This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 02

26MAR2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Physics
Class :	9B, 9C and 9E
Teacher :	Mr. Mohammed Assaf
Duration :	1 hour

Calculators are allowed

You are to answer the questions to this exam on : Squared paper

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

This exam is formed of four obligatory exercises in two pages.

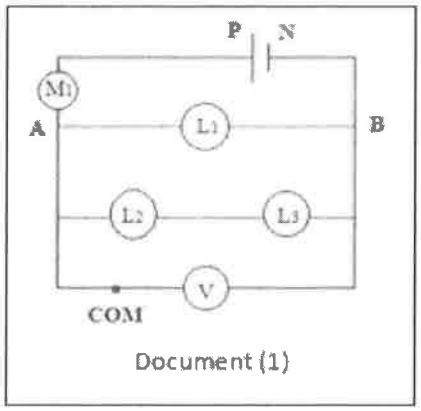
The use of non-programmable calculator is allowed.

Exercise 1 (4 points) **Electric Circuit**

In the circuit of document (1), (M_1) is a multimeter. The intensity of current that is traversed in lamp (L) is 1.5A, and that is traversed in (L_2) is 0.5A.

Referring to the given above and the document (1), choose the correct answer *with justification.*

1. The multimeter (M1) plays the role:
   a. of a voltmeter b. of an ammeter c. of an ohmmeter
2. The voltmeter (V) measures:
   a. U_{AB} b. U_{BA}
3. The intensity of current that traverses (L_3):
   a. 0.5 A b. 1.5 A c. 2 A
4. The intensity of current delivered by the battery:
   a. 0.5 A b. 1.5 A c. 2 A



Document (1)

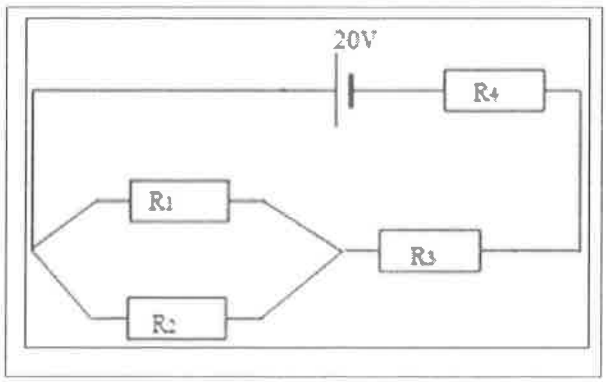
Exercise 2 (5 points) **Electric Power and Energy**

Consider the circuit of document 2 that consists of:

- Generator of $U_{Generator}$=20V.
- Resistors: R_1= R_2= R_3 = 10 Ω.
- Resistor R_4 = 5 Ω.

Calculate:

1- The equivalence resistance of all resistors.
2- The main current supplied by the generator.
3- The power consumed in the circuit due to Joule's effect.
4- The energy consumed (in J) in the circuit during 2 hrs.



Document 2

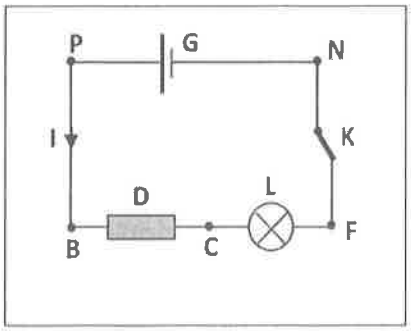
Exercise 3 (6 points) **Normal Functioning of a Lamp**

The objective of this exercise is to study the functioning of a lamp (L) that carries the inscriptions (3V;3W).

I- Resistance of the lamp (L)

The lamp (L) is connected in a convenient circuit so as to function normally.

1) a. What is the voltage across (L)?
   b. What is the power consumed by (L)?
   c. Deduce the value of the current I_0 carried by (L).
2) (L) may be considered as a resistor of resistance r.
   Show that r = 3 Ω.



Doc-3

II- Functioning of the lamp (L)

We connect (L) in series with a resistor (D) of resistance R = 17 Ω across the poles of a generator delivering a constant voltage U_{PN} = 12V as shown in Doc-3.

