

Assessment Schedule – 2006

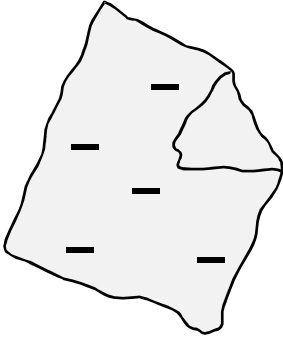
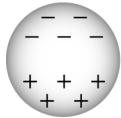
Physics: Demonstrate understanding of electricity and magnetism (90185)

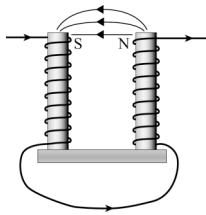
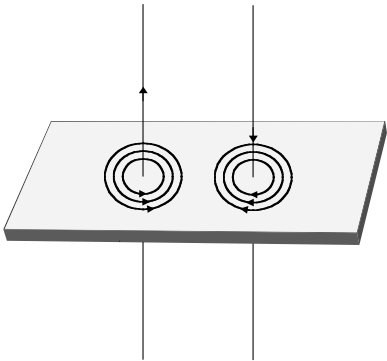
Note: Minor computational errors will not be penalised. A wrong answer will be accepted as correct provided there is sufficient evidence that the mistake is not due to a lack of understanding. Such evidence includes:

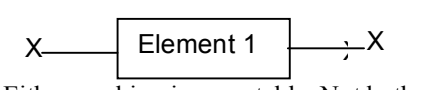
- the last written step before the answer is given has no unexpanded brackets or terms and does not require rearranging.
- the power of any number that is multiplied by a power of 10 is correct.

Correct units and significant figures are required only in the questions that specifically ask for them.

Evidence Statement

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	Negative charges on the cloth.  A diagram of an irregularly shaped cloth with several short horizontal lines representing negative charges distributed across its surface.	¹ Correct charge distribution. > 3 minuses approx evenly spread. No plus signs.		
1(b)	During rubbing, friction between the rod and the silk transfers negative charges (electrons) from the rod to the silk. (Positive charges moving or transferring from one object to another not accepted.)	¹ Mentions negative charges are transferred from rod to silk.	¹ Correct explanation, with friction or the rubbing, as the cause.	
1(c)	 A diagram of a sphere with negative charges (minuses) on the top half and positive charges (pluses) on the bottom half, representing induced charges.	¹ Correct charge distribution. No signs in the air around the ball.		
1(d)	1. The ball is attracted to the rod. 2. The positive charges on the rod induce negative charges on the side of the ball near it. Since opposite charges attract the ball now moves towards the rod.	¹ Gives statement 1 or similar. OR The ball is polarised. ("Ball then drops off" not accepted.)	¹ Correct explanation. Use of term "polarisation" ok. Movement of positive charges not accepted.	
1(e)	1. When the foil touches the sphere, it becomes positively charged. This is because the negative charges from the foil flow onto the sphere to neutralise some positive charges. 2. The foil and the sphere do not remain in contact as the like charges repel.		¹ Mentions the transfer of negative charges from foil to sphere / foil becomes positively charged so it repels. ("Foil is initially negatively charged") is not acceptable)	¹ Correct explanation giving the cause and the effect. Positive charges moving not accepted.

2(a)	$I = \frac{V}{R} = \frac{9.0}{25}$	² Correct working. Must show equation.		
2(b)	$P = VI = 9.0 \times 0.36 = 3.24 = 3.2 \text{ W}$	² Correct working. Must show equation.		
2(c)	$E = P \times t = 3.24 \times (2 \times 60)$ $= 388.8 = 389 / 390 \text{ J}$ OR $3.2 \times 120 = 384 \text{ J}$	² Correct working and answer, using 2 minutes.	² Correct working and answer.	
2(d)	$V = IR = 25 \times 0.30 = 7.5 \text{ V}$	² Correct working and answer.		
2(e)	$V_s = 9.0 - 7.5 = 1.5 \text{ V}$ OR Calc of R_T then $R = \frac{V}{I} = \frac{1.5}{0.30} = 5.0 \Omega$ $R_2 = R_T - R_1$	² Correct working and answer for V_s or for R_T	² Correct working for final answer.	
2(f)	$R_T = R_1 + R_2 = 25 + 5 = 30 \Omega$ OR $\frac{V}{I} = \frac{9.0}{0.30} = 30 \Omega$ OR working from 2(e)	² Correct working and answer.		
2(g)	$I = \frac{P}{V} = \frac{6.5}{9.0} = 0.722 \text{ A}$ (use of $P = V^2/R$ ok) $R = \frac{V}{I} = \frac{9.0}{0.722} = 12.5 \Omega$	² Correct working and answer for I .	² Correct methods and working but wrong answer. OR Correct answer with little or no working.	² Correct answer with complete working.
3(a)		¹ Correct shape / direction. Other lines drawn from N to S are acceptable	¹ Both, direction and shape are correct. At least 2 lines correctly drawn. No lines to be in the gap between the solenoids.	
3(b)	$R_T = 1.8 + 5.7 = 7.5 \text{ ohms}$ $I = \frac{V}{R} = \frac{250}{7.5} = 33.3$	² Calculation of total resistance must be shown.	² Correct working for current.	
3(c)	$V_{\text{coils}} = IR = 33.3 \times 5.7 = 189.81 \text{ V}$ $P = VI = 189.8 \times 33.3 = 6320.7$ $= 6321 \text{ W}$ (use of $P = V^2/R$ ok)	² Correct working and answer V .	² Correct methods and working but wrong answer. OR Correct answer with little or no working.	² Correct answer with complete working..
3(d)		¹ Correct shape / both directions correct. Must be sort of circular. No spirals accepted.	¹ Both, direction and shape are correct for both cables. At least 2 circles around each wire. Lines must not cut across each other.	

