مراجعة الوحدة الخامسة Resistance and Current التيار والمقاومة منهج انسباير

تاريخ إضافة الملف على موقع المناهج: 2025-01-09 12:24:11

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

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التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم

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

المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة فيزياء في الفصل الثاني

1	أسئلة اختبار الوحدة الخامسة التيار والمقاومة وفق منهج بريدج
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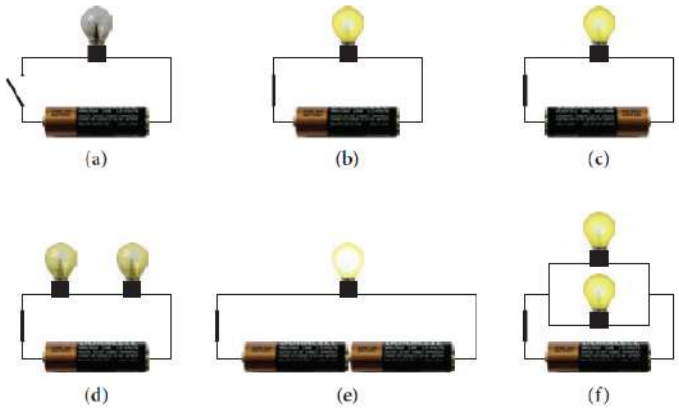
Chapter 5 Current and Resistance

5.1 Electric Current



a. open circuit [light bulb does not shine]

b. closed circuit [light bulb turns on]

c. the potential difference provided by the battery is reversed [The light bulb shines same as before]

d. light bulbs are connected in series [Each of the two light bulbs shines with significantly less intensity than the single bulb in Fig.b]

e. two batteries in series [the bulb shines significantly brighter]

f. wo light bulbs connected parallel to a single battery [the light bulbs shine with about the same intensity]

What happens to the brightness of two light bulbs connected in series compared to a single bulb in the circuit?

a) They shine brighter than a single bulb.

b) They shine with the same intensity as a single bulb.

c) They shine with less intensity than a single bulb.

d) They do not light up at all.

In a parallel circuit, how does the intensity of the bulbs compare to a single bulb connected to a battery?

a) Each bulb shines with greater intensity.

b) Each bulb shines with the same intensity as a single bulb.

c) Each bulb shines with less intensity.

d) The bulbs do not light up.

- The **random** motion of electrons in a conductor is **not a current**
- large amounts of charge are moving past a given point is a current
- current **i** is given by $i = \frac{dq}{dt}$
- The net amount of charge passing a given point in time t $q = \int dq = \int_0^t i\,dt'$
- Total charge is conserved, implying that charge flowing in a conductor is never lost
- The unit of current, coulombs per second, was given the name ampere (abbreviated A, or sometimes amp)

$$1\ \text{A} = \frac{1\ \text{C}}{1\ \text{s}}$$

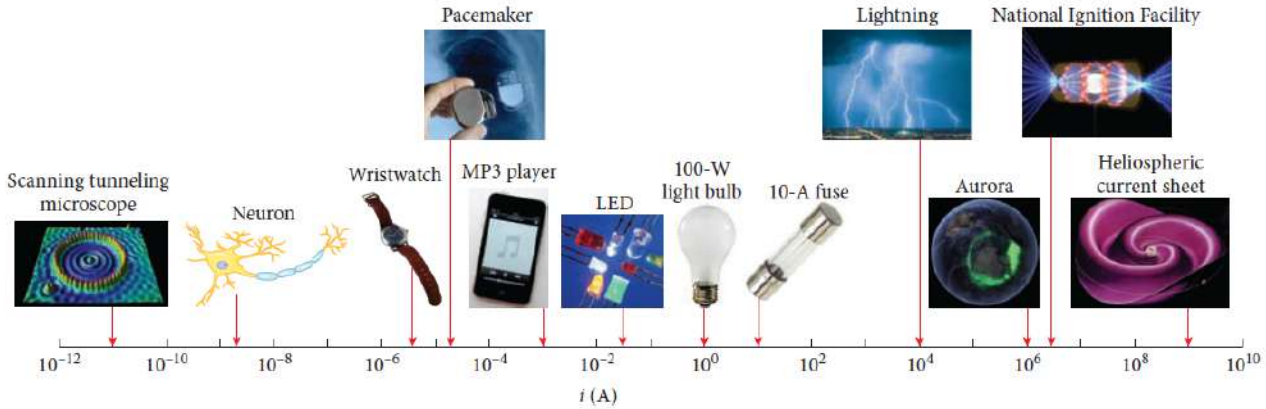
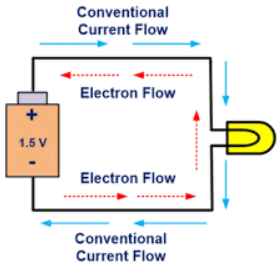


FIGURE 5.3 Examples of electrical currents ranging from 1 pA to 10 GA.



- current direction is the direction where the positive charges would flow

PROBLEM

A nurse wants to administer 80 μg of dexamethasone to the heel of an injured soccer player. If she uses an iontophoresis device that applies a current of 0.14 mA, as shown in Figure 25.4, how long does the administration of the dose take? Assume that the instrument has an application rate of 650 μg/C and that the current flows at a constant rate.

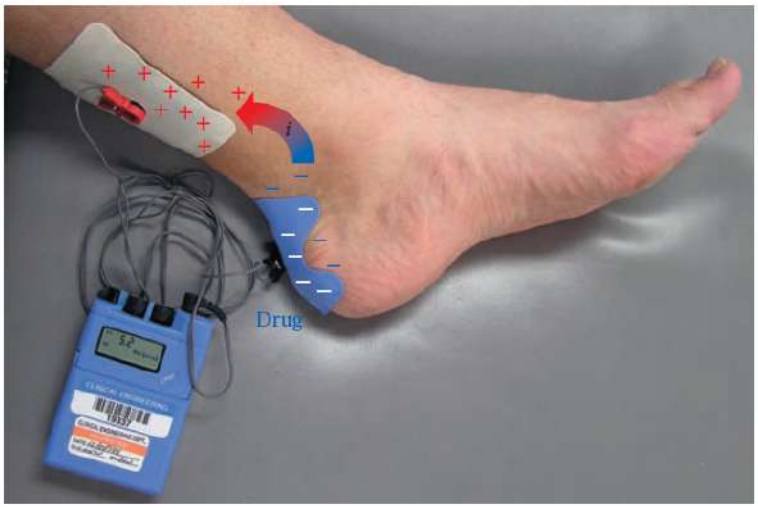


FIGURE 25.4 Iontophoresis is the application of medication under the skin with the aid of electrical current.

SOLUTION

If the drug application rate is 650 μg/C, to apply 80 μg requires a total charge of

$$q = \frac{80\ \mu g}{650\ \mu g/C} = 0.123\ C.$$

Solving for t and inserting the numbers, we find

$$q = it \Rightarrow t = \frac{q}{i} = \frac{0.123\ C}{0.14 \cdot 10^{-3}\ A} = 880\ s.$$

The iontophoresis treatment of the athlete will take approximately 15 min.

Which of the following represents the formula for electric current?

a) $i = \frac{dq}{dt}$

b) $i = \frac{dt}{dq}$

c) $i = dq \cdot dt$

d) $i = q^2 \cdot dt$

What type of current flows in only one direction and does not change with time?

a) Alternating current

b) Static current

c) Direct current

d) Induced current

Why is positive current defined as flowing from the positive to the negative terminal?

a) Electrons flow in this direction.

b) Protons are the charge carriers.

c) The definition originated before the discovery of electrons.

d) Current direction is arbitrary.

What happens to the current when the random motion of electrons does not result in net charge flow?

a) The current is zero.

b) The current increases.

c) The current decreases.

d) The current oscillates.

What is the mathematical expression for the net charge flowing in time t?

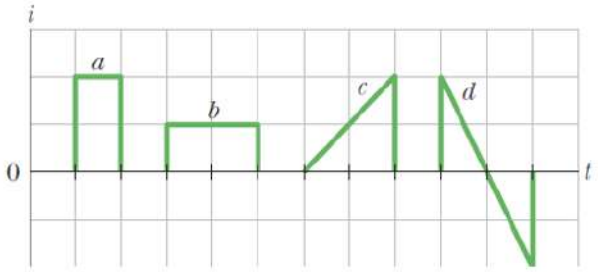
a) $q = \int i\, dq$

b) $q = \int i\, dt$

c) $q = i \cdot t$

d) $q = \int dq\, dt$

4 Figure 26-18 shows plots of the current i through a certain cross section of a wire over four different time periods. Rank the periods according to the net charge that passes through the cross section during the period, greatest first.

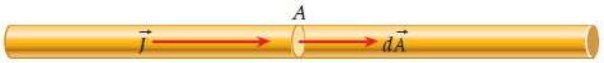


5.2 Current Density

the current density $\vec{J}$

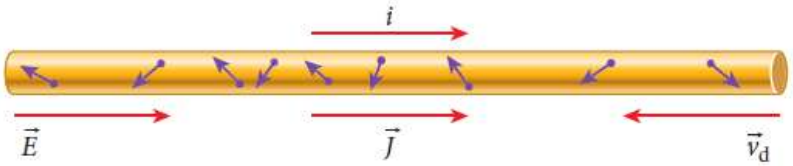
the current per unit area flowing through the conductor at that point

$$J = \frac{i}{A}$$



$$i = \int \vec{J} \cdot d\vec{A}$$

- $d\vec{A}$ is the differential area element of the perpendicular plane



25.3 Resistivity and Resistance & conductance and conductivity

Property	Resistivity (ρ)	Resistance (R)
Definition	A measure of how strongly a material opposes the flow of electric current.	The opposition to electric current flow in a specific conductor or device.
Formula	$\rho = \frac{E}{J}$ E is electric field and J is current density.	$R = \frac{\Delta V}{i}$ ΔV is potential difference and iii is current.
Unit	Ohm meter (Ω·m)	Ohm (Ω)
Dependence	Depends only on the material properties (temperature, composition, etc.).	Depends on both material and geometry $R = \rho \frac{L}{A}$

Property	Conductivity (σ)	Conductance (G)
Definition	A material's ability to conduct electric current (reciprocal of resistivity).	A measure of how easily current flows through a conductor (reciprocal of resistance).
Formula	$G = \frac{1}{R} = \frac{i}{\Delta V}$	$\sigma = \frac{1}{\rho}$
Unit	Siemens per meter (S/m)	Siemens (S)
Dependence	Depends only on the material properties.	Depends on the resistance of the conductor.