A current I passes then in the circuit.

1) a. Determine the value of the resistance equivalent to the combination of R and r.
   b. Determine the value of I.
   c. (L) does not function normally. Why?
2) To make (L) function normally, we replace (D) by another resistor (D') of resistance R'.
   R' must be smaller than R. Why?

Exercise 4 (5 points) **Joule's effect**

The following inscriptions are printed on a water boiler: 605W, 220V, AC.



1. What does each inscription represent?
2. How is the boiler connected with the other appliances at home? Justify your answer (or give two reasons).
3. Calculate the intensity of current passing through the water boiler during a normal functioning.
4. Choose from the list of fuses below, a convenient fuse to protect the water boiler. Justify your answer.

   i- Fuse 1: 1.5A ii- Fuse 2: 3A iii- Fuse 3: 5A

5. Define "Joule's effect" and indicate if it is for advantage or disadvantage across this water boiler.

Correction of SE02/Physics *Date:Tuesday, Mar 18 th, 2025*

Grade 9BCE *Done by: Mr.M.Assaf*

Exercise 1 (4 points) **Electric Circuit**

Number	Answer	Point
1	b: of an ammeter, since (M_1) connected in series.	1
2	b: U_{BA}, since COM terminal is connected to the +ve pole of the battery.	1
3	a: 0.5 A, because: $I_2 = I_3 = 0.5$ A (law of uniqueness of current in series connection).	1
4	c: 2 A, since: $I = I_1 + I_2$ (law of addition of current). $= 1.5\ A + 0.5\ A = 2\ A.$	1

Exercise 2 (5 points) **Electric Power and Energy**

Number	Answer	Point
1	$R_{12} = \frac{R1 \times R2}{R1+R2} = \frac{10 \times 10}{10+10} = 5\ \Omega$. (Parallel connection) Now, $R_{eq} = R_{12} + R_3 + R_4 = 5 + 10 + 5 = 20\ \Omega$ (series connection).	1 1
2	Ohm's law : $U = R_{eq} \times I_{main}$ then, $I = \frac{U}{Req} = \frac{20\ V}{20\ \Omega} = 1$ A.	1
3	$P = R_{eq} \times I^2 = (20\ \Omega) \times (1\ A)^2 = 20$ W.	1
4	$E = P \times t = 20\ W \times 2\ h = 20\ W \times 2 \times 3600\ s = 144{,}000$ J.	1

Exercise 3 (6 points) **Normal Functioning of a Lamp**

Number	Answer	Point
I- 1)	a. 3 V. b. 3 W.	0.5 0.5

	c. P = U × I_0 then, $I_0 = \frac{P}{U} = \frac{3\,W}{3\,V}$ = 1 A. 0.5	
2	Ohm's law: U = r × I_0 , then $r = \frac{U}{I0} = \frac{3\,V}{1\,A}$ = 3 Ω (Verified).	1
II- 1)	a. R_{eq} = R + r = 17 + 3 = 20 Ω (series connection).	0.5
	b. Ohm's law: U = Req × I then, $I = \frac{U}{Req} = \frac{12\,V}{20\,\Omega}$ = 0.6 A.	1
	c. No, (L) does not function normally, since the current carried by (L) in normal functioning is greater than the current passes in the circuit. I_0 = 1 A > I = 0.6 A.	1
2	R' must be smaller than R since: according to Ohm's law, R is inversely proportional to I and so, as R decreases, I increases.	1

Exercise 4 (5 points) **Joule's effect**

Number	Answer	Point
1	605 W: rated power 220 V: rated voltage AC: alternating sinusoidal current (Type of voltage).	0.5 0.5 0.5
2	Connected in parallel for two reasons: Function independently and to have the same voltage.	1.5
3	P = U × I then, $I = \frac{P}{U} = \frac{605\,W}{220\,V}$ = 2.75 A.	0.5
4	Fuse 2: 3 A, since: the 3 A fuse is slightly greater than the current (I = 2.75 A) of normal functioning of the water boiler.	0.5
5	Joule's effect is the transformation of electric energy into thermal energy (or heat). Its advantage for the water boiler case.	1