is 100 V
B. The time constant τ= 1.44 s
C. At time t = 5 sec the current will be i =0.31 A
D. The capacitance of the capacitor C = 1.44 μF

Magnetic field lines always

a. originate at the north poles of magnets and extend to infinity.

b. originate at the south poles of magnets and extend to infinity.

c. form closed loops.

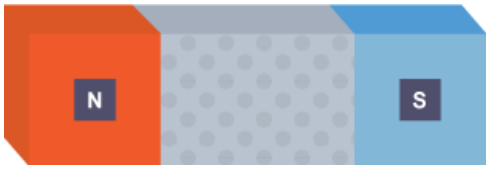
d. None are correct.

The unit of magnetic field strength has been named the **tesla** (T)

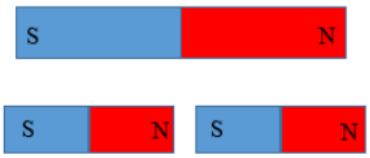
$$1\,\mathrm{T} = 1\,\frac{\mathrm{N\,s}}{\mathrm{C\,m}} = 1\,\frac{\mathrm{N}}{\mathrm{A\,m}}$$

Properties of Magnet

(1) All magnets have **two poles**: North-seeking pole and South-seeking pole.
The magnetic effect is **strongest at the poles**.



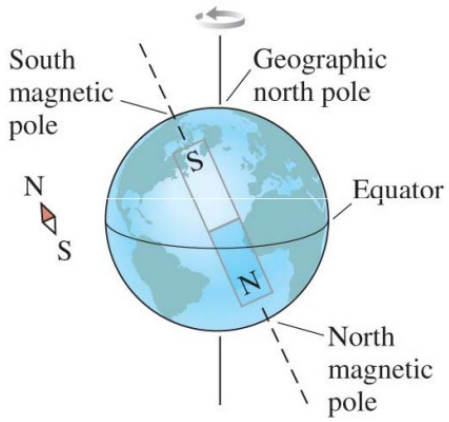
Note that when a magnet is cut into pieces, each piece itself is a small magnet with a North pole and a South pole.



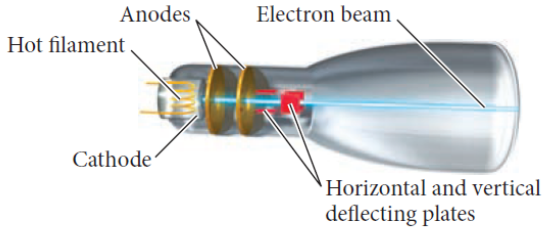
(2) A freely suspended magnet always comes to rest in a **North-South direction**.

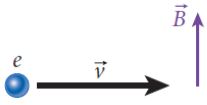
(3) **Law of Magnetism**: Like poles repel, unlike poles attract.

Remember that for magnetism, we talk about poles while charges for electrostatics



Cathode Ray Tube



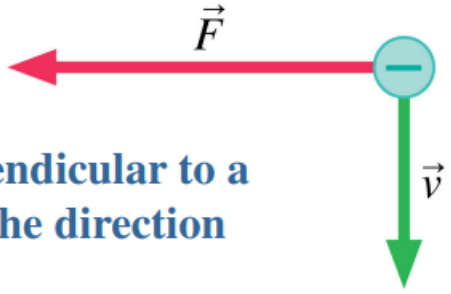


$$\Delta K + \Delta U = \tfrac{1}{2}mv^2 + q\Delta V = 0.$$

$$e\Delta V = \tfrac{1}{2}mv^2$$

$$F_B = ma = evB$$

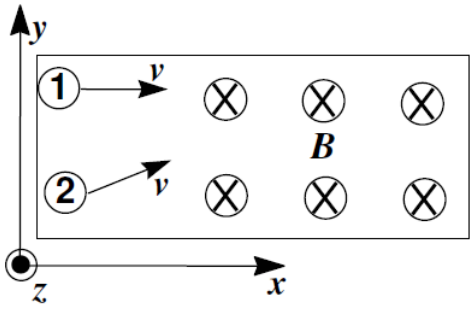
$$a = \frac{evB}{m} = \frac{eB\sqrt{\frac{2e\Delta V}{m}}}{m} = B\sqrt{2\Delta V\frac{e^3}{m^3}}.$$



An electron moves perpendicular to a magnetic field. What is the direction of $\vec{B}$?