Key Relationships and units:

The **resistivity, ρ**,

$$\rho = \frac{E}{J}.$$

The units of resistivity are

$$[\rho] = \frac{[E]}{[J]} = \frac{\text{V/m}}{\text{A/m}^2} = \frac{\text{V m}}{\text{A}} = \Omega\,\text{m}.$$

The **resistance, R**,

$$R = \frac{\Delta V}{i}$$

The units of resistance are volts per ampere, a combination that was given the name ohm and the symbol Ω

$$1\,\Omega = \frac{1\,\text{V}}{1\,\text{A}}$$

- Ohm's Law ΔV = iR
- Resistivity $$\rho = \frac{E}{J} = \frac{\Delta V/L}{i/A} = \frac{\Delta V}{i}\frac{A}{L} = \frac{iR}{i}\frac{A}{L} = R\frac{A}{L}$$
- Conductance $G = \frac{i}{\Delta V} = \frac{1}{R}$

  Conductance has the SI derived unit of siemens (S) $1\,\text{S} = \frac{1\,\text{A}}{1\,\text{V}} = \frac{1}{1\,\Omega}$
- **conductivity, σ** $\sigma = \frac{1}{\rho}$
- The units of conductivity are $(\Omega\ \text{m})^{-1}$

EXAMPLE 5.2 Resistance of a Copper Wire

Standard wires that electricians put into residential housing have fairly low resistance.

PROBLEM

What is the resistance of the 100.0-m standard 12-gauge copper wire that is typically used in wiring household electrical outlets?

SOLUTION

A 12-gauge copper wire has a diameter of 2.053 mm (see Table 25.2). Its cross-sectional area is then

$$A = 3.31\ \text{mm}^2.$$

Using the value for the resistivity of copper from Table 25.1 and equation 25.11, we find

$$R = \rho\frac{L}{A} = (1.72\cdot10^{-8}\ \Omega\,\text{m})\frac{100.0\ \text{m}}{3.31\cdot10^{-6}\ \text{m}^2} = 0.520\ \Omega.$$

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.

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

A) potential

B) resistivity

C) resistance

D) charge

When a current flows through a metal wire, the moving charges are

A) only protons.

B) only electrons.

C) both protons and electrons.

D) positive metal ions.

If a quantity you calculated has units of Ω · m what is that quantity?

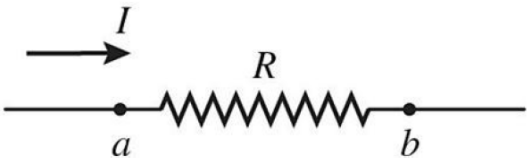
A) potential

B) resistivity

C) resistance

D) capacitance

The arrow shows the direction in which this conventional current is flowing. Which of the following statements are correct?



I- The charges are moving slower at point b than at point a.

II- The electric potential is lower at point b than at point a.

III- The electric potential is higher at point b than at point a.

IV- The current at point b is the same as the current at point a.

A	**I** and **III** only
B	**II** and **IV** only
C	**I** , **III** and **IV**
D	**II** and **III** only

A cylindrical metal rod has a resistance *R*. If both its length and its diameter are tripled, its new resistance will be

A. *R*. B. 9*R*. C. *R*/3. D. 3*R*.

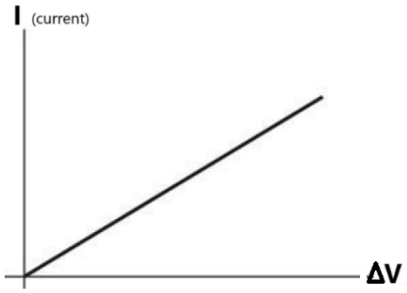
For the graph shown in the figure, what physical quantity does the slope of the graph represent for ohmic material?

A) power

B) resistivity

D) resistance

E) 1/(resistance)



Resistance and Resistivity: You are given a copper bar of dimensions **3 cm × 5 cm × 8 cm** and asked to attach leads to it in order to make a resistor. If you want to achieve the ***smallest*** **possible** **resistance**, you should attach the leads to the opposite faces that measure

A) 3 cm × 5 cm.

B) 3 cm × 8 cm.

C) 5 cm × 8 cm.

D) 5 cm × 5 cm.

Resistance and Resistivity: A wire of resistivity ρ must be replaced in a circuit by a wire of the same material but four times as long. If, however, the total resistance is to remain as before, the diameter of the new wire must

A) be the same as the original diameter.

B) be one-half the original diameter.

C) be one-fourth the original diameter.

D) be two times the original diameter.

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.

Which one of the following quantities is equivalent to 1 Ω?

A) 1 J/s

B) 1 A.s

C) 1 V · A

D) 1 V/A

If the length and diameter of a wire of circular cross section are both tripled, the resistance and resistivity will be

	resistance	resistivity
A	tripled	unchanged
B	unchanged	tripled
C	1/3 R	unchanged
D	1/9 R	1/3 ρ

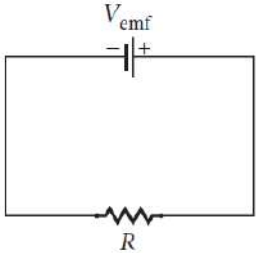
25.4 Electromotive Force and Ohm's Law

The mAh is another unit of charge:

$$1\text{mAh} = (10^{-3}\text{ A})(3600\text{ s}) = 3.6\text{ As} = 3.6\text{ C}.$$

The influence that makes current flow from lower to higher potential is called electromotive force (emf). **V_{emf}**

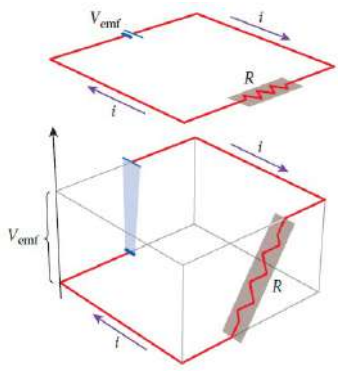
- An emf is not a force, but "energy per unit charge" = volt.
- The SI unit of V_{emf} is volt.



$V_{emf} = iR$

- Electromotive force (emf) is a measurement of the energy that causes current to flow through a circuit
- It can also be defined as the potential difference in charge between two points in a circuit
- It is also known as voltage, and it is measured in volts
- It is not truly a force; rather, it is a measurement of energy per unit charge

What does the total potential difference around a closed loop in a closed circuit equal?



A) The emf of the circuit
B) Zero
C) The potential drop across all resistors
D) The product of resistance and current

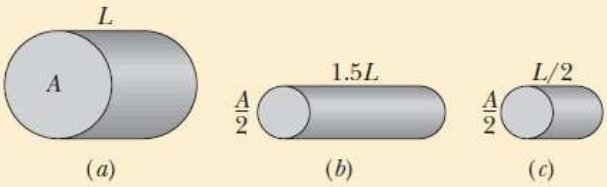
Which of the following is a non-ohmic device?

A) Resistor
B) Capacitor
C) Diode
D) Wire

Which property of resistors is implied by Ohm's Law?

A) Resistance depends on temperature
B) Resistance is inversely proportional to voltage
C) Current is directly proportional to voltage for ohmic resistors
D) Current is inversely proportional to resistance for non-ohmic resistors

The figure here shows three cylindrical copper conductors along with their face areas and lengths. Rank them according to the current through them, greatest first, when the same potential difference V is placed across their lengths.

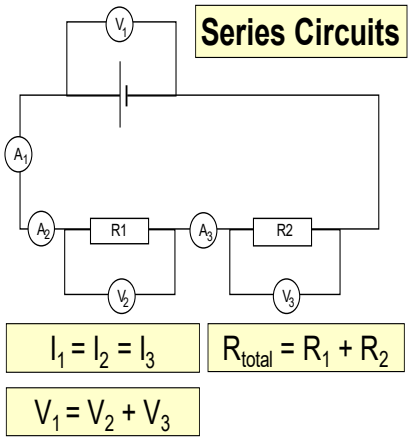


Connecting electric resistances in a circuit

Electric resistances can be connected in the electric circuit using two methods which are

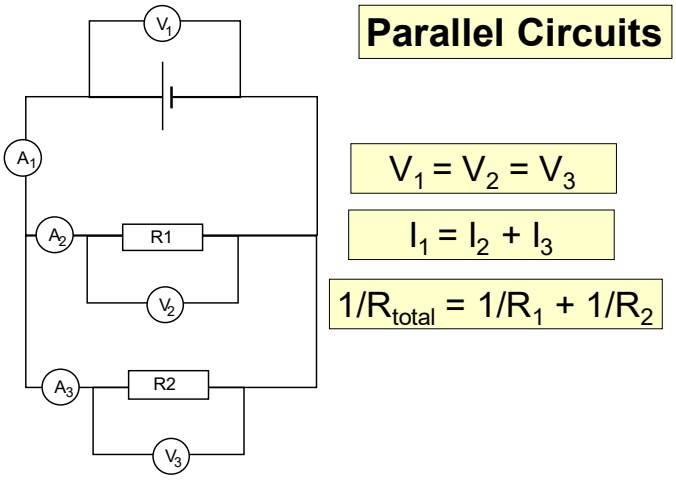
A. series connection **B. parallel connection**

A. Resistors connection in series



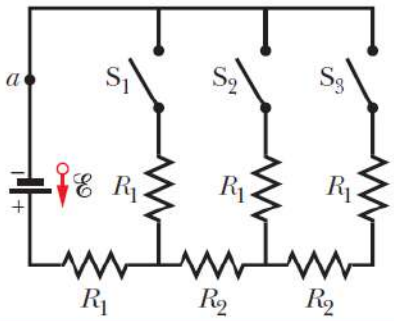
- current is the same through each component
- the total potential difference of the power supply is shared between the components
- the total resistance of the circuit is the sum of individual resistors Obtaining big resistance
- R_{eq} = NR for N equal resistances

B. resistors connection in parallel



- the total current supplied is split between the components on different loops
- potential difference is the same across each loop
- the **total resistance** of the circuit **is reduced** as the current can follow multiple paths
- $R_{eq} = \frac{R}{N}$ for equal N resistors

In Fig. 27-69, $R_1 = 20.0\ \Omega$, $R_2 = 10.0\ \Omega$, and the ideal battery has emf $\mathscr{E} = 120$ V. What is the current at point a if we close (a) only switch S_1, (b) only switches S_1 and S_2, and (c) all three switches?



