

Equations and constants

Use the following Formulas as needed to help solve the questions

$q = It$		
$V = IR$		
$P = IV$	$P = I^2R$	$P = \frac{V^2}{R}$
$E = Pt$		
$Total\ cost(DH) = P((kW) \times t(h) \times price(DH/1kW.h)$		
$Q = mc\Delta T$		
$P.E_g = mgh$		
$R = R_1 + R_2 + R_3$		
$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$		
$g = 9.80\ m/s^2$		

Question 1: Choose the correct answer by marking a (✓) in the

20

1) What is the property that determines how much electric current will flow through a conductor? [2]

- Potential difference across the conductor Electric resistance of the conductor
 Energy transfer rate Electric charge flow rate

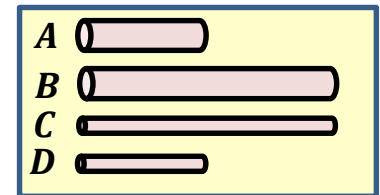
2) Which of the following shows the battery function in the electric circuit? [2]

- Provides the electric charges Provides the electric resistance
 Consumes electric energy Provides electric charges with energy

3) The total change in the electric potential energy of the charges as it moves across the electric circuit equals zero because of: [2]

- the loss of energy through the circuit the electric power dissipated in the resistance
 the conservation of electric charge the rapid increase of the potential difference

4) The figure shows four wires made of copper. If the same potential difference is applied across the wires which will carry the largest current? [2]



- A B C D

5) Three identical resistors each of 10Ω are connected in series across a 12 V battery. If one of the resistors is burnt, what, what is the current across the other resistors? [2]

- Zero 0.40 0.60 1.7

6) Which of the following is true when non identical resistors are connected in series across a battery? [2]

- The resistors dissipate equal power The resistors carry the same current
 The reciprocal of the equivalent resistance is equal to the sum of the reciprocals of individual resistances The voltage drop is the same across the resistors

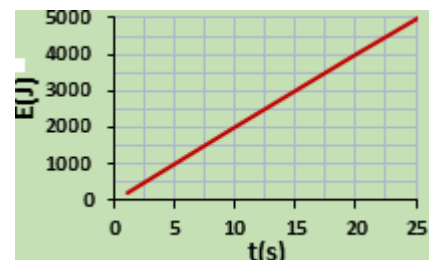
7) How will the electric current across an ohmic resistor change when the potential difference is decreased to one third? [2]

- Decreases to one third Decreases to one ninth
 Increases to three times Increases to 9th times

8) Two Lamps X and Y with resistance R_X and R_Y are connected across the same potential difference. If X dissipates $\frac{1}{4}$ the power dissipated in Y, which of the following is true? [2]

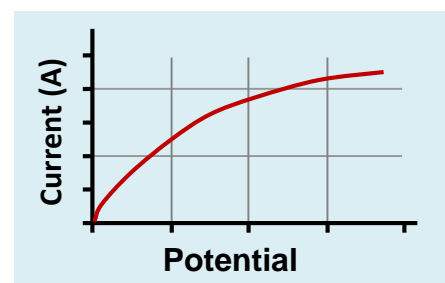
- $R_X = \frac{1}{4}R_Y$
 $R_X = \frac{1}{2}R_Y$
 $R_X = 2R_Y$
 $R_X = 4R_Y$

9) The graph shows how the electric energy consumed in an electric device is changing over time. What is the power of the device? [2]



- 200000W 125000W
 200 W 125W

10) A student studied the change in potential difference with the changes of the current across a conductor while it was heated. He graphed the results as shown. What do you conclude about the resistance of the conductor? [2]

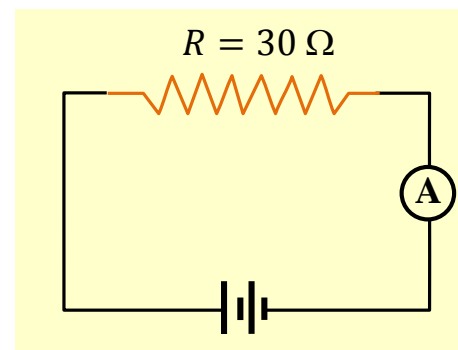


- Increases Does not change
 Decreases Becomes zero

28	
----	--

Question two:

11) In the circuit shown in the figure, the reading of \textcircled{A} is (0.12 A).



a. State what energy transformations occur in the resistance R. [2]

.....

b. Calculate the potential drop across the resistance R. [5]

.....

c. Predict what will happen to the reading of \textcircled{A} if R is replaced by a (60 Ω) resistor. [2]

.....