A. Left
B. Into the page
C. Out of the page
D. Up
E. Down

Two protons each move at speed *v* (as shown in the diagram) in a region of space which contains a constant B field in the -*z*-direction.



Ignore the interaction between the two protons.

– What is the relation between the magnitudes of the forces on the two protons?

A. $F_1 < F_2$

B. $F_1 = F_2$

C. $F_1 > F_2$

D. $F_1 = F_2 \sin\vartheta$

If a quantity you calculated has units of A · s, what is that quantity?

A) potential

B) resistivity

C) resistance

D) charge

The length of a certain wire is kept same while its radius is doubled. What is the new resistance of this wire?

A) It is increased by a factor of 2.

B) It is increased by a factor of 4.

C) It is reduced by a factor of 2.

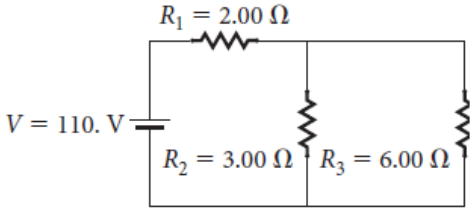
D) It is reduced by a factor of 4.

•25.77 Three resistors are connected to a power supply with $V = 110.$ V as shown in the figure.

a) Find the potential drop across R_3.

b) Find the current in R_1.

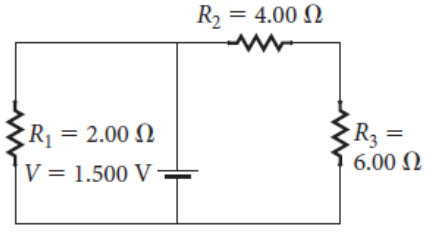
c) Find the rate at which thermal energy is dissipated from R_2.



•25.78 A battery with $V = 1.500$ V is connected to three resistors as shown in the figure.

a) Find the potential drop across each resistor.

b) Find the current in each resistor.



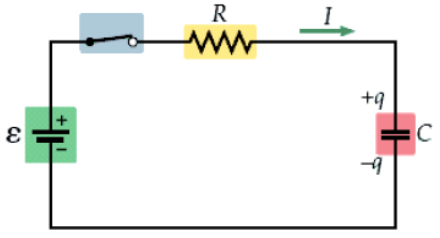
26.6 How long will it take, as a multiple of the time constant, τ, for the capacitor in an RC circuit to be 98% charged?

a) 9τ c) 90τ e) 0.98τ

b) 0.9τ d) 4τ

• The switch on an *RC* circuit is closed at $t = 0$. Given that $\mathcal{E} = 6.0\,\text{V}, R = 92\,\Omega$, and $C = 28\,\mu\text{F}$, how much charge is on the capacitor at time $t = 4.0$ ms?

Picture the Problem: A resistor and a capacitor form a series *RC* circuit as shown in the diagram at right.



Strategy: Apply Equation 21-18 to find the charge $q(t)$ on the plates of the capacitor as a function of time, where $t = 0$ corresponds to the instant at which the switch is closed.

Solution: Calculate the charge at $t = 4.0$ ms:

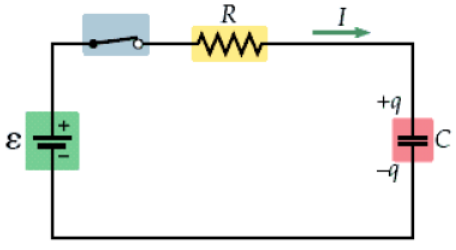
$$q(t) = C\mathcal{E}\left(1 - e^{-t/\tau}\right) = C\mathcal{E}\left(1 - e^{-t/RC}\right)$$

$$q(4.0\text{ ms}) = \left(28\times10^{-6}\text{ F}\right)(6.0\text{ V})\left[1 - e^{-\frac{0.0040\text{ s}}{(92\,\Omega)(28\times10^{-6}\text{ F})}}\right]$$

$$= 1.3\times10^{-4}\text{ C} = \boxed{0.13\text{ mC}}$$

• The capacitor in an *RC* circuit ($R = 120\,\Omega, C = 45\,\mu\text{F}$) is initially uncharged. Find **(a)** the charge on the capacitor and **(b)** the current in the circuit one time constant ($\tau = RC$) after the circuit is connected to a 9.0-V battery.

