

Question number	Answer	Notes	Marks
2 (a)	any two from: MP1. reverse the magnet (N into coil); MP2. reverse the connections at the ammeter; MP3. move the magnet out of coil;	ignore all references to • speed of movement • numbers of turns on the coil CARE that candidate does not conflate MP2 and 3 to negate their answer allow for MP2 invert the coil	(2)
(b) (i)	Y= magnet; Z = coil (of wire);		(2)
(ii)	(±)1.6 (V);		(1)
(iii)	reading of time for 1 cycle ; evaluation; e.g. 0.04s 25 (Hz)	no mark for eqn as it is given time can be assumed if $f = 1/0.04$ seen allow for 1 mark 50, 12.5 (Hz)	(2)
(iv)	C higher higher ;		(1)
(v)	any one from stronger magnet; more turns on the coil;	ignore bigger magnet condone more coils	(1)
(c) (i)	rearrangement of eqn; substitution; evaluation; e.g. work done (energy output) = power x time (=) 3.1×290 900 (W)	Accept 899 (W)	(3)
(ii)	$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$	accept standard abbreviations rearrangements with factor of X 100	(1)
(iii)	substitution; rearrangement of eqn; evaluation; e.g. input energy = $\frac{\text{output energy}}{\text{efficiency}}$ = $\frac{899 \text{ (W)}}{0.72}$ = 1200 (J)	ECF from ci allow 900 for 899 1245, 1250, 1300 (J)	(3)

- 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]

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

[Total: 7]