12) Answer the following (give short answers):

a. Explain how the electrical energy transformed into thermal energy in an electrical heater's wire. **[3]**

.....
.....

b. Explain what happens to the resistance of the filament in an electric lamp after it glows for a while. **[3]**

.....
.....

c. Why the equivalent resistance in a parallel circuit decreases when you connect more resistors. **[2]**

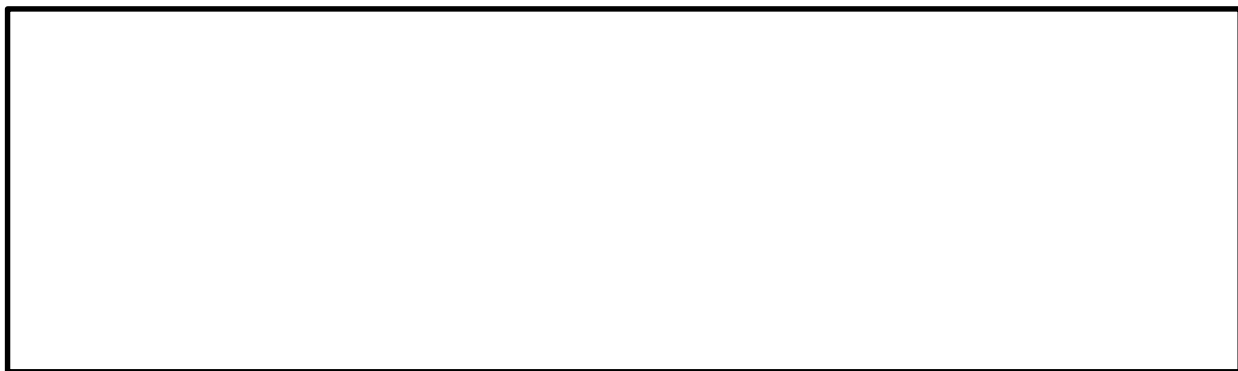
.....
.....

d. Describe the importance of using the circuit breaker when establishing the electrical connections in the buildings and factories. **[2]**

.....
.....

13) An electrical circuit consists of a battery, a resistor, a device to measure the potential drop across the resistor and a device to measure the current in the circuit.

a. Draw the circuit schematic diagram of this circuit. **[5]**



b. If the potential drop across the resistor is 12V and the current is 0.25A, calculate the dissipated power in the resistor. **[4]**

.....
.....
.....

Question 3:

14) Depending on what you learned about “Transmission of Electrical Energy”

a. State the factors that affect the power wasted (loss) in the transmission wires. [2]

.....

b. How can the power loss in the transmission wires be reduced?[3]

.....

c. The electric energy is used to operate 30 Ω electric heater by connected it to a 220 V.

1. Find the energy consumed by the heater when it is operated for half an hour. [4]

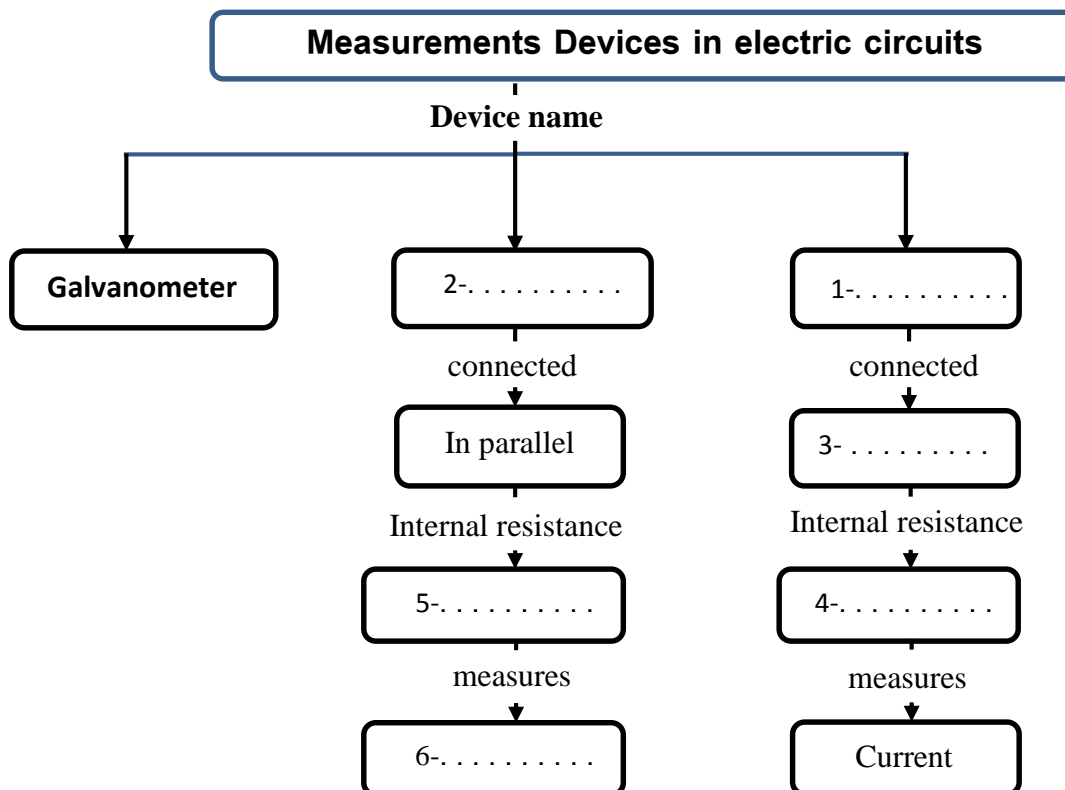
.....

