Revision Sheet

A-Level Physics · Unit 18 Electric fields

6 vocabulary items · 34 marks of exam questions (5 questions)

Part 1 · Vocabulary review answer key. Section A wants the exact English spelling.

Question	Answer	Marks
1	electric field	1
2	point charge	1
3	conductor	1
4	electric field strength	1
5	electric potential	1
6	electric potential energy	1

Multiple Choice Answers

Q7: A

Q8: C

Question 9(c) | Question 5(a)(i) | 5(a)(ii) | 5(b)(i) | 5(b)(ii) | 5(b)(iii) | Question 6(a)(i) | 6(a)(ii) | 6(b)(i) | 6(b)(ii)

10(a)(i)	force per unit mass
10(a)(ii)	force per unit positive charge
10(a)(iii)	similarity: • inversely proportional to distance (from point) • points of equal potential lie on concentric spheres • zero at infinite distance *Any point, 1 mark*
	difference: • gravitational potential is (always) negative • electric potential can be positive or negative *Any point, 1 mark*
10(b)(i)	$g = GM / r^2$
	$E = Q / 4\pi\varepsilon_0 r^2$
	algebra showing the elimination of r leading to $M / Q = (1 / 4\pi G\varepsilon_0)\ (g / E)$
10(b)(ii)	$\alpha = 1 / (4\pi \times 6.67 \times 10^{-11} \times 8.85 \times 10^{-12}) = 1.35 \times 10^{20}$ (kg^2 C^{-2}) **or** $\alpha = (8.99 \times 10^9) / (6.67 \times 10^{-11}) = 1.35 \times 10^{20}$ (kg^2 C^{-2})
10(c)(i)	$E = \alpha g Q / M$ $= (1.35 \times 10^{20} \times 9.81 \times 4.80 \times 10^5) / (5.98 \times 10^{24})$
	$= 106$ N C^{-1} **or** 106 V m^{-1}
10(c)(ii)	same (direction)

11(a)	(field line indicates) direction of force
	force on a positive charge
11(b)(i)	one straight line perpendicular to plates, starting on one plate and finishing on the other
	five straight lines perpendicular to plates between the plates, uniformly spaced
	downwards arrows on lines
11(b)(ii)	$E = V / d$
	$= 2400 / 0.046$ $= 5.2 \times 10^{4}\ \text{N C}^{-1}$
11(c)(i)	smooth curve in region of field and straight line outside field
	direction of deflection shown as downwards in region of field
11(c)(ii)	helium nucleus has double the charge but four times the mass
	velocity parallel to plates same and acceleration perpendicular to plates smaller (for helium)
	final speed is lower (for helium)