GET BETTER AT PHYSICS · MARK SCHEME

# Electrical Power & Energy: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.5.1.4 · 8 questions · 8 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 | Q7 | Q8 |
|---|---|---|---|---|---|---|---|
| B | C | B | C | D | A | D | A |

## Easy

Questions 1–2

**1** **B**

How long a phone battery lasts · AQA June 2018 · A-level Paper 1 · Q26

Energy stored = QV = 9400 × 3.7 = 34 800 J. Time = energy / power = 34 800 / 0.200 = 1.74 × $10^5$ s ≈ 48 hours.

**How students did:** 75.4% of students got this right in June 2018.

**2** **C**

Energy from a heating element · AQA June 2017 · AS Paper 2 · Q18

$P = V^2 / R = 12^2 / 6.5 = 22.2$ W. Energy = Pt = 22.2 × 300 = 6650 J.

**Watch out:** Convert 5 minutes to 300 s.

**How students did:** Over 70% of students got this right in June 2017.

## Medium

Questions 3–5

**3** **B**

pd when the power is quadrupled · AQA June 2024 · AS Paper 2 · Q13

$R = P / I^2 = 8.0 / 4.0^2 = 0.50\ \Omega$. At 32 W: $V^2 = PR = 32 \times 0.50 = 16$, so V = 4.0 V. (Or: $P \propto V^2$ for a fixed resistor, so 4 times the power needs 2 times the pd: 2.0 V → 4.0 V.)

**Watch out:** 8.0 V (C) assumes the pd goes up by the same factor as the power.

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

**4** **C**

Power in a parallel resistor · AQA June 2025 · AS Paper 2 · Q30

Each resistor has the full 6.0 V across it. Current in the 20 Ω resistor = 6.0 / 20 = 0.30 A, so the current in R = 1.1 − 0.30 = 0.80 A. Power in R = VI = 6.0 × 0.80 = 4.8 W.

**How students did:** In June 2025 the correct answer was the most popular choice.

**5** **D**

Power ratio in a series–parallel circuit · AQA June 2024 · AS Paper 2 · Q18

All the current I passes through $R_X$, and it splits equally between the identical resistors $R_Y$ and $R_Z$, so each carries I / 2. $P = I^2R$, so the power ratio is $I^2 : (I/2)^2 = 4$.

> **Watch out:** 2 (C) comes from comparing currents instead of powers. Power depends on current squared.

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

## Hard

Questions 6–8

**6** **A**

Power–current graph for an ohmic component · AQA June 2018 · AS Paper 2 · Q28

For an ohmic component R is constant, so $P = I^2R$: the power is proportional to $I^2$. The graph is a parabola through the origin: A.

> **Watch out:** C (straight line) would be true for P = VI only if V were constant, but V rises with I.

**How students did:** 28.8% of students got this right in June 2018.

**7** **D**

Kilowatt-hours to electronvolts · AQA June 2018 · AS Paper 2 · Q29

1.0 kW h = 1000 W × 3600 s = $3.6 \times 10^6$ J. Divide by $1.60 \times 10^{-19}$ J per eV: $3.6 \times 10^6 / 1.6 \times 10^{-19} = 2.3 \times 10^{25}$ eV.

> **Watch out:** Using 3600 J (forgetting the kilo) gives $2.3 \times 10^{22}$ eV (C).

**How students did:** Just under a quarter of students got this right in June 2018.

**8** **A**

Resistance of a transmission line · AQA June 2016 · AS Paper 2 · Q31

Current $I = P / V = 800 \times 10^6 / 132 \times 10^3 = 6.06 \times 10^3$ A. Power lost = 1% of 800 MW = $8.0 \times 10^6$ W = $I^2R$, so $R = 8.0 \times 10^6 / (6.06 \times 10^3)^2 = 0.22\ \Omega \approx 0.2\ \Omega$.

> **Watch out:** 132 kV is the transmission voltage, not the pd across the line. Use $P = I^2R$ with the line current, not $V^2/R$ with 132 kV.

**How students did:** Only about 13% of students got this right in June 2016; the correct answer was the least popular choice.

**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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