2. Calculate the cost of using the heater for this period if the price of (1kW.h) is 21 Fils [3]

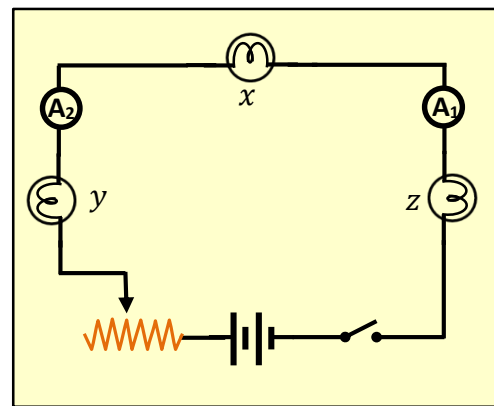
.....

15) Complete the concept map using the following : [6]

High, Voltmeter, potential difference, Low, Ammeter, In series



16) Three identical bulbs are connected in a circuit as shown in the figure. When the switch is closed the three bulbs glow. The potential difference across the battery is 6.0 V. and A_1 reading is 0.40 A.



- a. Draw on the diagram an arrow on the circuit to show the direction of the conventional current. [1]
- b. What should A_2 reading be when the switch is closed? Explain your answer. [2]

.....

- c. What is the equivalent resistance of the circuit after the switch closed? [4]

.....

- d. How do the bulbs (x, y) brightnesses compare. [2]

.....

- e. Show how you can change the brightnesses of the bulbs without changing any of the circuit's component after the switch closed. [2]

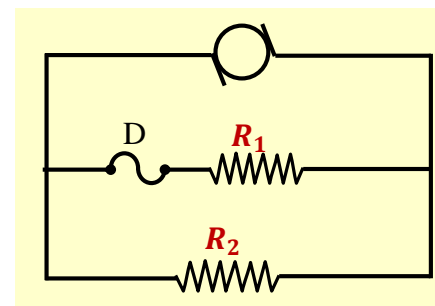
.....

Question 4:

23	
----	--

17) Electric engineers take many consideration into account when manufacturing or wiring electrical circuits in the buildings in order to ensure public safety. Use the shown electric circuit to answer the following:

- a. What is the device represented by the letter D [2]
- b. Explain the function of the device (D) in the circuit? [2]



.....

18) If the potential difference across the DC generator in the circuit is 15V.

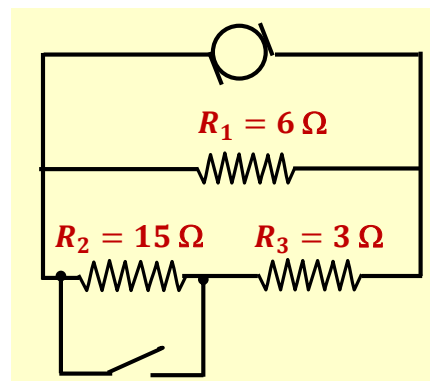
a. Find the equivalent resistance of the circuit. [5]

.....

.....

.....

.....



b. Calculate the current through R_2 . [4]

.....

.....

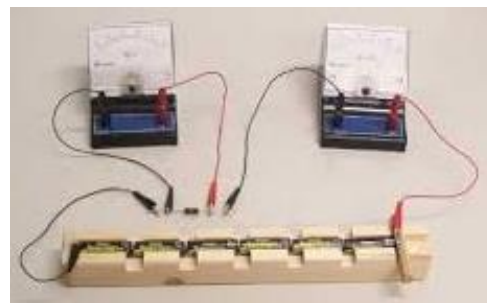
.....

c. Explain the change in the current through R_2 when the switch is closed. [2]

.....