(a) If S_1 is closed, and S_2 and S_3 are open, then $i_a = \mathscr{E}/2R_1 = 120\ \text{V}/40.0\ \Omega = 3.00\ \text{A}$.

(b) If S_3 is open while S_1 and S_2 remain closed, then

$$R_{eq} = R_1 + R_1\,(R_1 + R_2)\,/(2R_1 + R_2) = 20.0\ \Omega + (20.0\ \Omega) \times (30.0\ \Omega)/(50.0\ \Omega) = 32.0\ \Omega,$$

so $i_a = \mathscr{E}/R_{eq} = 120\ \text{V}/32.0\ \Omega = 3.75\ \text{A}$.

(c) If all three switches S_1, S_2, and S_3 are closed, then $R_{eq} = R_1 + R_1\,R'/(R_1 + R')$ where

$$R' = R_2 + R_1\,(R_1 + R_2)/(2R_1 + R_2) = 22.0\ \Omega,$$

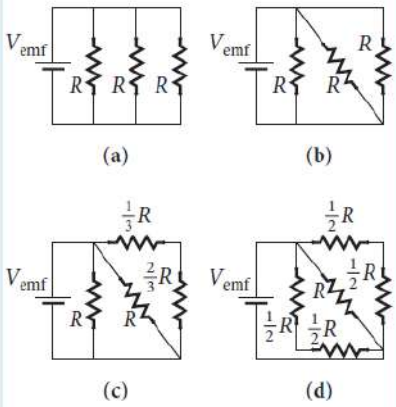
that is,

$$R_{eq} = 20.0\ \Omega + (20.0\ \Omega)\,(22.0\ \Omega)/(20.0\ \Omega + 22.0\ \Omega) = 30.5\ \Omega,$$

so $i_a = \mathscr{E}/R_{eq} = 120\ \text{V}/30.5\ \Omega = 3.94\ \text{A}$.

Concept Check 25.6

Which combination of resistors has the highest equivalent resistance?



a) combination (a)

b) combination (b)

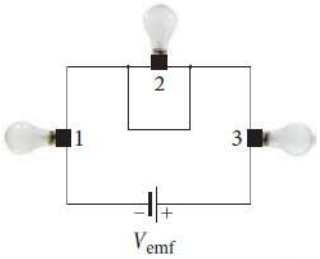
c) combination (c)

d) combination (d)

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

Concept Check 25.8

Three light bulbs are connected in series with a battery that delivers a constant potential difference, V_{emf}. When a wire is connected across light bulb 2 as shown in the figure, light bulbs 1 and 3



a) burn just as brightly as they did before the wire was connected.

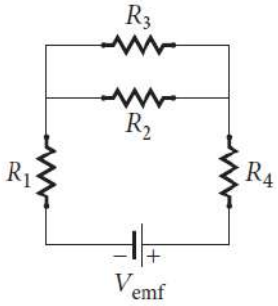
b) burn more brightly than they did before the wire was connected.

c) burn less brightly than they did before the wire was connected.

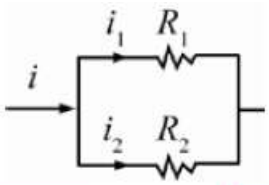
d) go out.

PROBLEM

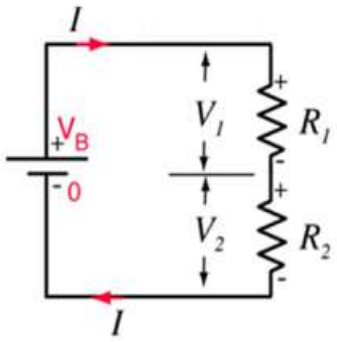
The circuit shown in Figure 25.20a has four resistors and a battery with $V_{emf} = 149$ V. The values of the four resistors are $R_1 = 17.0\ \Omega$, $R_2 = 51.0\ \Omega$, $R_3 = 114.0\ \Omega$, and $R_4 = 55.0\ \Omega$. What is the magnitude of the potential drop across R_2?



Tips



$$i_1 = \frac{R_2}{R_1 + R_2} i \qquad i_2 = \frac{R_1}{R_1 + R_2} i$$

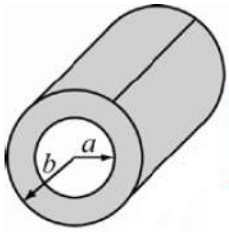


$$V_1 = \frac{R_1}{R_1 + R_2} V \qquad V_2 = \frac{R_2}{R_1 + R_2} V$$

$$R = \frac{\rho L}{A} = \frac{\rho L}{\pi r^2} = \frac{4 \rho L}{\pi d^2}$$

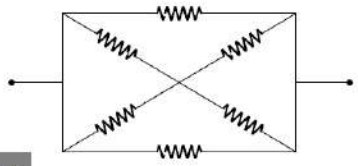
$$\frac{R_1}{R_2} = \frac{\rho_1 L_1 A_2}{\rho_2 L_2 A_1} = \frac{\rho_1 L_1 r_2^2}{\rho_2 L_2 r_1^2}$$

Area of Hollow cylindrical conductor

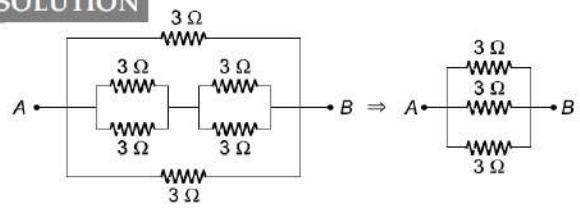


$$A = \pi\left(b^2 - a^2\right)$$

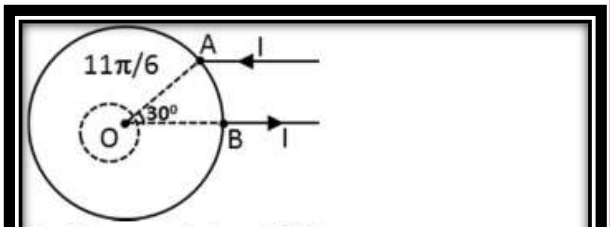
Find the equivalent resistance between points A and B in the network shown in Fig. 22.12. Each resistor has a resistance of 3 Ω.



SOLUTION



$R_{AB} = 1\ \Omega$



Resistance of wire = 36 Ω

Wire is bent in form of circle

Resistance of wire per unit angle $= \frac{36}{2\pi}$

Resistance of wire for are making angle 30^0

$= \frac{36}{2\pi} \times \frac{\pi}{6} = 3\Omega$

Resistance of remaining section of wire = 33 Ω

$\text{Req} = \frac{3\times33}{3+33} = \frac{3\times33}{36} = \frac{33}{12} = 2.75\Omega$

EXAMPLE

Find the equivalent resistance between points A and B in the network shown in Fig. 22.14, when

(a) switch S is open

(b) switch S is closed.

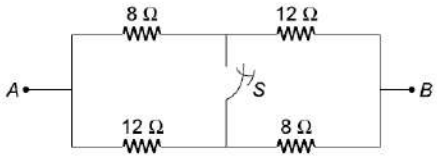


Fig. 22.14

SOLUTION

(a) When switch S is open, the circuit is as shown in Fig. 22.15.

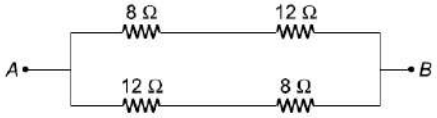


Fig. 22.15

$$R_{AB} = \frac{20 \times 20}{(20 + 20)} = 10\ \Omega$$

(b) When switch S is closed, the circuit can be redrawn as shown in Fig. 22.16

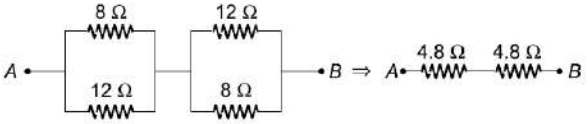


Fig. 22.16

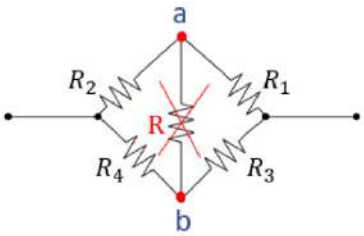
It is clear that

$$R_{AB} = 4.8 + 4.8 = 9.6\ \Omega$$

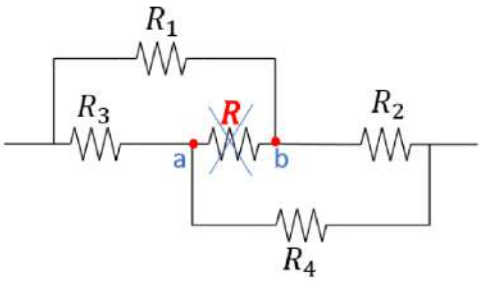
ملحوظة

إذا تساوى فرق الجهد بين طرفي مقاومة في دائرة كهربية بها مقاومات متساوية فلا يمر بها تيار كهربي.

أ)



ب)



1) هتجزأ التيار هتلاقى التيار بيدخل المقاومة من الناحيتين.

2) هترقم بداية ونهاية المقاومة a,b.

3) هترقم المقاومات على جانبى النقطة a وتكون R_2 و R_1

وعلى جانبى النقطة b R_4 و R_3.

$$\frac{R_1}{R_2} = \frac{R_3}{R_4}$$ و

∴ جهد A = جهد B

25.7 Energy and Power in Electric Circuits

$$dU = dq\,\Delta V$$

$$dU = i\,dt\,\Delta V$$

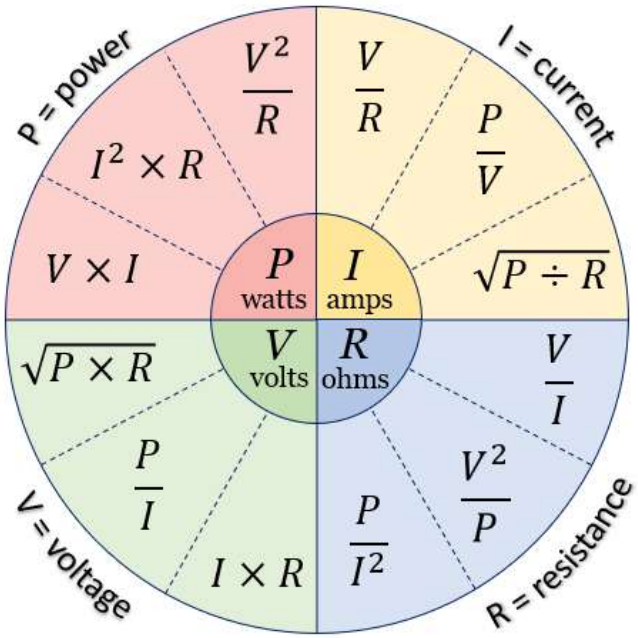
$$P = \frac{dU}{dt} = \frac{i\,dt\,\Delta V}{dt} = i\Delta V$$

<u>The electric power</u> (P_w)

The electric energy consumed in 1 second

It is measured in **Watt** which is equivalent to **Joule / second**

$$P_w = V\,I = \frac{U}{t}$$



When the current through a resistor is increased by a factor of 4, the power dissipated by the resistor

A) decreases by a factor of 4.

