

01. 0625_m23_ms_42 Q: 8

Question	Answer	Marks
(a)	downwards / into the page / anti-clockwise	B1
(b)	current, (magnetic) field, motion at right angles to each other	B1
	magnetic field from left to right / N to S AND current is from A to B / positive to negative	B1

Question	Answer	Marks
(c)	(at vertical) the coil stops OR (at vertical) the coil overshoots and comes back OR the coil vibrates (about the vertical)	B1
	<i>any one from:</i> <ul style="list-style-type: none"> (as the coil approaches vertical) the turning effect decreases (at vertical) the turning effect is zero (past vertical) the turning effect reverses / changes direction 	B1
(d)	reverses the current	B1
	<i>any two from:</i> <ul style="list-style-type: none"> (brushes) ensure current is maintained / owtte coil rotates continuously / continues to move in the same direction (allows current to change direction) without wires getting tangled (reverses the current) every half turn / 180 degrees / OR (reverses the current) when the coil is vertical / at right angles to the magnetic field 	B2

02. 0625_s23_ms_41 Q: 8

Question	Answer	Marks
(a)	any four from: <ul style="list-style-type: none"> alternating current in (primary coil) (current in primary generates) changing magnetic field iron core concentrates (magnetic) field OR iron core transfers (magnetic) field (to secondary coil) secondary coil is in alternating / changing (magnetic) field OR secondary coil cuts (magnetic) field e.m.f. <u>induced</u> (in secondary coil) 	B4
(b)(i)	(number of turns =) 3000	A2
	$N_p / N_s = V_p / V_s$ OR $(N_p =) N_s V_p / V_s$ OR $(N_p =) 450 \times 220\,000 / 33\,000$	C1
(b)(ii)	(current =) 350 A	A3
	$P = IV$ OR $(I =) P / V$ OR $(I =) 7.7 \times 10^7 / 220\,000$	C1
	$(I =) 3.5 \times 10^4$	C1

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03. 0625_s23_ms_43 Q: 7

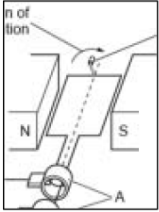
Question	Answer	Marks
(a)	$(I_p =) 0.14 \text{ A}$	A3
	$V_p I_p = V_s I_s$ OR $(I_p =) V_s I_s / V_p$ OR $(I_p =) 12 \times 2.5 / 220$	C1
	$(I_p =) 12 \times 2.5 / 220$	C1
(b)	(turns ratio =) 18 (: 1)	A2
	$N_p / N_s = V_p / V_s$ OR $(N_p / N_s =) V_p / V_s$ OR (turns ratio =) 220 / 12	C1

04. 0625_w23_ms_43 Q: 8

Question	Answer	Marks
(a)(i)	clockwise	B1
	force on left of coil up OR force on right of coil down	B1
(a)(ii)	(turning effect is) greater	B1
(a)(iii)	(turning effect is) less	B1
(b)(i)	horizontal line, labelled B on the left and A on the right	B1
(b)(ii)	vertical line, labelled A at top and B at bottom	B1
(b)(iii)	horizontal line, A on the left and B on the right	B1

05. 0625_m22_ms_42 Q: 6

Question	Answer	Marks
(a)	Minimum of one arrow on a field line pointing N → S and not contradicted	B1
	central line perpendicular to poles of magnets AND at least two other correct field lines	B1
(b)(i)	(A are) slip rings	B1

Question	Answer	Marks
(b)(ii)	 <p>Minimum of one arrow, pointing clockwise, on the wire, not contradicted</p>	B1
	Field direction, motion of wire and induced current are mutually perpendicular OWTTE	B1
(b)(iii)	(as coil rotates) it cuts (magnetic) field between the magnets	B1
	This <u>induces</u> an e.m.f. / voltage / p.d. (in the coil)	B1
	This produces a current in the (coil transferred to the) galvanometer (via the slip rings and carbon brushes)	B1
	Direction of current flow changes with each 180 degree rotation of coil	B1

06. 0625_m22_ms_42 Q: 8

Question	Answer	Marks
(a)	Labelled diagram showing <ul style="list-style-type: none"> labelled <u>Iron</u> (core) two coils, labelled primary and secondary, (around core and connected to separate circuits) Fewer turns on labelled secondary coil 	B3
(b)	(Primary voltage causes) an <u>alternating</u> current in primary coil	B1
	produces a <u>changing</u> magnetic field	B1
	(changing) field <u>induces</u> pd / e.m.f. (in secondary coil)	B1
(c)	0.026	A2
	$(N_s / N_p \Rightarrow) V_s / V_p$ in any form	(C1)

