

Keeping things moving

1.	(a)	(i)	(electromagnetic) induction <i>accept inducing current</i>	1	
		(ii)	swings to the left <i>accept moves to left or moves the other way</i> <i>accept it will go to – 1</i> <i>do not accept moves back to zero</i>	1	
		(iii)	no (induced) current when <i>accept no (induced) voltage</i>	1	
			no (relative) movement between conductor and magnetic field <i>do not accept wire not moving</i> <i>accept 'field' or 'magnet' for 'magnetic field'</i> <i>accept no change of flux linkage</i> <i>accept conductor or wire not cutting the field</i> <i>accept no change in magnetic field around wire</i> <i>do not accept field not broken</i>	1	
	(b)		one complete cycle shown <i>curve should be regular</i> <i>do not accept more than one cycle</i> <i>accept good sawtooth or square wave</i>	1	[5]
2.	(a)	(i)	it moves or experiences a force horizontally to the right <i>for 1 mark</i>	1	
		(ii)	A - moves in opposite direction or force reversed e.c.f. B - faster movement or larger force ( <b>not</b> move further) <i>for 1 mark each</i>	2	
	(b)		turns clockwise oscillates/reverses comes to rest facing field/at 90° to field/vertically <i>for 1 mark each</i>	3	
	(c)		number of turns or linear number density of turns current core <i>for 1 mark each</i>	3	[9]
3.			Quality of written communication: One mark for correct sequencing. bolt out → plunger up → switch off / circuit broken	1	
			any <b>five</b> from	5	
			<ul style="list-style-type: none"> <li>• high current flows</li> <li>• electromagnet is stronger</li> <li>• the iron bolt is pulled out</li> <li>• the plastic plunger moves up</li> <li>• the switch is lifted / open / off <i>accept circuit is broken</i></li> <li>• no current flowing</li> <li>• to re-set the plunger must be pushed down</li> </ul>		[6]
4.	(a)	(i)	(quickly) becomes magnetized	1	

*or (quickly) loses its magnetism*

*or 'it's (a) magnetic (material)'*

*any reference to conduction of electricity/heat nullifies the mark*

(ii) any **four** from: 4

- insulation prevents electricity/current flowing through the iron/core  
*or 'insulation so electricity/current only flows in the wires/turns/coils'*
- alternating current/a.c. in the primary (coil)
- produces a changing magnetic field (in the iron/core)
- (and hence magnetic) field in the secondary (coil)
- induces/generates/produces an alternating potential difference/ p.d./voltage across the secondary (coil)
- (and hence) alternating current/a.c. in the secondary (coil)

(b) 80 (turns) 2

*or credit (1) for any equation which if correctly evaluated would give 80 example*

$$\frac{230}{5.75} = \frac{3200}{\text{number of turns}}$$

[7]

5. (i) iron 1

*for 1 mark*

(ii) 20 2

*gains 2 marks*

else working

*gains 1 mark*

(iii) reverse input/output 1

*for 1 mark*

**or** increase secondary turns

[4]