Picture the Problem: A resistor and a capacitor form a series *RC* circuit as shown in the diagram at the right.



Strategy: Apply Equation 21-18 to find the charge $q(t)$ on the plates of the capacitor as a function of time, where $t = 0$ corresponds to the instant at which the switch is closed.

Solution: 1. (a) Solve Equation 21-18 for the case when $t = \tau$:

$$q(\tau) = C\mathcal{E}\left(1 - e^{-t/\tau}\right) = C\mathcal{E}\left(1 - e^{-\tau/RC}\right)$$

$$= \left(45\times10^{-6}\text{ F}\right)(9.0\text{ V})\left(1 - e^{-1}\right)$$

$$q(\tau) = \boxed{2.6\times10^{-4}\text{ C}} = 260\,\mu\text{C}$$

2. (b) Solve Equation 21-19 for the case when $t = \tau$:

$$I(\tau) = \frac{\mathcal{E}}{R}e^{-\tau/\tau} = \frac{9.0\text{ V}}{120\,\Omega}e^{-1} = \boxed{28\text{ mA}}$$

•• Consider an RC circuit with $\mathcal{E} = 12.0\,\text{V}, R = 195\,\Omega$, and $C = 45.7\,\mu\text{F}$. Find (a) the time constant for the circuit, (b) the maximum charge on the capacitor, and (c) the initial current in the circuit.

Strategy: The time constant of a series RC circuit is given by $\tau = RC$. The capacitor is fully charged at $t = \infty$, at which time Equation 21-18 reduces to $q(\infty) = q_{\max} = C\mathcal{E}$ because $e^{-\infty} = 0$. The initial current at $t = 0$ is given by $I(0) = (\mathcal{E}/R)$ (Equation 21-19) because $e^{-0} = 1$.

Solution: 1. (a) Calculate τ: $\tau = RC = (195\,\Omega)(45.7\times10^{-6}\,\text{F}) = \boxed{8.91\,\text{ms}}$

2. (b) Calculate $q(\infty) = q_{\max}$: $q_{\max} = C\mathcal{E} = (45.7\times10^{-6}\,\text{F})(12.0\,\text{V}) = 5.48\times10^{-4}\,\text{C} = \boxed{548\,\mu\text{C}}$

3. (c) Calculate $I(t=0)$: $I(0) = \dfrac{\mathcal{E}}{R} = \dfrac{12.0\,\text{V}}{195\,\Omega} = \boxed{61.5\,\text{mA}}$

•• A flash unit for a camera has a capacitance of $1500\,\mu\text{F}$. What resistance is needed in this RC circuit if the flash is to charge to 90% of its full charge in 21 s?

Strategy: Equation 21-18 determines the charge on a capacitor in a series RC circuit as a function of time. Solve Equation 21-18 for the resistance required to charge the capacitor to 90% of its full charge in the specified time interval.

Solution: Solve Equation 21-18 for R:

$$1-\frac{q}{C\mathcal{E}} = e^{-t/RC} = 1-\frac{q}{q_{\max}}$$

$$\ln\left(1-\frac{q}{q_{\max}}\right) = -\frac{t}{RC}$$

$$R = -\frac{t}{C\ln(1-q/q_{\max})} = -\frac{21\,\text{s}}{(1500\times10^{-6}\,\text{F})\ln(1-0.90)} = \boxed{6.1\,\text{k}\Omega}$$

Insight: Doubling the resistance to 12.2 kΩ would double the time constant, and the charge on the capacitor would reach only 68% of its full charge in 21 s.

Two particles having same charge and KE enter at right angles into the same magnetic field and travel in circular paths of radii 2cm and 3cm respectively. The ratio of their masses is :

A 2 : 3

B 3 : 2

C 4 : 9

D 9 : 4

An electron of mass m is accelerated through a potential difference of V and then it enters a magnetic field of induction B normal to the lines of force. Then the radius of the circular path is

A $\sqrt{\frac{2eV}{m}}$

B $\sqrt{\frac{2V\,m}{eB^2}}$

C $\sqrt{\frac{2V\,m}{eB}}$

D $\sqrt{\frac{2V\,m}{e^2B}}$

A loudspeaker produces sound by exerting a magnetic force on a voice coil in a magnetic field, the movable voice coil is connected to a speaker cone that actually produces the sounds. The magnetic field is produced by the two permanent magnets as shown. The magnitude of the magnetic field is $B = 1.50$ T. The voice coil is composed of $n = 100$ turns of wire carrying a current, $i = 1.00$ mA. The diameter of the voice coil is $d = 2.50$ cm.

