MARK SCHEME

GCSE
PHYSICS
AQA - TRIPLE SCIENCE

P7 - TEST 7
MAGNETISM
Advanced

Mark schemes

1. (a) 400 000

allow **1** mark for correct substitution ie

$$\frac{25000}{?} = \frac{800}{12800}$$

or

$$\frac{25}{?} = \frac{800}{12800}$$

2

volt(s) / V

*an answer 400 gains **2** marks*

*an answer 400 kilovolts / kV gains **3** marks*

*although the unit mark is independent to gain **3** marks it must be consistent with the numerical value*

1

(b) any **one** from:

*do **not** accept any response in terms of heat insulation, safety or electric shock*

- (so that there is) no short circuit

- (so that the) current goes round the coil

    *do **not** accept electricity for current*

- (so that the) current does not enter the core

1

(c) (the alternating p.d. in the primary causes) an (alternating) current in the primary

reference to the current in the core negates this mark

1

(causes an) <u>alternating / changing</u> (magnetic) field in the (iron) core

1

<u>induces</u> (alternating) p.d. across the <u>secondary</u> (coil)

accept in / through or similar for across

accept current for p.d.

accept output (coil) for secondary (coil)

*to gain **3** marks the sequence must be correct*

1

[7]

2. (a) (i) current produces a magnetic field (around XY)

accept current (in XY) is perpendicular to the (permanent) magnetic field

1

(creating) a force (acting) on XY / wire / upwards

reference to Fleming's left hand rule is insufficient

1

(ii) motor (effect)

1

(iii) vibrate / move up and down

1

5 times a second

only scores if first mark point scores

*allow for **1** mark only an answer 'changes direction 5 times a second'*

1

(b) 0.005

*allow **1** mark for calculating moment of the weight as 0.04 (Ncm)*
and
*allow **1** mark for correctly stating principle of moments*
or
*allow **2** marks for correct substitution*
*ie F × 8 = 2 × 0.02 **or** F × 8 = 0.04*

3

[8]

3. (a) (i) step-up

both parts required

more turns on the secondary / output (coil)

*do **not** accept coils for turns*

'secondary output is greater than primary input' is insufficient

1

(ii) (easily) magnetised (and demagnetised)

accept (it's) magnetic

it's a conductor negates answer

1

(b) 60

*allow **1** mark for correct substitution, ie* $\frac{230}{15} = \frac{720}{N_s}$

2

[4]

4. (a) (the alternating current creates) a <u>changing / alternating magnetic field</u>

1

(magnetic field) in the (iron) core

accept that links with the secondary coil

current in the core negates this mark

1

(causing a) potential difference (to be) <u>induced</u> in / across secondary coil

accept voltage for p.d.

1

(b) (i) 20

*allow **1** mark for correct substitution, ie* $\dfrac{230}{V_s} = \dfrac{575}{50}$

or $\dfrac{V_s}{230} = \dfrac{50}{575}$

2

(ii) 0.3

or

correct calculation using $230 \times I_p =$ their (b)(i) $\times\ 3.45$

*allow **1** mark for correct substitution, ie*
$230 \times I_p = 20 \times 3.45$
allow ecf from (b)(i) for 20
OR
substitution into this equation $\dfrac{I_p}{I_s} = \dfrac{N_s}{N_p}$

2

(c) any **one** from:

- fewer (waste) batteries have to be sent to / buried in land-fill

- the soil is polluted less by batteries in land-fill

- fewer (waste) batteries have to be recycled

- fewer batteries have to be made

- less raw materials are used in making batteries

- customers have to replace their batteries less often
  longer lifetime is insufficient

- customers have to buy fewer (replacement) batteries
  it costs less is insufficient

1

[8]

5. (a) which causes the magnet to turn / spin / rotate

1

(magnetic) field / lines of force / flux rotate(s) / move(s) / through / in / cut(s) the coil

*do **not** credit the idea that movement 'creates' the magnetic field*

1

potential difference / p.d. / voltage <u>induced</u> across the coil

*do **not** credit just 'current induced'*

1

(b)   any **one** from:

- more powerful / stronger / lighter magnet

    *do **not** credit 'a bigger magnet'*

- larger / more / bigger / lighter cups / with a bigger surface area

- longer arms

- lubricate the spindle

- add more turns to the coil

1

[4]

6.   (a)   (i)   generator

1

(ii)   alternating current

1

(iii)   voltmeter / CRO / oscilloscope / cathode ray oscilloscope

1

(b)   (i)   time

1

(ii)   peaks and troughs in opposite directions

1

amplitude remains constant

dependent on first marking point

1

(c)   any **two** from:

- increase speed of coil
- strengthen magnetic field
- increase area of coil

    *do **not** accept larger*

2

[8]

7.   (a)   in a longitudinal wave the oscillations / vibrations are parallel to the direction of energy transfer.

accept wave travel for energy transfer throughout

1

in a transverse wave the oscillations / vibrations are perpendicular to the direction of energy transfer.

1

(b)   accept any sensible suggestion eg a vibrating drum skin does not move the air away to create a vacuum (around the drum)

1

(c)   **Level 3 (5–6 marks):**
A detailed explanation linking variations in current to the pressure variations of a sound wave, with a logical sequence.

Level 2 (3–4 marks):
A number of relevant points made, but not precisely. A link between the loudspeaker and a sound wave is made.

Level 1 (1–2 marks):
Some relevant points but fragmented with no logical structure.

0 marks:
No relevant content.

Indicative content

the current in the electrical circuit is varying

the current passes through the coil

the coil experiences a force (inwards or outwards)

reversing the current reverses the force

the size of the current affects the size of the force

the varying current causes the coil to vibrate

the (vibrating) coil causes the cone to vibrate

the vibrating cone causes the air molecules to move

the movement of the air molecules produces the pressure variations in the air needed for a sound wave

the air molecules bunch together forming compressions and spread apart forming rarefactions

6

[9]