B) decreases by a factor of 16.

C) increases by a factor of 16.

D) increases by a factor of 4.

Power: Which one of the following quantities is equivalent to 1 W?

A) 1 V/A

B) 1 Ω · m

C) 1 V · A

D) 1 V/Ω

A resistor *R* and another resistor 2*R* are connected in series across a battery. If heat is produced at a rate of 10 W in *R*, then in 2*R* it is produced at a rate of

A. 40 W. B. 20 W. C. 10 W. D. 5 W.

If the resistance in a constant voltage circuit is doubled, the power dissipated by that circuit will

A) increase by a factor of two.

B) increase by a factor of four.

C) decrease to one-half its original value.

D) decrease to one-fourth its original value.

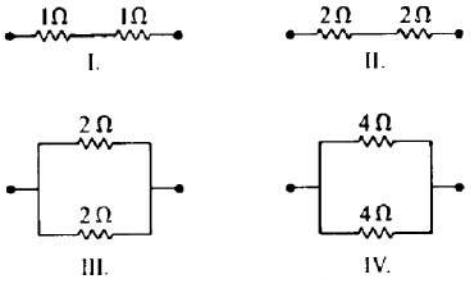
If the voltage across a circuit of constant resistance is doubled, the power dissipated by that circuit will

A) be four times as large.

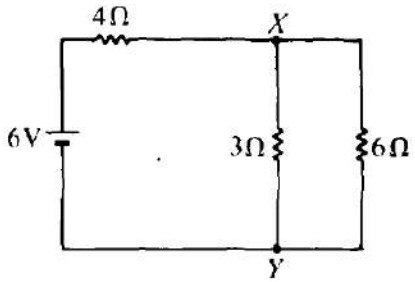
B) be two times as large.

C) decrease to one-half the original power.

D) decrease to one-fourth the original power

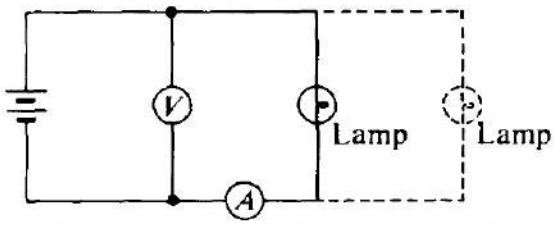


1. **Multiple Correct.** Which arrangements of resistors shown above have the same resistance between the terminals? Select two answers
   (A) I
   (B) II
   (C) III
   (D) IV



2. In the circuit shown above, what is the value of the potential difference between points X and Y if the 6–volt battery has no internal resistance?
   (A) 2 V (B) 3 V (C) 4 V (D) 6V

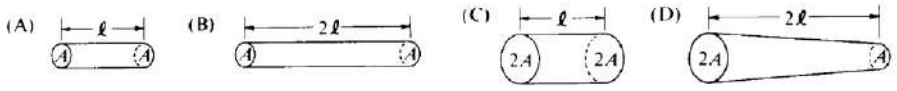
Questions 3-4:
A lamp, a voltmeter V, an ammeter A, and a battery with zero internal resistance are connected as shown.

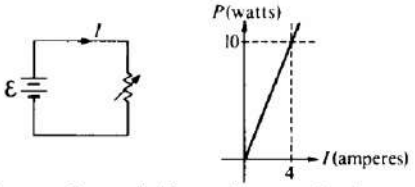


3. How would the ammeter reading change when another lamp is connected in parallel with the first lamp as shown by the dashed lines?
   (A) increases, because the current through the ammeter splits to feed both branches
   (B) remains the same, because the ammeter measures the current provided by the battery
   (C) decreases, because the resistance of the circuit is increased
   (D) remains the same, because energy is conserved in the circuit

4. How would the voltmeter reading change when another lamp is connected in parallel with the first lamp as shown by the dashed lines?
   (A) decreases, because the current is split between the two branches
   (B) remains the same, because charge is conserved in the circuit
   (C) increases, because the resistance of the circuit is increased
   (D) remains the same, because energy is conserved in the circuit

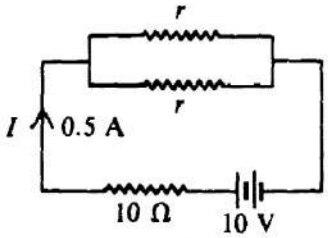
The four resistors shown below have the lengths and cross–sectional areas indicated and are made of material with the same resistivity. Which has the greatest resistance?





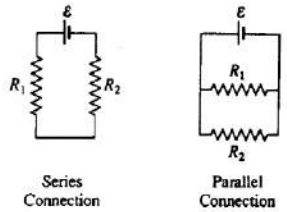
The circuit shown above left is made up of a variable resistor and a battery with negligible internal resistance. A graph of the power P dissipated in the resistor as a function of the current I supplied by the battery is given above right. What is the emf of the battery?

(A) 0.025 V (B) 2.5 V (C) 6.25 V (D) 40 V

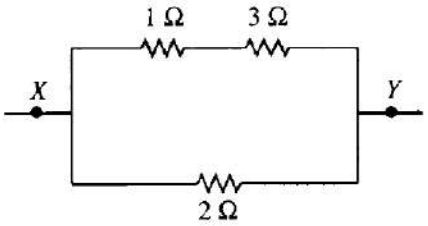


In the circuit shown above, the value of r for which the current I is 0.5 ampere is

(A) 1 Ω (B) 5 Ω (C) 10 Ω (D) 20 Ω



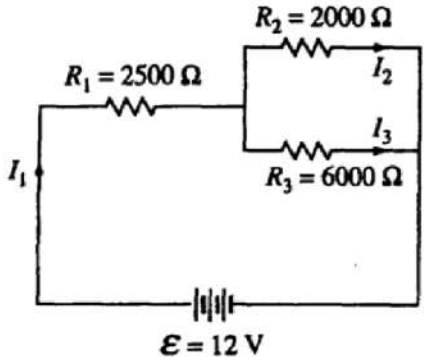
11. In the diagrams above, resistors R_1 and R_2 are shown in two different connections to the same source of emf ε that has no internal resistance. How does the power dissipated by the resistors in these two cases compare?
    (A) It is greater for the series connection, because the current is not split.
    (B) It is greater for the series connection, because the equivalent resistance is greater
    (C) It is greater for the parallel connection, because the total current is greater.
    (D) It is greater for the parallel connection, because both resistors have the same voltage.



12. The diagram above shows part of a closed electrical circuit. When there is a steady current in the circuit, the amount of charge passing a point per unit of time is
    (A) greater in the 1 Ω resistor than in the 3 Ω resistor
    (B) greater in the 1 Ω resistor than in the 2 Ω resistor
    (C) greater in the 2 Ω resistor than in the 3 Ω resistor
    (D) greater at point X than at point Y

A wire of length L and radius r has a resistance R. What is the resistance of a second wire made from the same material that has a length $L/2$ and a radius $r/2$?
(A) $4R$ (B) $2R$ (C) R (D) $R/2$

Questions 16-18



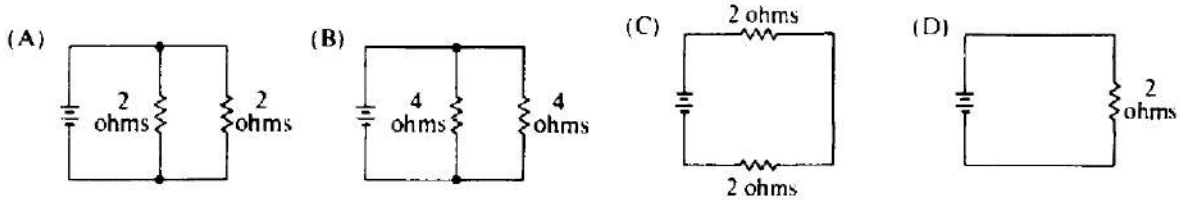
16. Which current is greater I_1 or I_2?
(A) I_1 is greater, because it has more resistance.
(B) I_2 is greater, because it has less resistance.
(C) I_1 is greater, because of charge conservation.
(D) I_2 is greater, because of energy conservation.

17. What is the current I_1?
(A) 1 mA (B) 3 mA (C) 4 mA (D) 12 mA

18. Which of the following changes would increase the value of I_1?
(A) Remove R_3 and the branch containing it.
(B) Replace R_2 with another 6000 Ohm resistor.
(C) Add an 8000 Ohm resistor in parallel with R_2 and R_3.
(D) Rewire the circuit, putting all three resistors in series.

19. A 60-W incandescent bulb and a 13.3-Watt compact fluorescent light are both plugged into a 110-volt household circuit and lit. Which bulb has the greater resistance?
(A) Neither, since they are connected across the same potential difference.
(B) The 60-W bulb, because it draws more current.
(C) The 13.3-W bulb, because it uses less power
(D) The 13.3-W bulb, because it is more efficient.

Questions 23-25



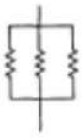
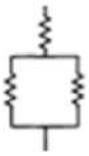
The batteries in each of the circuits shown above are identical and the wires have negligible resistance.

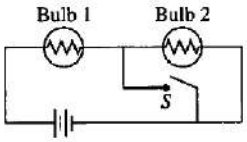
23. In which circuit is the current furnished by the battery the greatest?
(A) A (B) B (C) C (D) D

24. In which circuit is the equivalent resistance connected to the battery the greatest?
(A) A (B) B (C) C (D) D

25. Which circuit dissipates the least power?
(A) A (B) B (C) C (D) D

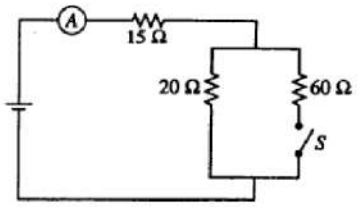
Which of the following combinations of 4Ω resistors would dissipate 24 W when connected to a 12 Volt battery?

