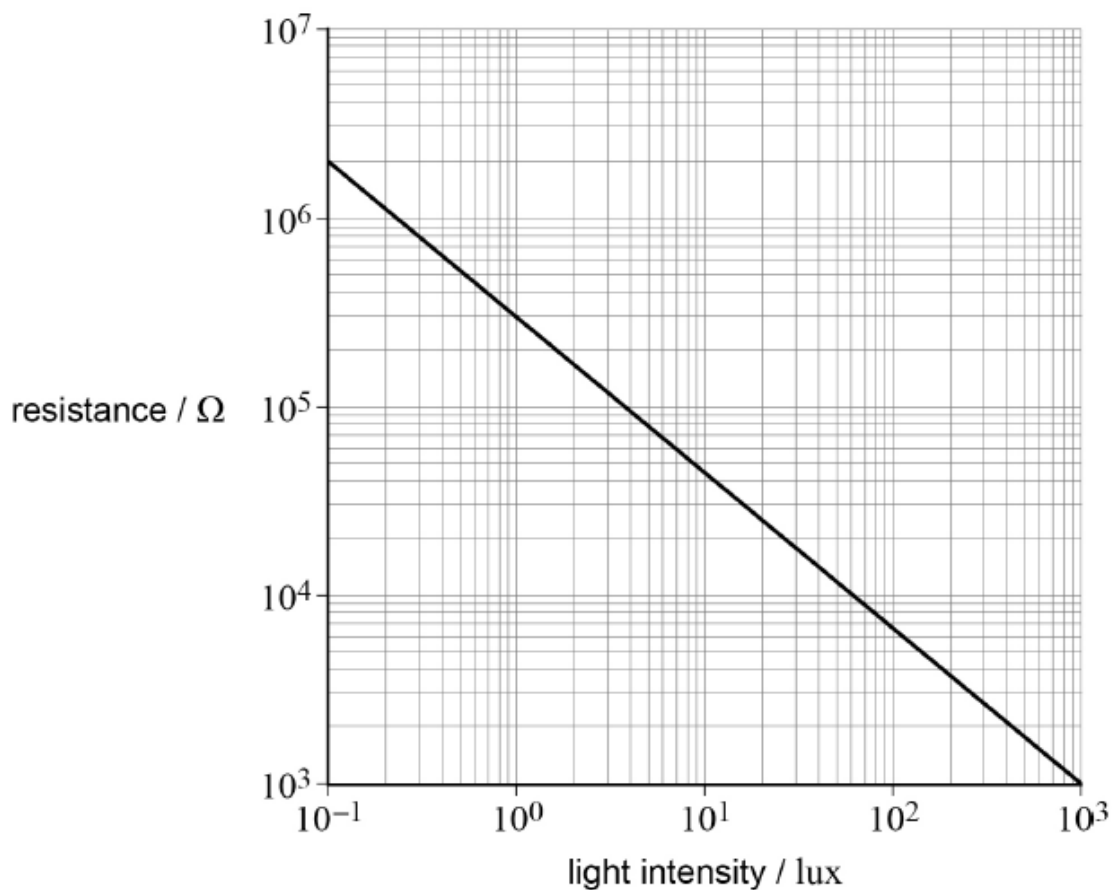


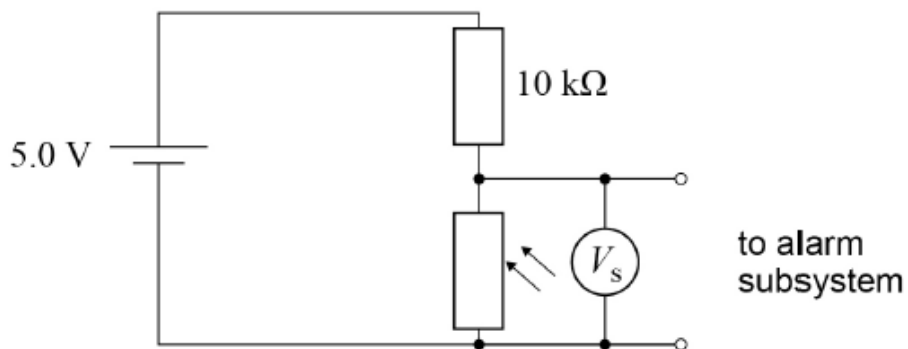
Electricity – A2 Physics P1

1. No.06

Figure 11 shows how the resistance of an LDR varies with light intensity.

Figure 11

The LDR is used as part of an alarm system in a dim room. Figure 12 shows one proposal for a sensor circuit for this system.

Figure 12

The power supply to the sensor has an emf of 5.0 V and a negligible internal resistance. A negligible current is drawn from the sensor circuit by the alarm subsystem.

