

# Electromagnetic effects

## Mark Scheme 1

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electromagnetic effects
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 1

**Time Allowed:** 56 minutes

**Score:** /46

**Percentage:** /100

- 1 (a) (i) (magnetic) field (lines) of magnet cut by turns / coil / wire  
OR (magnetic) field linked with coil changes B1
- (ii) 1 (needle of meter) deflects to the left (and returns to zero) B1
- 2 (needle of meter) deflects to right and left (alternately)  
OR to and fro B1
- (b) (i)  $N_p/N_s = V_p/V_s$  in any form OR  $(N_s =) N_p V_s/V_p$  OR  $8000 \times 6/240$  C1  
OR  $(V_p/V_s =) 40$   
 $(N_s =) 200$  A1
- (ii) 1  $(P = IV = 0.050 \times 240 =) 12 \text{ W}$  B1
- 2  $0.9 \times 12$  OR  $10.8$  OR  $I_s V_s = 0.9 I_p V_p$  OR  $I_s = 0.9 I_p V_p / V_s$  C1  
OR  $0.9 \times 0.05 \times 240/6$   
 $(I_s =) 1.8 \text{ A}$  ecf 1. A1

[Total: 8]

- 2 (a) (i) electromagnetic induction OR mutual induction B1
- (ii) copper B1
- good conductivity OR good conductor B1
- (b) (i)  $N_p \div N_s = V_p \div V_s$  in any form OR  $N_p V_s \div V_p$  C1  
accept in ratio format  
400 A1
- (ii) (current in secondary =)  $4 \times 1.5$  OR  $6.0 \text{ (A)}$
- $I_p V_p = I_s V_s$  in any form OR  $I_s V_s \div V_p$  C1
- 0.30 OR 0.3A A1

- 3 (a) (magnetic) field (lines) of magnet cuts coils (of solenoid)  
OR (magnetic) field in solenoid changes B1
- (b) meter deflects in opposite direction B1
- deflection is greater (than initially) OR for shorter time B1
- magnet moving faster B1
- more field lines cut per second OR  
opposite pole **and** direction **and** end of solenoid B1
- (c) any two from: max. B2
- stronger magnet
  - use a solenoid (of same length) with more turns
  - use a more sensitive meter
  - use wires of smaller resistance for solenoid or connecting wires
  - drop from further up

[Total: 7]

- 4 (a) (step-down) transformer B1
- (b) (alternating current causes) magnetic field in core / iron  
magnetic field changes / alternates  
field cuts / links with secondary coil OR secondary coil cuts field B1  
e.m.f. / voltage **induced** (and current flows in lamp)  
OR **induced** current (in lamp) B1
- (c)  $V_1/V_2 = N_1/N_2$  in any form OR  $(N_1 =) N_2 \times V_1/V_2$  OR  $450 \times 240/12$   
= 9000 A1
- (ii) tick 4<sup>th</sup> box B1

[Total: 8]

- 5 (a)  $\geq 3$  horizontal lines in gap by eye B1  
 $\geq 4$  evenly spaced horizontal lines filling  $\frac{3}{4}$  of width of gap AND arrows L to R B1
- (b) (i) ammeter deflects/gives a reading OR registers a current B1  
 wire cuts the field lines o.w.t.t.e. M1  
 e.m.f./voltage/current induced/produced/generated A1
- (ii) 1 reading/deflection/current increased B1  
 2 reading/deflection/current reversed ignore magnitude B1
- [Total: 7]**

- 6 (a) less power/energy lost OR heat generated (in cables) B1  
 smaller current B1  
 $P = VI$  OR  $P = I^2R$  B1
- (b) (i) (laminated) iron core B1
- (ii) (connected to) primary (coil) B1
- (iii) ( $N_S =$ )  $N_P V_S / V_P$  OR  $400 \times 115\,000 / 5\,000$   
 9200 (turns) A1
- (c) less insulation needed OR safer OR devices designed for 230 V B1
- [Total: 8]**