Problem

What is the magnetic force exerted by the magnetic field on the loudspeaker's voice coil?

Use: $L = n\pi d$.

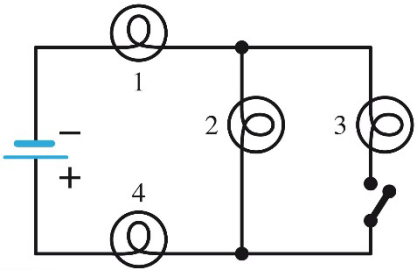
How Will the Brightness of Bulb 1 Compare Before and After the Switch Next to Bulb 3 Is Closed.

The brightness will decrease.

b. The brightness will be the same.

c. The brightness will increase.

d. It's impossible to determine from the given information.



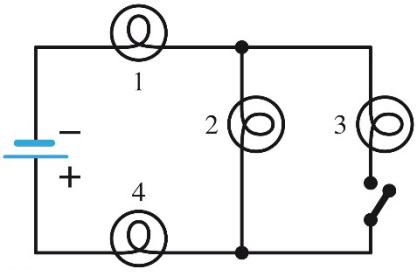
How Will the Brightness of Bulb 2 and Bulb 3 Compare After the Switch Is Closed?

a. The brightness will decrease.

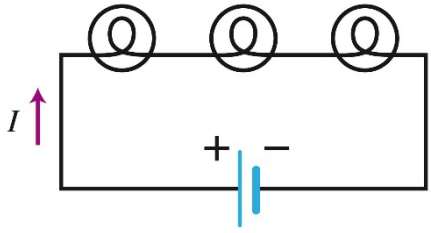
b. The brightness will be the same.

c. The brightness will increase.

d. It's impossible to determine from the given information.



If the Resistance of Each Bulb Shown in the Figure Is 10 Ohms and the e m f of the Battery Is 15 V:



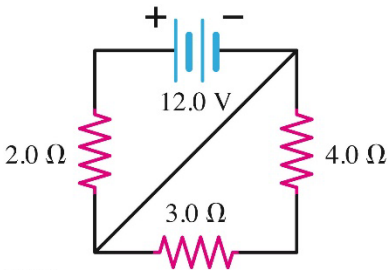
a. The current in each bulb will be 1.5 A.

b. The potential difference across each resistor will be 5 V.

c. The first bulb will be brighter than the third bulb.

d. None of the above is correct.

What Is the Equivalent Resistance of the Combination of Resistors Shown in the Figure?



a. 2 ohms

b. 3 ohms

c. 4 ohms

d. 9 ohms

When a Light Bulb Is Connected in Series to a Battery and a Capacitor, Which of the Following Will Happen:

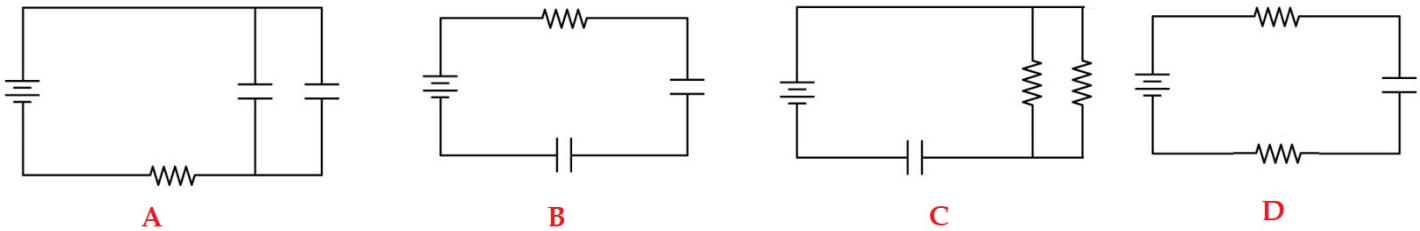
a. The bulb will not light up.

b. The bulb will slowly start to light up, get brighter, and then stay brightly lit.