A light beam illuminates the LDR. When the light beam is broken the LDR is not illuminated by the light beam. This causes the alarm to sound.

Table 3 shows how the light intensity at the LDR changes.

Table 3

	Light intensity / lux
LDR illuminated by light beam	4.0
LDR not illuminated by light beam	1.0

0 6 . 1

Show that the current in the sensor circuit when the LDR is **not** illuminated by the light beam is approximately $16\ \mu\text{A}$.

[2 marks]

0 6 . 2

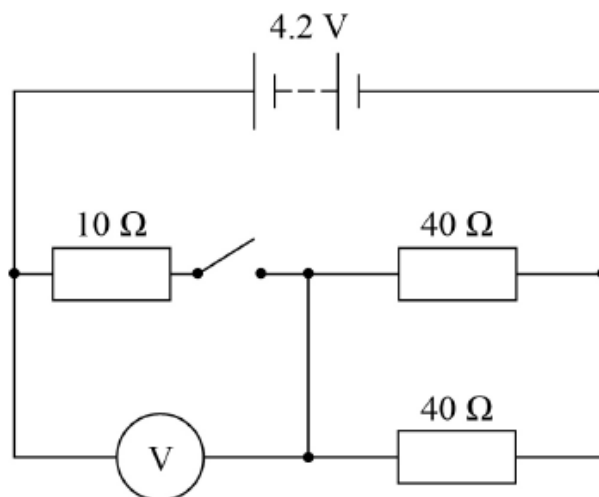
The alarm sounds when the potential difference V_S across the LDR changes by more than 25% of the power supply emf.

Discuss whether the circuit shown in **Figure 12** is suitable.
Support your answer with a calculation.

[3 marks]

2. No.27

The battery in this circuit has an emf of 4.2 V and negligible internal resistance.



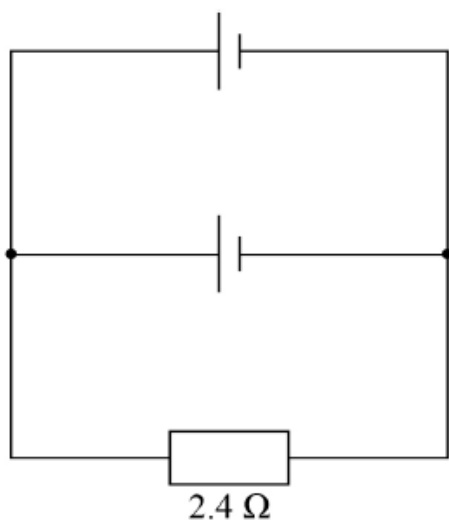
What are the readings on the voltmeter when the switch is open (off) and when the switch is closed (on)?

[1 mark]

	Open	Closed	
A	0 V	2.1 V	☐
B	4.2 V	2.1 V	☐
C	0 V	1.4 V	☐
D	4.2 V	1.4 V	☐

3. No.28

Two identical batteries each of emf 1.5 V and internal resistance $1.6\ \Omega$ are connected in parallel. A $2.4\ \Omega$ resistor is connected in parallel with this combination.



What is the current in the $2.4\ \Omega$ resistor?

[1 mark]

A 0.38 A

☐

B 0.47 A

☐

C 0.75 A

☐

D 0.94 A

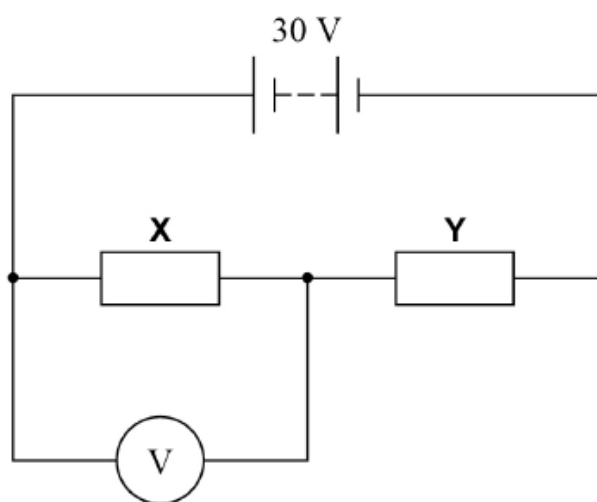
☐

4. No.29

Two resistors **X** and **Y** are connected in series with a power supply of emf 30 V and negligible internal resistance.

The resistors are made from wire of the same material. The wires have the same length.

X uses wire of diameter d and **Y** uses wire of diameter $2d$.



What is the reading on the voltmeter?

[1 mark]

- | | |
|---------------|-----------------------|
| A 10 V | ☐ |
| B 15 V | ☐ |
| C 20 V | ☐ |
| D 24 V | ☐ |