GET BETTER AT PHYSICS · MARK SCHEME

Thermistors & LDRs: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.5.1.3 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question

How students did = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
B	C	D	A	A

Easy

Question 1

1 **B**

Copper wire getting hotter · AQA June 2022 · AS Paper 2 · Q30

In a metal, the positive ions vibrate more as the temperature rises, so the electrons collide with them more often. The resistance increases.

How students did: This was one of the more successful questions on the June 2022 paper.

Medium

Questions 2–4

2 **C**

Resistance–temperature graph for an ntc thermistor · AQA June 2017 · AS Paper 2 · Q33

An ntc (negative temperature coefficient) thermistor's resistance decreases as temperature increases, and the fall is steep at first and then levels off: the curve in C.

Watch out: D also decreases, but in a straight line. A thermistor's resistance changes non-linearly.

How students did: Less than half of students got this right in June 2017.

3 **D**

LDR and fixed resistor in series · AQA June 2017 · AS Paper 2 · Q34

Brighter light lowers the LDR's resistance, so the total resistance falls and the current (ammeter) increases. The LDR now has a smaller share of the total resistance, so the pd across it (voltmeter) decreases.

How students did: 35% of students got this right in June 2017, and more than 1 in 10 left it blank.

4 **A**

Finding an LDR's resistance · AQA June 2024 · AS Paper 2 · Q9

First: the fixed resistor has 2.0 V and the LDR has 10.0 V, so R_{fixed} = 480 × 2.0 / 10.0 = 96 Ω.

Then: the resistor has 8.0 V and the LDR has 4.0 V, so R = 96 × 4.0 / 8.0 = 48 Ω.

Watch out: The voltmeter is across the fixed resistor, not the LDR.

How students did: This was one of the less successful questions in June 2024; a wrong answer was the most popular choice.

Hard

Question 5

5 **A**

Thermistor and resistor in parallel · AQA June 2018 · AS Paper 2 · Q31

As the thermistor cools, its resistance increases, so the current through A_1 decreases. The resistor is in parallel with an ideal cell, so it always has the full emf across it: the current through A_2 is unchanged.

> **Watch out:** With negligible internal resistance, a change in one parallel branch does not affect the other branches.

How students did: Just under 20% of students got this right in June 2018.

End of mark scheme. Answers from AQA's published keys; explanations written for this pack. AQA material is © AQA. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

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