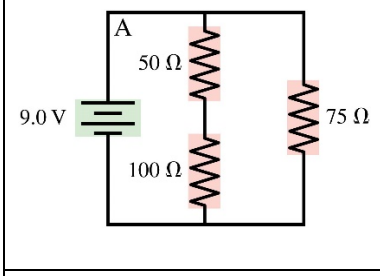
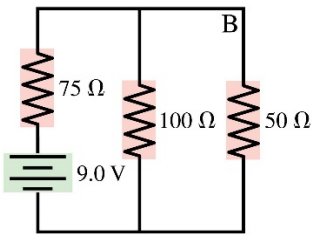
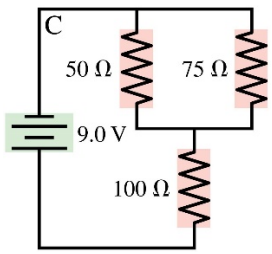
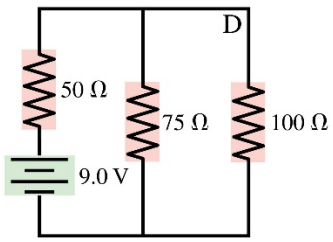
c. The bulb will start brightly lit then will dim and go dark over a short period of time.

d. The bulb will start brightly lit and stay brightly lit.

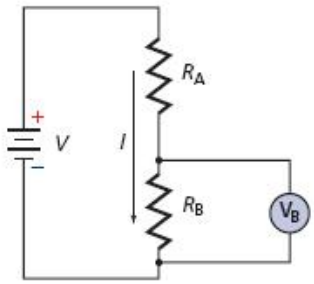
Which circuit will give the highest time constant?



Which circuit will give the highest current from the battery?

			
A	B	C	D

1. Which pair of options below would result in a greater reading on V_B in the figure below?

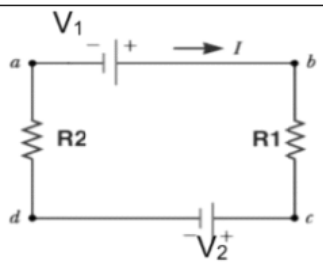


A. ○ increase the battery voltage or decrease R_B

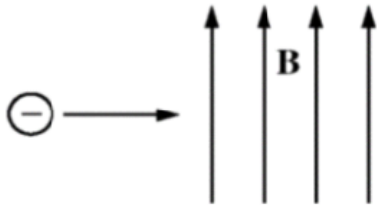
B. ○ decrease the battery voltage or decrease R_B

C. ○ increase the battery voltage or decrease R_A

D. ○ decrease the battery voltage or decrease R_A

Which of the following equations represent the current in the shown circuit?		أي من المعادلات التالية تعبر عن التيار الكهربائي في الدائرة الموضحة؟
$I = \frac{V_1 - V_2}{R_1 - R_2}$		$I = \frac{V_2 - V_1}{R_1 - R_2}$
$I = \frac{V_1 - V_2}{R_1 + R_2}$		$I = \frac{V_2 - V_1}{R_1 + R_2}$

An electron moving to the right with constant velocity enters a region with a uniform magnetic field **B** directed toward the top of the page, as shown below. In what direction will the electron initially be deflected?



A. Toward the top of the page

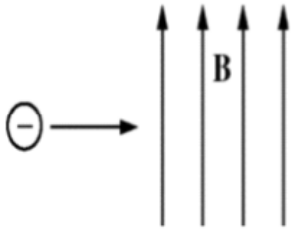
B. Toward the bottom of the page

C. Into the page

D. Out of the page

يتحرك إلكترون لليمين بسرعة ثابتة داخل مجال مغناطيسي منتظم باتجاه أعلى الصفحة كما موضح بالشكل أدناه

في أي اتجاه ينحرف الإلكترون في البداية؟



A. أعلى الصفحة

B. أسفل الصفحة

C. داخل الصفحة

D. خارج الصفحة

A proton enters with a speed of $3.0 \times 10^5\ m/s$ into a uniform magnetic field of strength $2.5\ T$ as shown below. What is the magnitude and direction of the magnetic force acting on the proton?



A. $1.2 \times 10^{-13} N$, upward

B. $1.2 \times 10^{-13} N$, downward

C. $2.4 \times 10^{-13} N$, upward

D. $2.4 \times 10^{-13} N$, downward

يتحرك بروتون بسرعة $3.0 \times 10^5 m/s$ ويدخل مجال مغناطيسي منتظم مقداره $2.5\ T$ كما موضح بالشكل أدناه.

