

Topic 13: Practical Electricity

IP4 Worksheet 13A: Tutorial

Name:

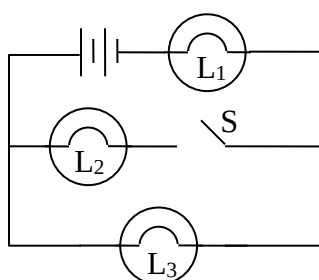
Class:

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1. A 120 W dryer turns 80% of the electrical energy it receives into heat energy. Calculate the amount of heat energy that it generates in 20 s.

[1920 J]

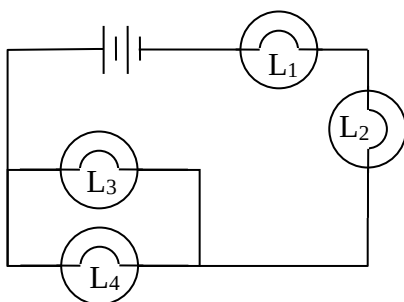
2. The light bulbs in the circuit below are identical. The switch S is initially closed. What will happen to the brightness of L_1 and L_3 if S is opened?



	L_1	L_3
A	unchanged	unchanged
B	increases	Increase
C	increases	Decreases
D	decreases	Increases

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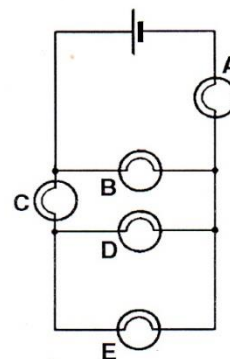
3. The light bulbs in the circuit below have equal resistance. If L_4 blows, which of the following correctly describes the change in brightness of the other three bulbs?



	L_1	L_2	L_3
A	increases	increases	unchanged
B	decreases	decreases	unchanged
C	decreases	increases	decreases
D	decreases	decreases	increases

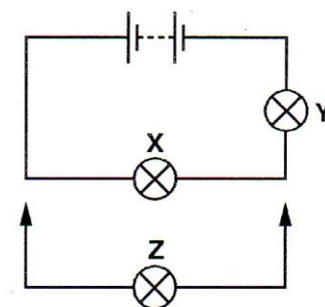
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4. A circuit is able to light up five lamps as shown in the diagram on the right. All 5 lamps are similar.



- Which lamp, once removed, will cause all the other lamps to go out? [1]
- Which two lamps are equally bright? [1]

5. The diagram shows identical lamps **X** and **Y** connected in series with a battery. The lamps light with normal brightness.

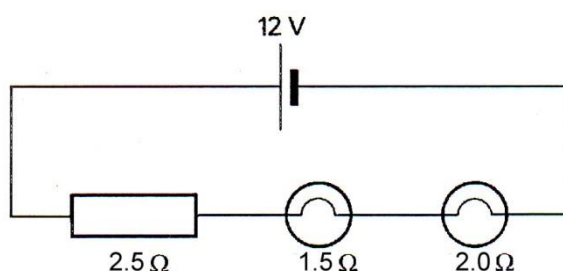


A third lamp **Z** is then connected in parallel with lamp **X**.

Explain what happens to the brightness of lamp **Y**?

[3]

6. The diagram below shows a battery of e.m.f. 12 V connected in series with a $2.5\ \Omega$ resistor and lamps of resistance $1.5\ \Omega$ and $2.0\ \Omega$.



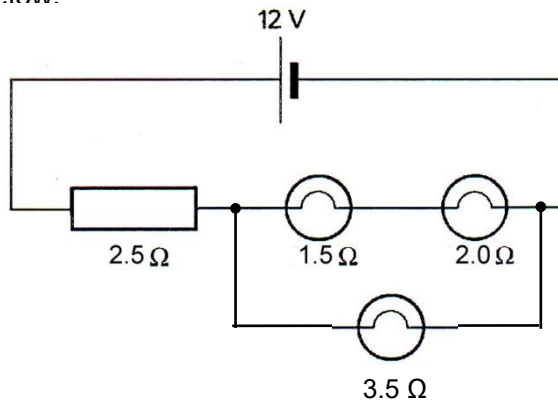
Calculate

- the current in the circuit, [1]
- the power developed in the battery, [1]
- the voltage across the two lamps, [2]

(d) the power developed in each of the lamp, [2]

(e) the power loss in the resistor. [1]

(f) An additional $3.5\ \Omega$ lamp is now connected in parallel to the two current lamps as shown in the diagram below.