4(a)	$I = \frac{V}{R} = \frac{235}{130} = 1.81 \text{ A (1.8 A)}$	² Correct working and answer.		
4(b)	$I_{\text{element 1 and 3}} = 2 \times 1.81 = 3.62 \text{ A}$ $I_{\text{element 2}} = \frac{235}{110} = 2.14 \text{ (Use of parallel R calc ok)}$ Total current = 5.76 A $P = VI = 235 \times 5.76 = 1353.6 \text{ W (1354 W)}$	² Correct working and answer for element 2.	² Correct methods and working but wrong answer. OR Correct answer with little or no working.	² Correct answer with complete working.
4(c)	 <p>Either marking is acceptable. Not both.</p>	¹ Correct answer.		
4(d)	Power is less. Power = Voltage \times Current The elements are in parallel so the voltage is unchanged. The total current is less because one element has been disconnected, so the power output is less.	¹ Mentions less power.	¹ Mentions less power due to less current.	¹ Correct explanation. Must include $P = V \times I$ (or in words) and the fact that V is constant.
4(e)	The right-hand side of the arm moves down. The solenoid becomes magnetised and the end A of the solenoid becomes magnetic north . It repels the north end of the magnet and the end C side of the arm moves down.	¹ Mentions the end C moves down.	¹ Mentions the solenoid becomes a magnet and causes the end C to move down.	¹ Correct explanation must include the appearance of the North pole and subsequent repulsion.
Total opportunities		Criterion 1: 9 Criterion 2: 11	Criterion 1: 7 Criterion 2: 6	Criterion 1: 3 Criterion 2: 3

Judgement Statement

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The grade awarded is the highest one that has been demonstrated in all achievement criteria up to and including that grade.

The following is a guide to the standard required for each grade in the two criteria.

Criterion One

Achievement	Achievement with Merit	Achievement with Excellence
Total of FOUR opportunities answered at Achievement level or higher. $4 \times A1$	Total of SIX opportunities answered with THREE at Merit level or higher. $3 \times M1 + 3 \times A1$	A total of SEVEN opportunities answered with at least ONE at Excellence level and THREE at Merit level. $1 \text{ or } 2 \times E1 + 3 \times M1 + 3 \times A1$ (Note: A total of $3 \times E$ with at least ONE from each criterion)

Criterion Two

Achievement	Achievement with Merit	Achievement with Excellence
Total of SIX opportunities answered at Achievement level or higher. $6 \times A2$	Total of SEVEN opportunities answered with THREE at Merit level or higher. $3 \times M2 + 4 \times A2$	A total of EIGHT opportunities answered with at least ONE at Excellence level and THREE at Merit level. $1 \text{ or } 2 \times E2 + 3 \times M2 + 4 \times A2$ (Note: A total of $3 \times E$ with at least ONE from each criterion)

Overall Judgement Statement

Note: For Excellence overall a total of THREE opportunities answered at Excellence level is required, with at least ONE from each of Criterion One and Two.

Achievement Criteria			
Achievement	Achievement with Merit	Achievement with Excellence	
$4 \times A1$	$3 \times M1 + 3 \times A1$	$3 \times M1 + 3 \times A1$	3 × E with at least ONE from each criterion.
$6 \times A2$	$3 \times M2 + 4 \times A2$	$3 \times M2 + 4 \times A2$	