GET BETTER AT PHYSICS · MARK SCHEME

Electric Potential & Equipotentials: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.7.3.3 · 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
D	D	D	D	A

Easy

Questions 1–3

1 **D**

Potential difference from work done · AQA June 2019 · A-level Paper 2 · Q15

$V = W / Q = 1.5 \times 10^{-3} \div 30 \times 10^{-6} = 50$ V.

Watch out: 1.5 mJ = 1.5×10^{-3} J and 30 μC = 30×10^{-6} C.

How students did: In June 2019 this was answered much better than most of Section B.

2 **D**

Potential of a charged sphere from E and r · AQA June 2018 · A-level Paper 2 · Q21

$E = Q / (4\pi\varepsilon_0 r^2)$ and $V = Q / (4\pi\varepsilon_0 r)$. Dividing V by E: $V / E = r$, so $V = rE$.

How students did: 63.3% of students got this right in June 2018.

3 **D**

Finding the fourth charge from the potential · AQA June 2018 · A-level Paper 2 · Q22

Potential is a scalar, so the potentials at the centre add: $(Q + Q + Q + q) / (4\pi\varepsilon_0 d) = 5Q / (4\pi\varepsilon_0 d)$. So $3Q + q = 5Q$ and $q = 2Q$.

Watch out: Unlike field strength, potential has no direction, so the positions of the charges don't matter.

How students did: 57.5% of students got this right in June 2018.

Medium

Questions 4–5

4 **D**

Field and potential at three times the radius · AQA November 2021 · A-level Paper 2 · Q18

T is 2R from the surface, so 3R from the centre. $E \propto 1/r^2$, so E falls to E/9. $V \propto 1/r$, so V falls to V/3: row D.

Watch out: Measure from the centre of the sphere: 2R from the surface is 3R from the centre.

5 **A**

Change in potential energy in a uniform field · AQA June 2022 · A-level Paper 2 · Q16

Moving from R to S is at right angles to the field, so the potential doesn't change. Moving from S to T, 3.0 m along the field, the potential changes by $15 \times 3.0 = 45$ V. $\Delta E_p = Q\Delta V = 3.0 \times 10^{-6} \times 45 = 1.35 \times 10^{-4}$ J = 135 μJ.

Watch out: Only the distance along the field counts. Using the 5.0 m straight-line distance from R to T gives 225 μJ (C).

How students did: Fewer than 40% 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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