(A)  (B)  (C)  (D) 



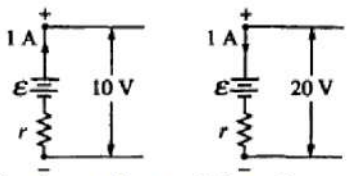
The circuit in the figure above contains two identical lightbulbs in series with a battery. At first both bulbs glow with equal brightness. When switch S is closed, which of the following occurs to the bulbs?

Bulb I	Bulb 2
(A) Goes out	Gets brighter
(B) Gets brighter	Goes out
(C) Gets brighter	Gets slightly dimmer
(D) Gets slightly dimmer	Gets brighter



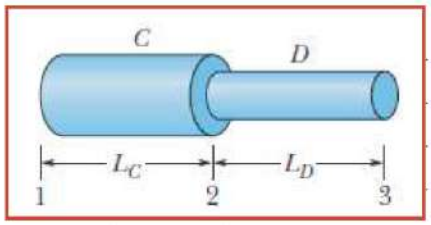
When the switch S is open in the circuit shown above, the reading on the ammeter A is 2.0 A. When the switch is closed, the reading on the ammeter is
(A) doubled
(B) increased slightly but not doubled
(C) the same
(D) decreased slightly

Two conducting cylindrical wires are made out of the same material. Wire X has twice as much resistance than wire Y. Which of the following could be true?
(A) Wire X is twice the diameter of wire Y.
(B) Wire X is twice as long and twice the diameter of wire Y.
(C) Wire Y is twice as long and twice the diameter of wire X.
(D) Wire Y is twice as long as wire X.



The figures above show parts of two circuits, each containing a battery of emf ε and internal resistance r. The current in each battery is 1 A, but the direction of the current in one battery is opposite to that in the other. If the potential differences across the batteries' terminals are 10 V and 20 V as shown, what are the values of ε and r ?
(A) $\mathcal{E}$ = 5 V, r = 15 Ω
(B) $\mathcal{E}$ =10 V, r = 100 Ω
(C) $\mathcal{E}$ = 15 V, r = 5 Ω
(D) $\mathcal{E}$ = 20 V, r = 10 Ω

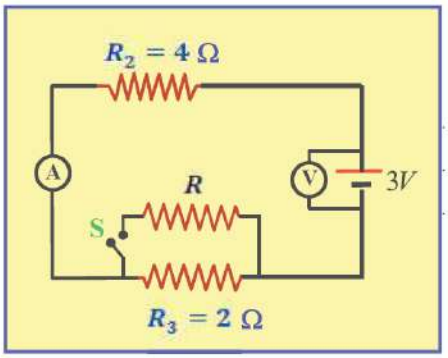
4. سلكان C و D مختلفان بنوع المادة وبنصف قطر مقطعهما وطولهما متساوي كما بالشكل المجاور $L_C = L_D = 1.0m$ و $\rho_C = 2.0\times10^{-6}(\Omega.m)$ وقطره $1.0mm$ بينما السلك D $\rho_D = 1.0\times10^{-6}(\Omega.m)$ وقطره $0.5mm$ وشدة التيار الكهربائي المار بهما 2A



a- ما مقدار فرق الجهد بين (1,2) و (2,3)

b- ما معدل صرف الطاقة الكهربائية (P) في كل من السلكين؟

5. معتمداً على الدائرة الكهربائية المجاورة والبيانات الواردة عليها،

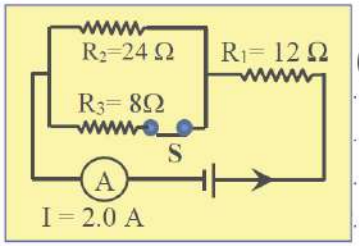


a-احسب شدة التيار المار في الدائرة.

b- اذا أغلق المفتاح فماذا يطرأ على كل من :

- قراءة الفولتميتر؟
- قراءة الأميتر ؟

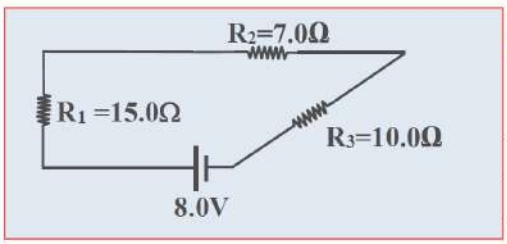
6. وصلت ثلاث مقاومات مع بطارية كما في الشكل المجاور.



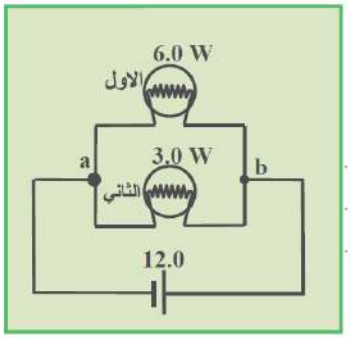
a-احسب فرق الجهد بين قطبي البطارية.(القوة المحركة الكهربائية)

b-فسر ما يحدث لقراءة الأميتر عند فتح المفتاح S ؟

7. معتمداً على البيانات الموضّحة على الدائرة الكهربائيّة المجاورة: جد فرق الجهد بين طرفي المقاومة R_3.(الهبوط في الجهد بالمقاومةR_3)(اهمال المقاومة الداخلية للبطارية)



8. **في الشكل المجاور المصباحان يعملان على فرق جهد (12.0 V). بالاعتماد على الدائرة الكهربائية الموضحة في الشكل والبيانات التي عليها.**



أجب عمّا يلي☹ (اهمال المقاومة الداخلية للبطارية)

a-احسب شدّة التيار الكلي المسحوب من البطارية.

.....

.....

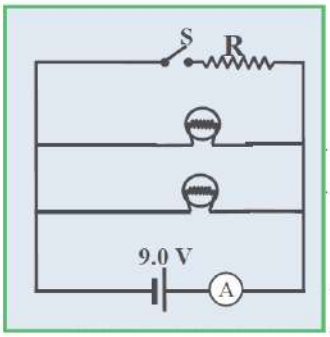
.....

b-إذا أزيل المصباح (6.0W) من قاعدته فماذا يحدث لدرجة سطوع المصباح (3.0 W)؟ برر إجابتك.

.....

.....

9. **الشكل المجاور يبين مقاومة متصلة على التوازي مع مصباحين متماثلين. فإذا كانت قراءة الاميتر والمفتاح S مفتوحاً يساوي 0.4A وعندما أغلق المفتاح أصبحت قراءة الاميتر 0.7A بالاعتماد على البيانات التي على الشكل أجب عما يلي**



a- عند غلق المفتاح S ماذا يطرأ على :

❶ سطوع المصباحين . برر إجابتك؟

.....

.....

❷ قراءة الأميتر . برر اجابتك؟

.....

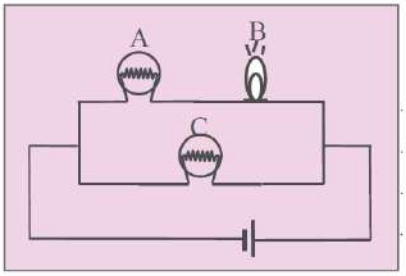
.....

b- ما مقدار المقاومة R

.....

.....

10. **مصابيح ضوئية (المصباح A والمصباح C مصباحان عاديان متماثلان) والمصباح B مصباح زينة إذا علمت ان سطوع مصباح الزينة اقل من سطوع المصباح A). ادرس الشكل ثم أجب عما يلي:**



a–اي من المصباحين (AوB) مقاومته أكبر؟ فسر اجابتك.

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.....

b–اذا احترق المصباح A ماذا يحدث لسطوع المصباحين CوB

.....

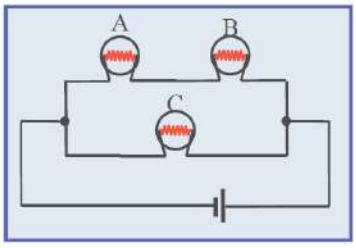
.....

c–اذا ازيل المصباح C من قاعدته ماذا يحدث لسطوع المصباحين Bو A

.....

.....

11. مصابيح ضوئية متماثلة موصلة مع بطارية كما في الشكل المجاور. ادرس الشكل ثم :أوجد النسبة



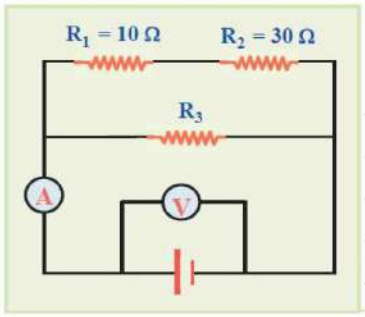
بين قدرة المصباح A الى قدرة المصباح C . ($\frac{P_A}{P_C}$)

.....

.....

.....

12. في الدائرة الكهربائية قراءة الاميتر 1.5A والفولتميتر 12V
احسب المقاومة R_3



.....

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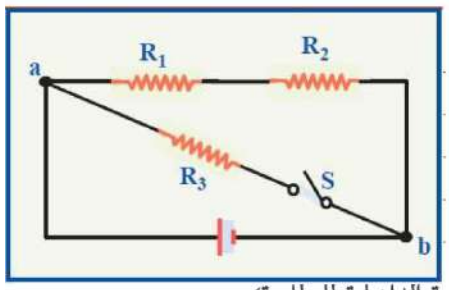
.....

13. في الدائرة الكهربائية اذا كان (R_1=15Ω و R_2=9 Ω و R_3=6 Ω) بينما $\Delta V_{ab} = 6V$ أجب عما يلي:



a- احسب فرق الجهد بين طرفي المقاومة R_2

.....

.....

.....

.....

.....

b- احسب شدة التيار المار في البطارية عند إغلاق المفتاح S (اهمل المقاومة الداخلية للبطارية)

.....

.....

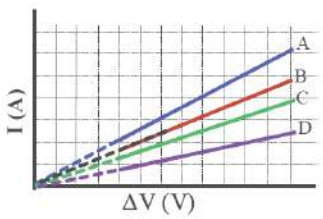
.....