Describe and explain what happens to

(i) the brightness of the two existing lamps,

[3]

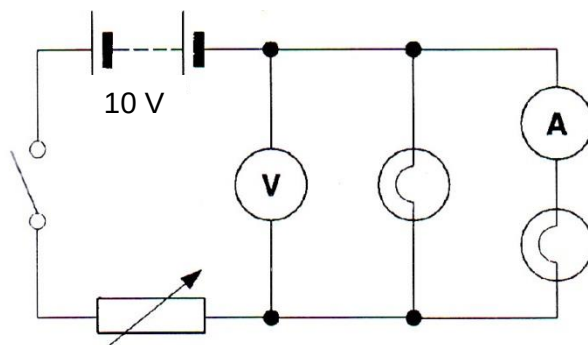
(ii) the current flowing through the $2.5\ \Omega$ resistor.

[2]

(g) State one assumption that you made in answering parts (a) to (f).

[1]

7. The diagram below shows two identical lamps connected in parallel with each other. Assume the ammeter has negligible resistance and the voltmeter has infinite resistance.



The ammeter reading is 2.5 A when the voltmeter reading is 5.0 V. Determine

- the resistance of each lamp, [2]
 - current flowing through the variable resistor, [2]
 - the resistance of the variable resistor in this setup, [2]
 - the power dissipated in each of the lamp and the variable resistor. [2]
8. The diagram shows the three wires of an electrical mains supply connected to an electric water heater.

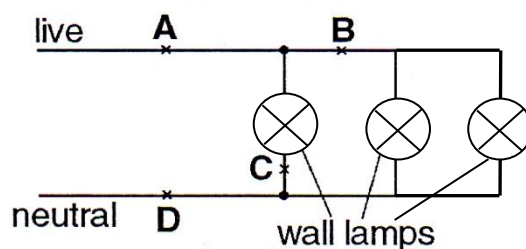


What are the currents in the neutral and earth wires corresponding to a current of 5 A in the “live” wire during normal operation?

	<i>neutral</i>	<i>earth</i>
A	0 A	0 A
B	0 A	5 A
C	5 A	0 A
D	5 A	5 A

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9. Which position on the diagram would be safest for a switch in order to turn off all three wall lamps?



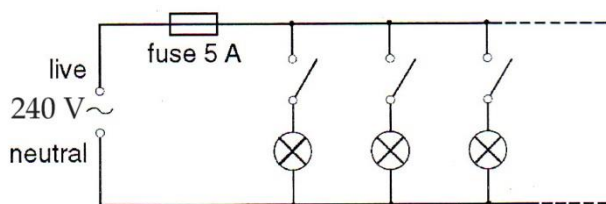
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10. A fuse blew in Tom's house causing all the lights to go out. Tom discovered that there was only one fuse left in the entire house. This fuse's rating was different from the one that blew. Nevertheless, Tom replaced the blown fuse with this new fuse.

Explain why this is not a good idea.

[2]

11. The diagram below shows the lighting circuit of a house. Each lamp is connected in parallel with the power supply. All lamps are identical.



- a. If each lamp has a power rating of 60 W, calculate
- the current through one lamp when it is switched on. [2]
 - the resistance of each lamp. [2]
- b. Three lamps are connected to this circuit and switched on. The filaments in one of the lamps blow.
- What happens to the current in the circuit?
_____ [1]
 - Are there any changes to the brightness of the remaining lamps?
_____ [1]

- c. Given that the fuse has a rating of 5 A, calculate the maximum number of lamps that can be connected and switched on without blowing the fuse. [1]

- d. Explain why the fuse is placed in the live wire and not the neutral wire.

[1]

- e. All three lamps shown in the diagram are switched on.

There is a wiring fault in the first lamp that causes one of the electrical wires to touch the metal base of this lamp. An electrician standing on the level ground touches this metal base in his attempt to change the first lamp.

- (i) Explain what would happen next if the earth wire is connected properly.

[2]

- (ii) Explain what would happen if the earth wire is not connected at all.

[2]