ما مقدار واتجاه القوة المغناطيسية المؤثرة على البروتون؟



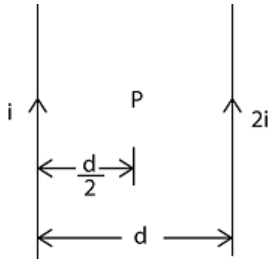
A. $1.2 \times 10^{-13} N$ لأعلى

B. $1.2 \times 10^{-13} N$ لأسفل

C. $2.4 \times 10^{-13} N$ لأعلى

D. $2.4 \times 10^{-13} N$ لأسفل

Two long thin conductors 10 cm apart carry currents in the ratio 1 : 2 in the same direction. The magnetic field midway between them is 2×10^{-3} Tesla. The force on 1 metre length of any conductor will be :



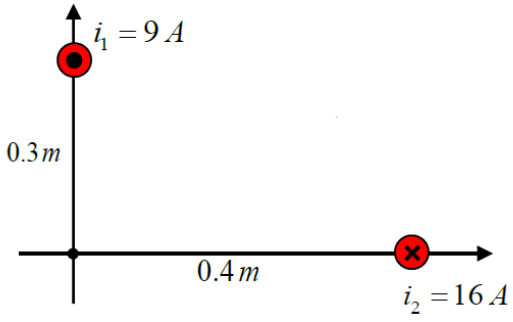
A $2\pi \times 10^{-3}$ Newton

B 2×10^{-3} Newton

C π Newton

D 1 Newton

Two very long straight wires run parallel to the z-axis, as shown in the figure . Calculate the magnetic field at the origin and Calculate its angle with the positive x-axis .



An electron is shot from an electron gun with a speed of 4.0×10^5 m/s and moves parallel to and at a distance of 5.0 cm below a long, straight wire carrying a current of 15 A.

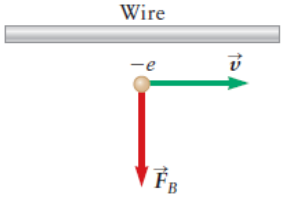


Figure P20.4

A- What is the direction of current in the wire

B-Determine the magnitude and the direction of the acceleration of the electron the instant it leaves the electron gun.

The force felt by an electron on entering into a magnetic field is independent of its

A Charge

B Strength of the field

C Mass

D Direction of its velocity

Two particles having same charge and KE enter at right angles into the same magnetic field and travel in circular paths of radii 2cm and 3cm respectively. The ratio of their masses is :

A 2 : 3

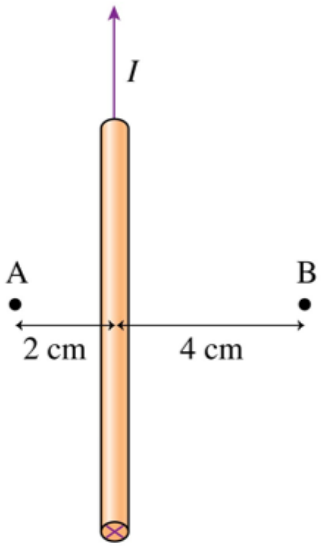
B 3 : 2

C 4 : 9

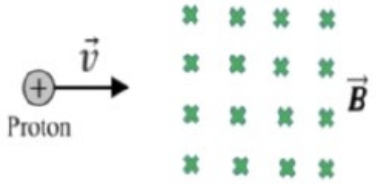
D 9 : 4

Compared to the magnetic field at point A, the magnetic field at point B is

A. Half as strong, same direction.
B. Half as strong, opposite direction.
C. One-quarter as strong, same direction.
D. One-quarter as strong, opposite direction.
E. Can't compare without knowing *I*.



A proton in a particle accelerator has a speed of 5.0 x 10^6 m/s. The proton encounters a magnetic field whose magnitude is 0.40 T and whose direction makes and angle of 30.0 degrees with respect to the proton's velocity (see part (c) of the figure). Find



(a) the magnitude and direction of the force on the proton

(b) the acceleration of the proton

(c) determine the direction of rotation

A conductor suspended by two flexible wires as shown in Figure has a mass per unit length of 0.040 0 kg/m. What current must exist in the conductor for the tension in the supporting wires to be zero when the magnetic is 3.60 T