أختر أنسب تكملة لكل مما يلي ثم ضع في المربع أمامها إشارة (✓)

1. في المحاليل الالكتروليتية تمثل حاملات الشحنة فيها

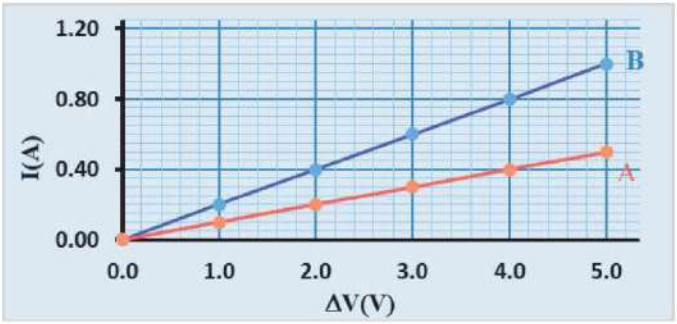
- ☐ الالكترونات فقط
- ☐ البروتونات فقط
- ☐ الايونات الموجبة والسالبة
- ☐ الايونات السالبة فقط

2. الشكل المجاور يبين تغيرات فرق الجهد وشدة التيار لأربع أسلاك من المادة نفسها ولهما نفس مساحة المقطع ولهما الطول نفسه فإن السلك الذي مقاومته أكبر هو



- A ☐
- B ☐
- C ☐
- D ☐

3. سلك نُحاسي منتظم المقطع وطوله (ℓ) قُص إلى قطعتين **A** و **B** مُختلفتين في الطول، الرسم المُجاور يُبيّن تغيرات شدة التيار المار في كل منهما بتغير فرق الجهد المطبق بين نهايتي كل من القطعتين. ما النسبة بين طولي القطعتين $(\frac{\ell_A}{\ell_B})$؟



☐ $\frac{2}{1}$ ☐ $\frac{5}{2}$ ☐ $\frac{1}{2}$ ☐ $\frac{2}{5}$

4. سلك من النحاس طوله (1.0m) ومقاومته الكهربائية (6.0Ω) عند درجة حرارة معينة. ما مقاومة سلك آخر من النحاس طوله (3.0 m) له نصف القطر نفسه وعند درجة الحرارة نفسها؟

☐ 2.0Ω ☐ 6.0Ω
☐ 12Ω ☐ 18Ω

5. أي الأسلاك المبينة في الشكل المجاور مقاومته **الأكبر** عند نفس درجة الحرارة وجميعها من نفس النوع

☐ (A)
☐ (C)
☐ (B)
☐ (D)

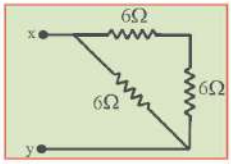
6. سلك اسطواني نصف قطره (r) ومقاومته الكهربائية (R) اذا استخدم سلك من نفس النوع ونفس الطول عند نفس درجة الحرارة ونصف قطره ثلاثة امثال السلك الأول فإن مقاومته تصبح

☐ 3R ☐ 9R
☐ 1/3R ☐ 1/9R

7. سلك من الألمنيوم مقاومته النوعية $2.8\times10^{-8}\Omega.m$ فإن قدرة الألمنيوم على التوصيل (موصليتها) **تساوي**

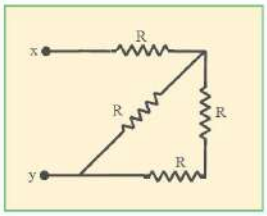
☐ $3.57\times10^{7}(\Omega.m)^{-1}$ ☐ $2.8\times10^{-8}(\Omega.m)^{-1}$
☐ $5.75\times10^{7}(\Omega.m)^{-1}$ ☐ $7.53\times10^{8}(\Omega.m)^{-1}$

8. يبين الشكل المجاور جزءاً من دائرة. المقاومة المكافئة لمجموعة المقاومات الموصولة بين النقطتين x ، y تساوي :



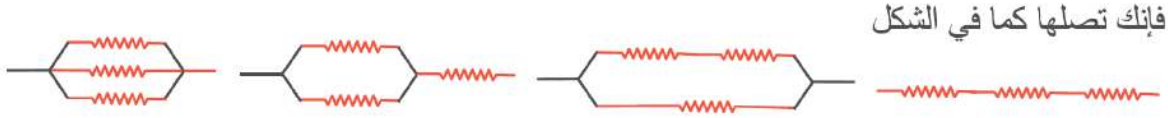
☐ 9Ω ☐ 18 Ω
☐ 4Ω ☐ 2Ω

9. المقاومة المكافئة لمجموعة المقاومات المتصلة كما في الشكل المجاور تساوي :



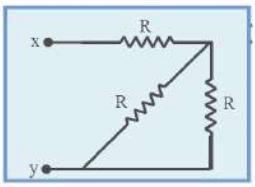
☐ $\frac{3R}{5}$ ☐ $\frac{5R}{3}$
☐ R ☐ 4 R

10. أذا طُلب منك توصيل ثلاث مُقاوِمات مُقاوَماتها متساوية في دائرة بحيث تحصل على أقل مقاومة مكافئة فإنك تصلها كما في الشكل



❐ ❐ ❐ ❐

11. المقاومة المكافئة لمجموعة المقاومات المتصلة كما في الشكل المجاور تساوي



❐ $\frac{2R}{3}$ ❐ $\frac{3R}{2}$

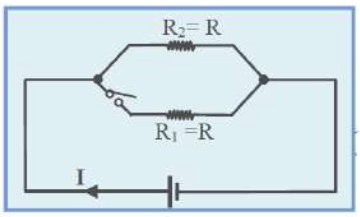
❐ R ❐ 3R

12. أي القيم الآتية للمقاومة المكافئة لا يمكن الحصول عليها عند توصيل متعلم ثلاث مقاوِمات متماثلة يمكن توصيلها بطرق مختلفة مقاومة كل منهما (24 Ω)؟

❐ 72 Ω ❐ 36 Ω

❐ 24 Ω ❐ 8.0 Ω

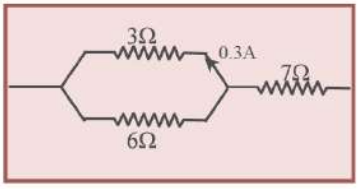
13. عند اغلاق المفتاح في الدائرة المجاورة فإن شدة التيار (I) :



❐ تنعدم ❐ تقل للنصف

❐ يزداد للضعف ❐ قيمته تبقى ثابتة (لا يتغير)

14. في الشكل المجاور شدة التيار المار في المقاومة Ω 6 تساوي:



❐ 0.5A ❐ 0.15A

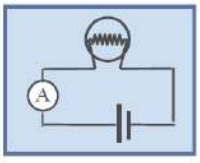
❐ 1A ❐ 4.5A

15. في المسألة السابقة إن شدة التيار المار في المقاومة Ω 7 يساوي

❐ 0.5A ❐ 0.15A

❐ 1A ❐ 0.45A

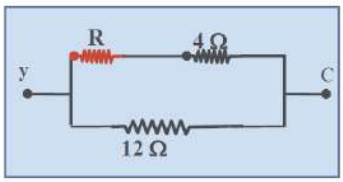
16. في الشكل المجاور مصباح كهربائي مرمز (2 W, 8V) وعندما تم توصيل المصباح ببطارية (مهملة المقاومة الداخلية)كانت قراءة الاميتر (0.2A) ، فإن مقدار فرق الجهد للبطارية تساوي



❐ 8 V ❐ 20 V

❐ 6.4 V ❐ 3.4 V

17. المقاومة المكافئة لمجموعة المقاومات المتصلة بين (y,c) كما في الشكل المجاور

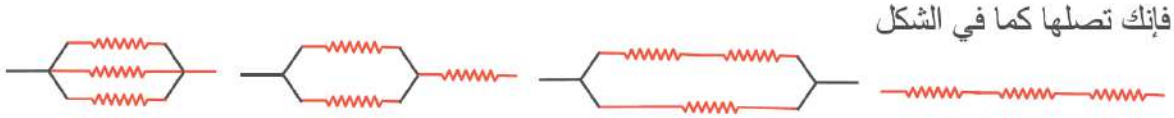


تساوي 6Ω فإن مقدار المقاومة R

❐ 2Ω ❐ 4Ω

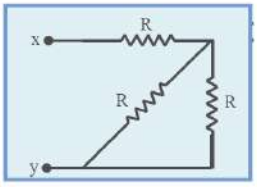
❐ 8Ω ❐ 6Ω

10. أذا طُلب منك توصيل ثلاث مُقاوِمات مُقاوَماتها متساوية في دائرة بحيث تحصل على أقل مقاومة مكافئة فإنك تصلها كما في الشكل



❐ ❐ ❐ ❐

11. المقاومة المكافئة لمجموعة المقاومات المتصلة كما في الشكل المجاور تساوي



❐ $\frac{2R}{3}$ ❐ $\frac{3R}{2}$

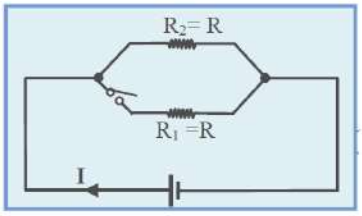
❐ R ❐ 3R

12. أي القيم الآتية للمقاومة المكافئة لا يمكن الحصول عليها عند توصيل متعلم ثلاث مقاوِمات متماثلة يمكن توصيلها بطرق مختلفة مقاومة كل منهما (24 Ω)؟

❐ 72 Ω ❐ 36 Ω

❐ 24 Ω ❐ 8.0 Ω

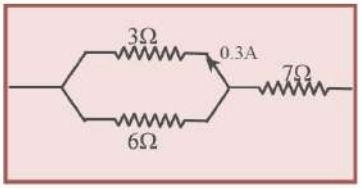
13. عند اغلاق المفتاح في الدائرة المجاورة فإن شدة التيار (I) :



❐ تنعدم ❐ تقل للنصف

❐ يزداد للضعف ❐ قيمته تبقى ثابتة (لا يتغير)

14. في الشكل المجاور شدة التيار المار في المقاومة 6 Ω تساوي:



❐ 0.5A ❐ 0.15A

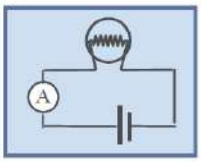
❐ 1A ❐ 4.5A

15. في المسألة السابقة إن شدة التيار المار في المقاومة 7 Ω يساوي

❐ 0.5A ❐ 0.15A

❐ 1A ❐ 0.45A

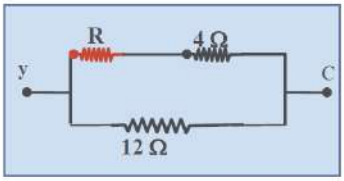
16. في الشكل المجاور مصباح كهربائي مرمز (2 W, 8V) وعندما تم توصيل المصباح ببطارية (مهملة المقاومة الداخلية)كانت قراءة الاميتر (0.2A) ، فإن مقدار فرق الجهد للبطارية تساوي



