GET BETTER AT PHYSICS · MARK SCHEME

Alternating Current & Oscilloscopes: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.7.5.5 · 6 questions · 6 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	Q6
D	C	D	B	D	B

Easy

Questions 1–3

1 **D**

Frequency and phase from two traces · AQA June 2024 · A-level Paper 2 · Q14

One full cycle spans 8 divisions: 8 × 5 ms = 40 ms, so f = 1 / 0.040 = 25 Hz. The two traces are offset by 0.6 of a division, which is 0.6 / 8 = 0.075 of a cycle: phase difference = 0.075 × 2π = 0.15π rad.

Watch out: Count divisions for a complete cycle, crest to crest.

2 **C**

Choosing the volts per division · AQA June 2024 · A-level Paper 2 · Q13

Peak voltage = 7.0 × √2 = 9.9 V, so peak-to-peak = 19.8 V. To fit on 8 divisions, the setting must be at least 19.8 ÷ 8 = 2.5 V div^{-1}. The tallest complete waveform uses the smallest setting that still fits: 2.5 V div^{-1}.

Watch out: 1.5 and 2.0 V div^{-1} would make the trace taller than the screen.

3 **D**

rms voltage and frequency from a trace · AQA June 2019 · A-level Paper 2 · Q29

The peak is 1 cm × 10 V cm^{-1} = 10 V, so V_{rms} = 10 ÷ √2 = 7 V. One cycle spans 2 cm: T = 2 × 5 ms = 10 ms, so f = 100 Hz.

Watch out: 14 V (A, B) multiplies by √2 instead of dividing.

Medium

Question 4

4 **B**

Mean power from an rms current · AQA November 2021 · A-level Paper 2 · Q24

$P = I^2R$. In the second resistor: $(3I)^2 \times R/2 = 9I^2R / 2 = 9P/2$.

Watch out: With an rms current you can use I^2R directly, with no extra factor of ½.

Hard

Questions 5–6

5 **D**

Peak and peak-to-peak mains voltage · AQA November 2021 · A-level Paper 2 · Q23

230 V is the rms value. Peak = 230 × √2 = 325 V, so peak-to-peak = 650 V. The mean voltage over a whole cycle is zero, so A is wrong too.

Watch out: 325 V is the peak, not the rms value (C).

How students did: Under 25% of students got this right in November 2021.

6 **B**

ac power in a bigger resistor · AQA June 2022 · A-level Paper 2 · Q24

Peak current I, so $I_{rms} = I / \sqrt{2}$. Mean power = $I_{rms}^2 \times 2R = (I^2/2) \times 2R = I^2R = P$.

Watch out: Using the peak current as if it were rms gives 2P (C).

How students did: Fewer than 20% of students got this right in June 2022.

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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