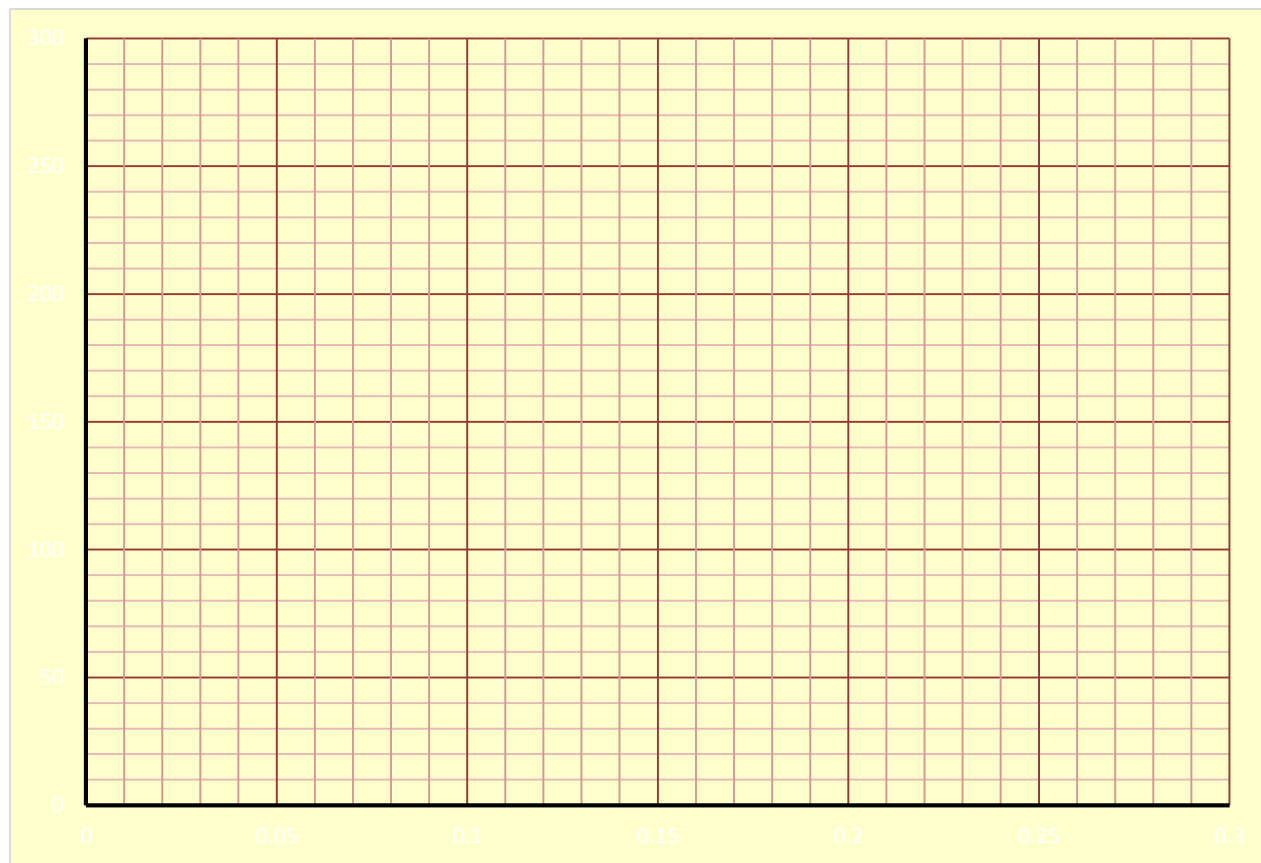
.....

19) A group of students investigated the relationship between the potential difference across a device and the current through it. They used the set of batteries to change the potential difference several times and in each trial, they recorded the potential difference against the current. The following table shows their results.



Trial No	1	2	3	4	5	6	7	8	9
Voltmeter reading (V)	0.14	0.18	0.20	0.22	0.24	0.26	0.27	0.28	0.29
Ammeter reading ($10^{-6}A$)	50	100	150	200	250	300	350	400	450

a. Graph the current versus the potential difference. [4]



b. Can Ohm's Law be applied to the circuit? Why? [2]

.....
.....

c. What is the resistance of the device when the potential difference across it equals 0.23V? [2]

.....
.....
.....

The End