

Section B : (Short Questions, 20 marks)

There are 4 questions in this sections. Answer **ALL** questions in the answer sheet provided.

1. Complete the following table. (5 marks)

Physical Quantities	Symbol	Unit
Displacement	s	metre
Acceleration	a	meter per second square
Voltage	V	Volt
Charge	Q	Coulmb
Current	I	Ampere
Energy	E	Joule

2. Given the following graph of Force against acceleration of a car .
- a) Find the slope of the graph.

m = 5 N/ m s⁻² (kg)

b) What is the physical meaning of the slope of the graph.

mass of the object

c) Write an equation to express the relationship between F and a..

F = 5 a
- (6 marks)

3. James turned on a computer for 2 hours with a current of 1.5A. The power supply is 220 V.

- a) How many charges will go through the device in 2 hours ?

(2 marks)

$Q = 1.5 \times 2 \times 60 \times 60 = 10800 \text{ C}$
- b) What is the power of the computer?

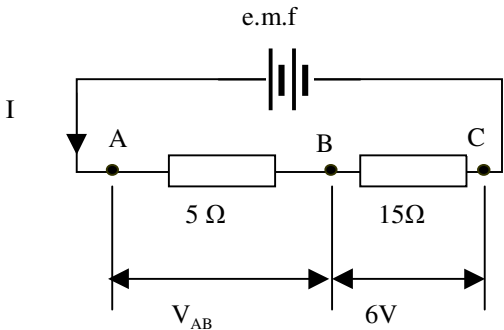
(2 marks)

$P = I V = 1.5 \times 220 = 330 \text{ W}$
- c) What is the total energy dissipated?

(2 marks)

$E = P \times t = 330 \times 2 \times 60 \times 60 = 2376000 \text{ J}$

4. In the circuit shown,



- b) Find the current I .

(1 mark)

$I = 6/15 = 2/5 = 0.4 \text{ A}$
- b) Find the e.m.f. of the battery.

(2 marks)

$\text{e.m.f.} = 0.4 \times (5+15) = 0.4 \times 20 = 8 \text{ V}$

5. Two light bulbs are of equal brightness and of different power ratings. The following table shows details of these two light bulbs. Complete the following table and hence determine which light bulb will save you money for 8000 hours. (5 marks)

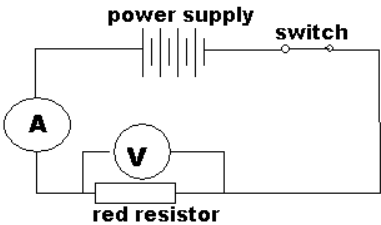
Item	Light bulb A	light bulb B
Cost of each light bulb	\$6	\$22
Power	125 W	25 W

Life time	1000 hours	8000 hours
Electric charge	\$0.92 per unit	0.92 per unit
Cost of light bulb for 8000 hours (\$)	\$48	\$22
Total electrical energy used (kWh)	1000 kWh	200 kWh
Electric Bill (\$)	\$920	\$184
Total cost for 8000 hours (\$)	\$968	\$206

Conclusion :
I will choose the light bulb B for it saves me \$762 in 8000 hours operation.

Section C : (Long questions, 30 marks)
There are 3 questions in this section. Answer **ALL** questions in the answer sheet provided.

6. David and Janet set up an electric circuit as shown below. They then recorded the results of their measurements in the following table.



Test No.	Ammeter (mA)	Voltmeter (V)
1	7.50	1.5
2	14.9	3
3	22.5	4.5
4	30.0	6

- a) Plot a graph of voltage against current in the graph paper provided. (5 marks)
- b) Find the resistance of the material A. (3 marks)
the resistance = slope of the graph = $(6-0)/(30.0 \times 10^{-3}-0) = 200 \text{ ohms}$
7. A helicopter of 1000 kg takes off vertically with an acceleration of 3 m s^{-2} for 15 second from the ground level. It then stay at the same level for 10 seconds. The pilot then drop a stone of 0.5 kg from the helicopter and the stone reached the ground eventually. (Given the gravitational acceleration is 10 m s^{-2} downwards)
- a) What is the total force acting on the helicopter in the first 15 seconds? (2 marks)
total force = $m \times a = 1000 \times 3 = 3000 \text{ N}$
- b) What is the height reached by the helicopter after the first 15 seconds? (2 marks)
 $s = ut + \frac{1}{2} at^2 = 0 + 0.5 \times 3 \times 15^2 = 337.5 \text{ m}$
- c) What is the total force acting on the stone after it is dropped? (1 mark)
force = weight of the stone = $0.5 \times 10 = 5 \text{ N}$
- d) What is the velocity of the stone just before it strikes the ground? (2 marks)
 $2 a s = v^2 - u^2$
 $2 \times 10 \times 337.5 = v^2 - 0^2$
 $v = 82.2 \text{ m/s}$
- e) How long does it take for the stone to reach the ground after it is released? (2 marks)
 $v = u + a t$
 $82.2 = 0 + 10 \times t$
 $t = 8.22 \text{ s}$

8. In the circuit shown on the right.

- a) Find the potential difference between E and F, V_{EF}

(1 mark)
- $V = I R = 1 \times 5 = 5 \text{ V}$
- b) Find e.m.f. of the battery.

(3 marks)
- Total resistance = $5 + (1/(1/5 + 1/(5+10))) = 8.75 \text{ ohm}$

e.m.f. = $I \times R = 1 \times 8.75 = 8.75 \text{ V}$
- c) Find the potential difference between A and C, V_{AC} .

(1 mark)
- $V = 8.75 - 5 = 3.75 \text{ V}$
- d) Find the potential difference between B and D, V_{BD}

(1 mark)
- $V = 3.75 \text{ V}$
- e) Find the current, I_1 and I_2

(2 marks)
- $I = V/R = 3.75 / 5 = 0.75 \text{ A}$
- f) Find the total power of the circuit.

(2 marks)
- $I = V/R = 3.75 / 15 = 0.25 \text{ A}$

M.C

1	2	3	4	5	6	7	8	9	10
D	D	C	B	A	D	C	C	B	A
11	12	13	14	15	16	17	18	19	20
A	D	D	D	B	A	A	B	A	B