
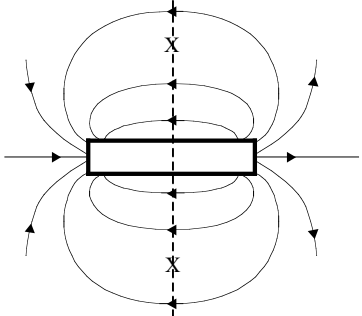
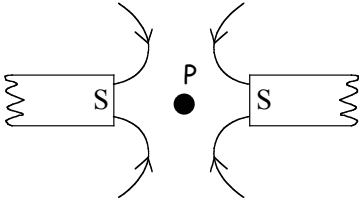
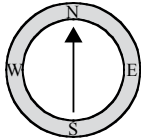
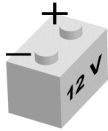


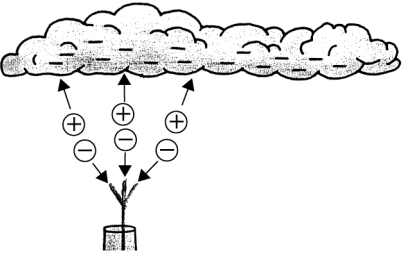
## Assessment Schedule – 2005

## Physics: Demonstrate understanding of electricity and magnetism (90185)

## Evidence Statement

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
1(a)	$R_T = 3.0 + 3.0 + 3.0 = 9.0$ ohms $I = \frac{V}{R} = \frac{4.5}{9} = 0.5$ A	<sup>2</sup> Correct answer for $R_T$ .	<sup>2</sup> Correct working must be shown.	
1(b)	$P = VI = 1.5 \times 0.50 = 0.75$ W	<sup>2</sup> Correct answer.		
1(c)	Each bulb requires 1.5 V across it to shine at full brightness. Since all three bulbs are in series, the total voltage required to burn at full brightness is $3 \times 1.5 = 4.5$ V.	<sup>1</sup> Mentioned only $3 \times 1.5 = 4.5$	<sup>1</sup> Mentions bulbs are <b>in series</b> , therefore $3 \times 1.5 = 4.5$ V is required.	
1(d)	$P_{\text{total}} = VI = 4.5 \times 0.50 = 2.25$ (Total power = $0.75 \times 3 = 2.25$ W) $E = P \times t = 2.25 \times (2 \times 60) = 270$ J	<sup>2</sup> Calculation of total power.	<sup>2</sup> Correct process but fails to convert 2 minutes into seconds.	<sup>2</sup> Correct working and answer.
1(e)	$I_{\text{total}} = 3 \times 0.50 = 1.5$ A	<sup>2</sup> Correct working and answer.		
1(f)	$V_{\text{resistor}} = 4.5 - 1.5 = 3.0$ V $R = \frac{V}{I} = \frac{3.0}{1.5} = 2.0$ $\Omega$ [Carry on error possible from (e).]	<sup>2</sup> Correct working and answer for 3.0 V.	<sup>2</sup> Correct working and answer. Resistance calculations are an acceptable alternative.	
1(g)	$P = VI = 4.5 \times 1.5 = 6.75$ W [Carry on error possible from (e).]	<sup>2</sup> Correct working and answer.		
1(h)	The bulbs are connected in parallel. To light them at their normal brightness, they require only 1.5 V. The battery provides 4.5 V. The resistor is connected in series with the bulbs so the voltage is shared between the bulb and the resistor. The bulbs will have 1.5 V across them and the resistor will have 3.0 V across it.		<sup>1</sup> Explanation shows some understanding of the situation.	<sup>1</sup> Clearly explains the need to drop the voltage across the resistor.