❐ 8 V ❐ 20 V

❐ 6.4 V ❐ 3.4 V

17. المقاومة المكافئة لمجموعة المقاومات المتصلة بين (y,c) كما في الشكل المجاور

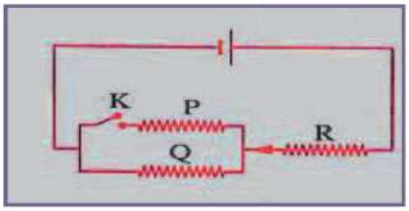


تساوي 6Ω فإن مقدار المقاومة R

❐ 2Ω ❐ 4Ω

❐ 8Ω ❐ 6Ω

18. في الدائرة الكهربائية المقابلة ثلاثة مقاومات متماثلة متصلة، عند غلق المفتاح K فإنه:



- ❒ يقل تيار R ويزيد تيار Q
- ❒ يقل تيار R ويقل تيار Q
- ❒ يزيد تيار R ويزيد تيار Q
- ❒ يزيد تيار R ويقل تيار Q

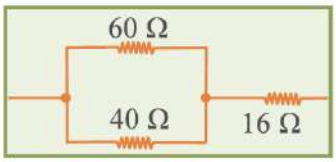
19. لدى متعلم ثلاثة مقاومات متماثلة مقاومة كل منهما (12Ω)، يمكن توصيلها بطرق مختلفة أي القيم الآتية للمقاومة المكافئة لا يمكن الحصول عليها عند توصيل جميع المقاومات معا؟

❒ 36 Ω ❒ 24 Ω ❒ 18 Ω ❒ 4.0 Ω

20. دائرة كهربائية مكونة من ثلاثة مقاومات موصلة على التوازي وبطارية ومفتاح. أهم ما يميز هذا النوع من التوصيل أنه:

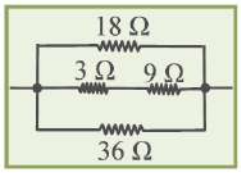
- ❒ فرق الجهد الكلي يساوي مجموع فروق الجهد بين طرفي كل مقاوم.
- ❒ عندما يتوقف مرور التيار في أحد هذه المقاومات فإنه يتوقف عن باقي المقاومات
- ❒ يجب أن يمر في جميع هذه المقاومات التيار الكهربائي نفسه.
- ❒ يجب أن يكون التيار الكلي مساوياً لمجموع التيارات الفرعية المارة في هذه المقاومات.

21. ما مقدار المقاومة المكافئة لمجموعة المقاومات الموصولة فيما بينها كما في الشكل المجاور؟



❒ 40 Ω ❒ 5.17Ω
❒ 331Ω ❒ 116Ω

22. ما مقدار المقاومة المكافئة لمجموعة المقاومات الموصولة فيما بينها كما في الشكل المجاور؟

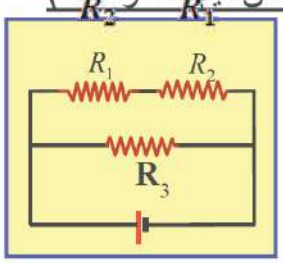


❒ 66 Ω ❒ 12 Ω
❒ 9 Ω ❒ 6 Ω

23. ثلاثة مقاومات (3Ω و 6Ω و 8Ω) أي التالية لا تمثل مقاومة مكافئة لها عند توصيلها معاً

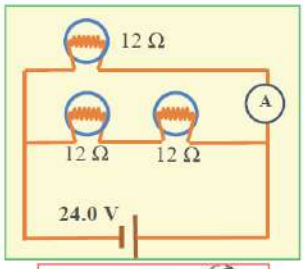
❒ 17 Ω ❒ 10 Ω
❒ 1.6Ω ❒ 1Ω

24. في الدائرة الكهربائيّة، أيّ العبارات الآتية صحيحة دائماً؟ (بغض النظر عن قيم المقاومات)



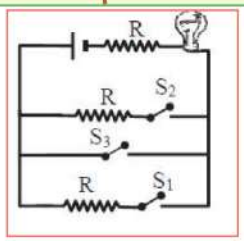
- ❒ يمر بالمقاومين R_1 و R_2 التيار نفسه
- ❒ فرق الجهد بين طرفي المقاوم R_1 يساوي فرق الجهد بين طرفي المقاوم R_2
- ❒ يمر بالمقاومين R_1 و R_2 تياراً شدّته أقل من شدّة التيار المار بالمقاوم R_3
- ❒ فرق الجهد بين طرفي المقاوم R_1 يساوي فرق الجهد بين طرفي المقاوم R_3

25. ما مقدار قراءة الأميتر في الشكل المجاور؟



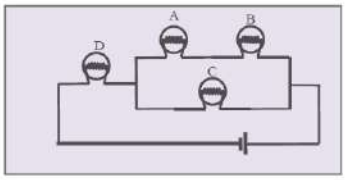
- ❒ 3.0 A
- ❒ 2.0 A
- ❒ 1.0 A
- ❒ 0.67 A

26. ان اضاءة المصباح تكون بسطوع أعلى عند غلق:



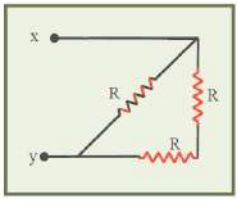
- ❒ المفتاح S_2 فقط
- ❒ المفتاح S_1 فقط
- ❒ المفتاح S_3 فقط
- ❒ المفتاحين S_1 ، S_2 معاً

27. الشكل المجاور يبين اربعة مصابيح. المصباح الذي اذا ازيل من قاعدته لا يؤدي الى انطفاء أي من المصابيح الأخرى هو المصباح



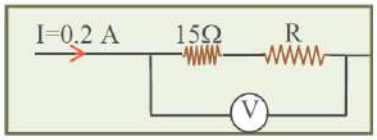
- ❒ A
- ❒ B
- ❒ C
- ❒ D

28. المقاومة المكافئة لمجموعة المقاومات المتصلة كما في الشكل المجاور تساوي:



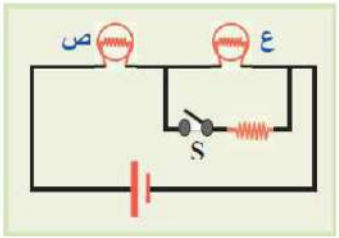
- ❒ $\frac{3}{2R}$
- ❒ $\frac{2R}{3}$
- ❒ $\frac{2}{3R}$
- ❒ 3 R

29. اذا كانت قراءة الفولتميتر المبين بالشكل المجاور يساوي 8 فولت فإن مقدار المقاومة R تساوي:



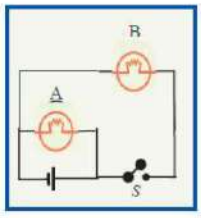
- ❒ 25Ω
- ❒ 1.2Ω
- ❒ 30Ω
- ❒ 40Ω

30. مصباحان كهربائيان متماثلان ومقاومة وبطارية موصولة معاً كما هو مبين بالشكل اي الاتي يحدث عند اغلاق المفتاح S



- ❒ يزداد سطوع المصباح (ع)
- ❒ يزداد سطوع المصباح (ص)
- ❒ يقل سطوع المصباح (ص)
- ❒ لا يتأثر سطوع المصباحين

31. في الشكل المجاور وعند غلق المفتاح S فإن اضاءة المصباح A



- ❒ يزداد
- ❒ تنعدم
- ❒ يقل
- ❒ تبقى على حالها

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

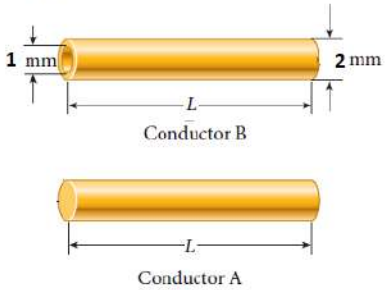
A 0.08 Ω in series

B 13.5 Ω is parallel

C 0.08 Ω in parallel

D 13.5 Ω in series.

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.



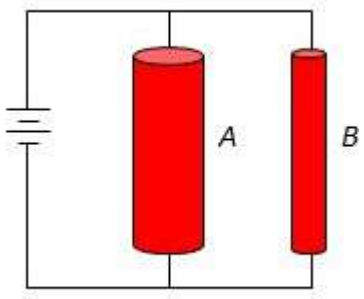
A 3:1

B 1:3

C 1:1

D 2:1

The 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.

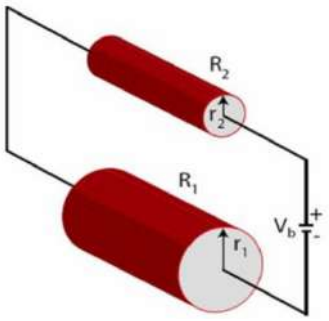
B) The voltage drop across resistor B is larger than the voltage drop across resistor A.