07. 0625_s22_ms_41 Q: 8

Question	Answer	Marks
(a)	0.27 J	A4
	$(v \Rightarrow) at$ (in any form) or 10×0.67 or 6.7 (m/s)	C1
	6.7 (m/s)	C1
	$(KE \Rightarrow) \frac{1}{2}mv^2$ (in any form) or $\frac{1}{2} \times 0.012 \times (10 \times 0.67)^2$ or $\frac{1}{2} \times 0.012 \times 6.7^2$	C1
(b)(i)	<u>magnetic field</u> / <u>magnetic field lines cut the copper / tube / it</u> (or vv.)	B1
	electromagnetic <u>induction</u> occurs or e.m.f. <u>induced</u>	B1

Question	Answer	Marks
(b)(ii)	(upwards / opposing) force on magnet	B1
	force / magnetic field / e.m.f. / current opposes the change (producing it) / opposes motion or force on magnet due to <u>magnetic field</u> caused by <u>current</u> in tube	B1

08. 0625_s22_ms_42 Q: 7

Question	Answer	Marks
(a)	(pole A:) N AND (pole B:) S	B1
(b)	vertical	B1
	up	B1
(c)	vertical	B1
	down	B1

09. 0625_s22_ms_42 Q: 8

Question	Answer	Marks
(a)	$(t = 1/60 =) 0.017 \text{ s}$ OR $1.7 \times 10^{-2} \text{ s}$	B1
(b)(i)	diode	B1
(b)(ii)	$(I =) 1.4 \text{ A}$	A3
	$(I =) Q/t$ in any form	C1
	$(I =) 1.5 \times 10^{17} \times 1.6 \times 10^{-19} / 0.017$ OR $0.024 / 0.017$	C1

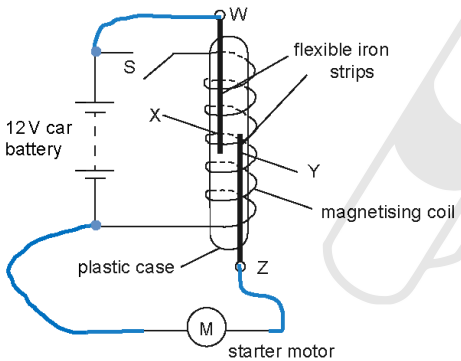
Question	Answer	Marks
(c)	one arrow clockwise AND one arrow anticlockwise	B1
	arrow anticlockwise (around circuit) <u>labelled</u> I	B1
(d)	$(P = 0.35 \times 12 =) 4.2 \text{ W}$	A2
	$(P =) IV$ in any form	C1

10. 0625_s22_ms_43 Q: 9

Question	Answer	Marks
(a)(i)	any four from: <ul style="list-style-type: none"> needle oscillates (as magnet moves up and down) coil cuts magnetic field / magnetic field changes (as magnet moves) changing (magnetic) field <u>induces</u> voltage/current induced voltage/current opposes the motion/change causing it force, magnetic field and induced current are mutually perpendicular 	B4
(a)(ii)	larger (maximum) deflection	B1
(b)	2300	A2
	$(N_P =) V_P N_S / V_S$ in any form OR $(N_P =) \frac{25000 \times 36000}{400000}$	C1

11. 0625_w22_ms_41 Q: 7

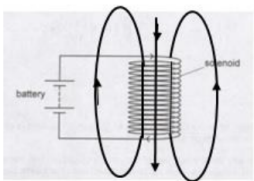
Question	Answer	Marks
(a)		B3
	X and Y /they become magnetised or they / strips have poles	B1
	strips in the centre have opposite (magnetic) poles or X and Y attract	B1
	X and Y touch / close switch / activate relay /complete circuit	B1
(b)(i)	150 A	A2
	$I = P / V$ in any form or 1.8 / 12 or 1800 / 12 or 1800 / 12 or 0.15	C1
(b)(ii)		B2
	small(er) resistance mentioned	B1
	less thermal energy produced or wires do not melt or large current mentioned	B1

Question	Answer	Marks
(c)		B2
	flexible strips in series with motor	B1
	power supply in series with motor	B1
	expected answer: 	

12. 0625_w22_ms_43 Q: 9

Question	Answer	Marks
(a)	0.02 s	A2
	$t = 1 / f$ OR $(t =)1 / f$ OR 1 / 50	C1
(b)(i)	correct shape shown with rectification for two cycles	A2
	sine shape shown (without rectification for two cycles)	C1
(b)(ii)	340 marked	A1
(b)(iii)	one correct time value marked on time axis	B1
	a second correct time value marked on time axis	B1

13. 0625_w22_ms_43 Q: 11

Question	Answer	Marks
(a)	at least one line on the left and one line on the right, outside coil AND curved back over the top and under the base of the coil, towards the central core of the coil	B1
	at least two (straight vertical) lines inside coil	B1
	direction of arrow correct on at least one line and none wrong 	B1
(b)	910	A2
	$N_P / N_S = V_P / V_S$ OR $(N_S =) (V_S / V_P) \times N_P$ OR $(N_S =) \frac{11000 \times 33\,000}{400\,000}$ OR $(N_S =) \frac{11000 \times 33}{400}$	C1