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
2(a)	Magnetic field is the region where the magnetic <b>force</b> is felt.	<sup>1</sup> Correct definition.		
2(b)		<sup>1</sup> Correct answers.		
2(c)	 <p>Because the field lines are furthest apart at this point.</p>	<sup>1</sup> Correct labelling. X can be from outer line to just in from (but not on) the second line and on the centre line only.	<sup>1</sup> Correct labelling and correct explanation.	
2(d)		<sup>1</sup> Correct pattern with no or wrong directions. Pattern must be approx symmetrical, no lines cross P or each other.	<sup>1</sup> Correct field pattern with direction.	
2(e)		<sup>1</sup> Correct direction.		
2(f)	The direction of the compass needle is in the same direction as the magnetic force exerted by <b>the earth's magnetic field</b> , because at P the net magnetic force due to the magnets is zero.	<sup>1</sup> Mentions that the magnetic force is zero at point P (is a null point).	<sup>1</sup> Mentions point P is a null point or the force at this point is zero. So the magnetic needle points up or north.	<sup>1</sup> Correct explanation.
2(g)			<sup>1</sup> Correct labelling.	
2(h)	$I = \frac{V}{R} = \frac{12}{1.6} = 7.5 \text{ A}$ $B = \frac{\mu_0}{2\pi d} = \frac{1.26 \times 10^{-6} \times 7.5}{2 \times 3.14 \times 0.25}$ $B = 6.0 \times 10^{-6}$	<sup>2</sup> Correct working and answer for I.	<sup>2</sup> Correct process and working but wrong answer. Or wrong value for I.	<sup>2</sup> Correct working and answer. range 6.0 – 6.3
Unit	Tesla	<sup>1</sup> Correct unit.		

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
3(a)		<sup>1</sup> Shows the correct distribution of charges in air. Arrows not required, + can be next to clouds and – next to spikes.		
3(b)	The negative cloud repels the electrons from the spikes to the earth. The points on the spikes are left with a large positive charge, which removes electrons from the nearby air (molecules). Now the air is positively charged, and the positive charges in the air move upwards to cancel some of the negative charges on the cloud. If a flash of lightning occurs, it is now less violent and the conductor carries this current safely to earth, thereby protecting the building.		<sup>1</sup> Explains that the current produced by the lightning passes through the conductor to earth, thereby protecting the building.	<sup>1</sup> Correct explanation in terms of charge motion.
3(c)	Because unlike (opposite) poles attract and there is a force of attraction between the magnets, so they move together.	<sup>1</sup> Because unlike (opposite) poles attract.  (Unlike charges not accepted.)	<sup>1</sup> Correct explanation.	
3(d)	$R_T = 20 + 30 + 130 = 180 \text{ ohms}$ $I_T = V/R = 9/180 = 0.05 \text{ A}$ $V_{130} = IR = 0.05 \times 130 = 6.5 \text{ V}$ [OR any other valid method]	<sup>2</sup> Correct answer for $R_T$ .	<sup>2</sup> Correct answer for $I_T$ .	<sup>2</sup> Correct working and answers.
3(e)	$P = \frac{E}{t} = 270/(60 \times 60) = 0.075 \text{ W}$	<sup>2</sup> Correct process but converts 1 hour into minutes instead of seconds.	<sup>2</sup> Correct working and answer.	
<b>Total opportunities</b>		<b>Criterion 1: 10</b> <b>Criterion 2: 9</b>	<b>Criterion 1: 8</b> <b>Criterion 2: 6</b>	<b>Criterion 1: 3</b> <b>Criterion 2: 3</b>

**Judgement Statement****Criterion 1:**

<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>
FIVE opportunities answered at Achievement level or higher.  5 × A1	SEVEN opportunities answered with FOUR at Merit level or higher.  4 × M1 <i>plus</i> 3 × A1	SEVEN opportunities answered with at least ONE at Excellence level and THREE at Merit level.  1 × E1 <i>plus</i> 3 × M1 <i>plus</i> 3 × A1

**Criterion 2:**

<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>
FOUR opportunities answered at Achievement level or higher.  4 × A2	SIX opportunities answered with THREE at Merit level or higher.  3 × M2 <i>plus</i> 3 × A2	SIX opportunities answered with at least ONE at Excellence level and TWO at Merit level.  1 × E2 <i>plus</i> 2 × M2 <i>plus</i> 3 × A2

**Note:** To gain Excellence overall there needs to be 3 × E with at least ONE E from each criterion.

<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>	
5 × A1	4 × M1 <i>plus</i> 3 × A1	3 × M1 <i>plus</i> 3 × A1	<i>plus</i> 3 × E with at least 1 from each category
4 × A2	3 × M2 <i>plus</i> 3 × A2	2 × M2 <i>plus</i> 3 × A2	