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

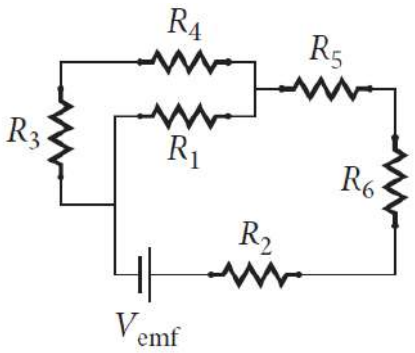
B. 1.51

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 $R_6 = 4\ \Omega$

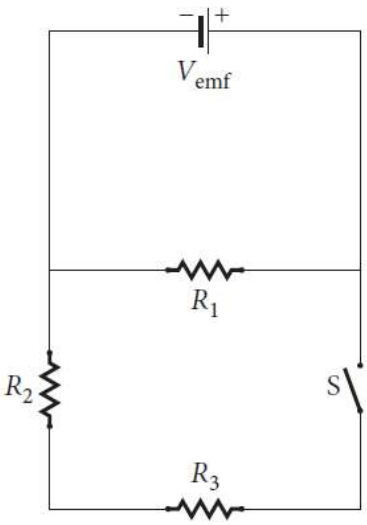
The $V_{emf} = 180$ V



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

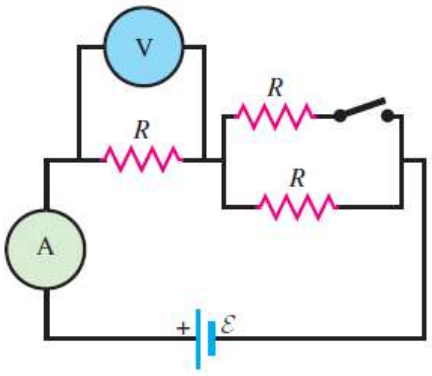
In the circuit in the figure, there are three identical resistors. The switch, S, is initially open. When the switch is closed, which statement is TRUE



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

When the switch in Figure is closed, the reading of the voltmeter V will

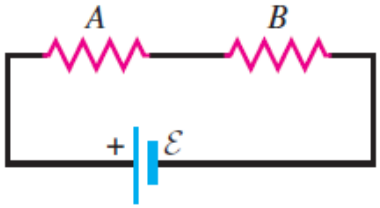
A- Decrease
B- Increase
C- Become zero
D- Not change



You connect three resistors with resistances *R*, 2*R*, and 3*R* in parallel. The equivalent resistance of the three resistors will have a value that is

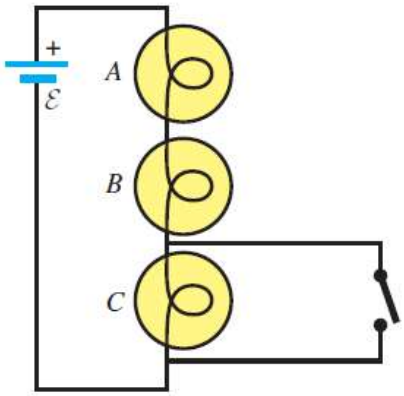
A. greater than 3*R*.
B. between 2*R* and 3*R*.
C. between *R* and 2*R*.
D. less than *R*.

In the circuit shown in Figure resistor A has three times the resistor B. Therefore,



A. the current through A is three times the current through B.
B. the current through B is three times the current through A.
C. the potential difference across A is three times the potential difference across B.
D. the potential difference is the same across both resistors

Three identical light bulbs, *A*, *B*, and *C*, are connected in the circuit shown in Figure. When the switch is closed,



A. the brightness of *A* and *B* remains the same as it was, but *C* goes out.

B. the brightness of *A* and *B* remains the same as it was, but *C* will be about half as bright as it was.

C. the brightness of *A* and *B* decreases, and *C* goes out.

D. the brightness of *A* and *B* increases, and *C* will be about half as bright as it was.

E. the brightness of *A* and *B* increases, but *C* goes out.

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

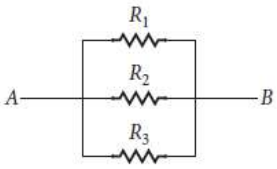
a) is the same as the current through R_1 and R_3.

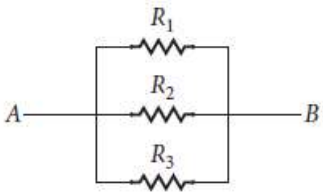
b) is a third of the current through R_1 and R_3.

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?

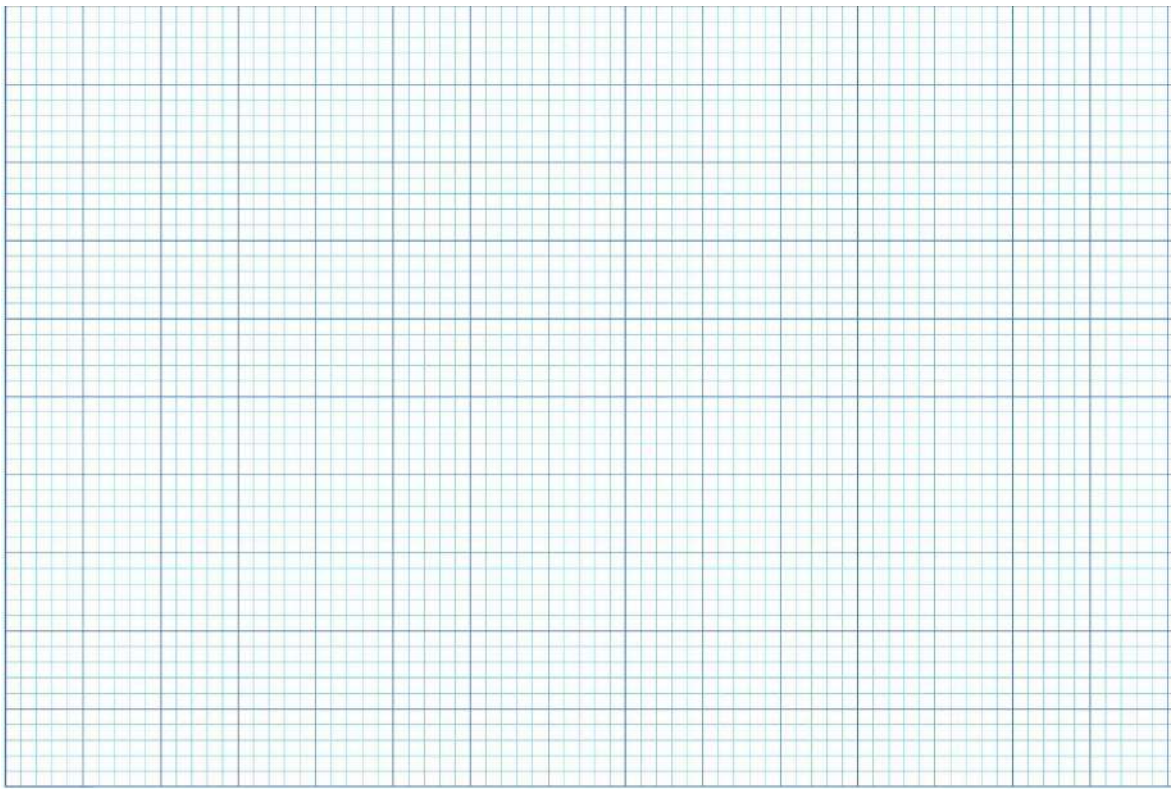
a. 11 Ω
b. 2.9 Ω
c. 4.1 Ω

d. 5.2 Ω	

The following measurements of current and potential difference were made on a resistor constructed of Nichrome™ wire, where *ab* is the potential difference across the wire and *I* is the current through it:

I(A)	V_{ab} (V)
0.50	1.94
1.00	3.88
2.00	7.76
4.00	15.52

(a) Graph *Vab* as a function of *I*.



(b) Does Ohm's law apply to Nichrome™? Why?

.....

.....

(c) What is the resistance of the resistor in ohms?

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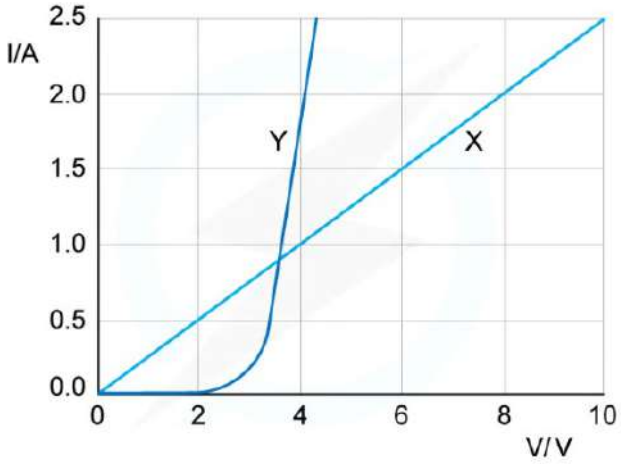
.....

The I–V characteristic of two Resistors X and Y are shown



Which statement is correct?

A. The resistance of **X** increases as the current increases

B. At 2 V, the resistance of **X** is half the resistance of **Y**

C. **Y** doesn't obey ohm's law and **X** does.

D. **X** and **Y** have the same resistance

Find the resistance X

.....

.....

.....

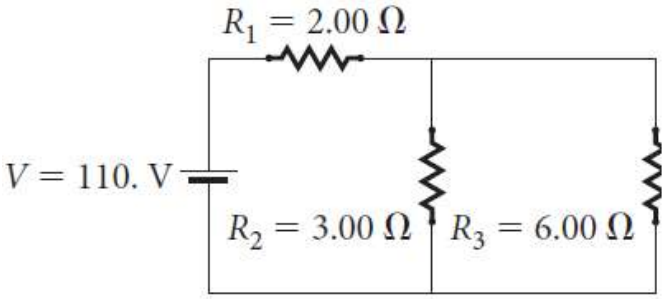
Find the power of resistance X

.....

.....

.....

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.

.....

.....

.....

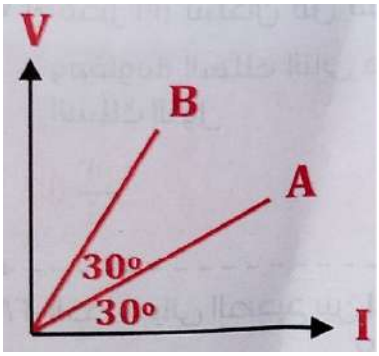
c) Find the rate at which thermal energy is dissipated from R_2.

.....

.....

.....

Find the ratio od resistance A to B



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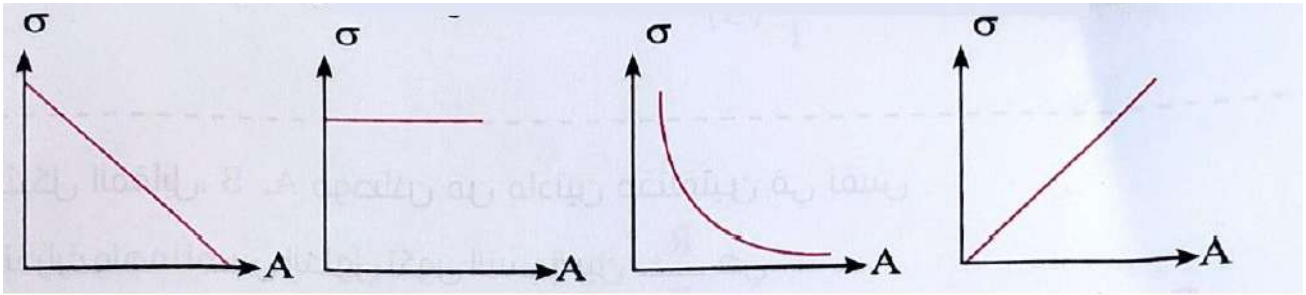
Which of the following is the correct diagram for the relation between conductivity and cross-sectional area of a wire



A B C D