14. 0625_m21_ms_42 Q: 7

	Answer	Marks
(a)	no cutting of (magnetic) flux / <u>magnetic</u> field	B1
(b)	to the top of the page / RH box	B1
	current, motion and (magnetic) field mutually at right angles	B1
	(magnetic) field from left to right	B1
(c)(i)	opposite current (direction) / opposite deflection (on ammeter)	B1
(c)(ii)	greater current / deflection	B1

15. 0625_s21_ms_41 Q: 7

	Answer	Mark
(a)(i)	any three from: <ul style="list-style-type: none"> • y-axis labelled <i>e.m.f.</i> and x-axis labelled <i>time</i> • at least one cycle of a sinusoidal wave • <u>only two</u> complete cycles of a sinusoidal wave • constant amplitude and constant period for first two periods of a sinusoidal wave 	B3
(a)(ii)	peak or trough or corresponding time labelled P	B1
(a)(iii)	(amplitude / maximum e.m.f.) increases	B1
	(e.m.f.) changes direction more often or greater frequency	B1
(b)	alternating current in primary coil	B1
	alternating / changing magnetic field or magnetic field cuts secondary coil (continuously)	B1
	(alternating) e.m.f. <u>induced</u> in the secondary coil	B1

	Answer	Mark
(c)	smaller current (and same resistance when the power is transmitted and an equal rate)	B1
	less thermal energy loss / produced (in cables)	B1

16. 0625_s21_ms_42 Q: 7

	Answer	Mark
(a)	3 lines from N face to S face middle line must be straight AND perpendicular to end faces	B1
	at least 1 arrow from N to S AND NO arrows from S to N	B1
(b)(i)	needle perpendicular to end faces AND {arrow pointing to S OR correctly labelled N OR S}	B1
(b)(ii)	compass / needle / it aligns with field OR compass / needle / it points in direction of magnetic field OR compass / needle / it points to S(outh)	B1
	N pole of needle attracted to S of magnet(s) OR N pole repelled by N of magnets OR unlike poles attract / like poles repel	B1
(c)	heat OR hammer	B1
	with magnet lying (magnetically) E – W	B1
	OR place in coil / solenoid with a.c.	(M1)
	withdraw OR reduce current to 0	(A1)

17. 0625_s21_ms_42 Q: 8

	Answer	Mark
(a)(i)	α in Box 4 / towards bottom of page	B1
	γ in Box 3 / no deflection	B1
(a)(ii)	α in Box 1 / into page	B1
	γ in Box 3 / no deflection	B1

	Answer	Mark
(b)(i)	clockwise accept rotation arrow on diagram	B1
	force on L wire up / up arrow on L wire labelled force on diagram	B1
	force on RH wire down / down arrow on R wire labelled force on diagram	B1
(b)(ii)	none / zero (moment)	B1
(b)(iii)	current in coil reverses OR changes direction	B1
	force(s) (on wires in new positions) still up on L OR down on R owttt	B1

18. 0625_s21_ms_43 Q: 9

	Answer	Mark
(a)	$(N_s =) 24\ 000$	A2
	$N_s = N_p \times V_s / V_p$ OR $50 \times 110 \times 10^3 / 230$ in any form	C1
(b)	labelled diagram showing: <ul style="list-style-type: none"> (soft)-iron core copper coils fewer coils on secondary than primary 	B3
(c)	alternating voltage in primary	B1
	alternating / varying / changing magnetic field (in iron core)	B1
	voltage is induced in the secondary coil	B1

19. 0625_w21_ms_43 Q: 10

Question	Answer	Marks
(a)(i)	6.0 V	A2
	$(V_s =) N_s V_p / N_p$ in any form or $(V_s =) (25 \times 120) / 500$	C1
(a)(ii)	2.5 A OR 2500 mA	A2
	$(I_s =) I_p V_p / V_s$ in any form OR $(0.125 \times 120) / 6.0$	C1
(b)(i)	arrow right to left along loose part of wire or any other correct position	B1
(b)(ii)		B2
	wire moves up	B1
	(reversing direction of the current) reverses the direction of force	B1
(c)	coil does not continue to rotate in the same direction	B1

20. 0625_m20_ms_42 Q: 10

(a)	magnetic field (produced)	B1
	(magnetic field / magnetic flux / magnetic effect / magnetism) (it) alternates / changes direction / reverses	B1
(b)	e.m.f. / p.d. / voltage	B1
(c)	(temperature) increased	B1
	current in <u>base of pan</u> o.w.t.t.e.	B1
	thermal energy (produced in base of pan)	B1

21. 0625_s20_ms_41 Q: 7

(a)(i)	(copper) contains free electrons	B1
	good <u>electrical</u> conductor	B1
(a)(ii)	magnetic material OR easily magnetised	B1
	temporary magnetic material OR easily demagnetised	B1
(b)(i)	alternating / changing / varying magnetic field (produced by X)	B1
	(electromagnetic) induction in Y	B1
	(alternating) electromotive force (e.m.f.) between terminals of Y / in Y	B1
(b)(ii)	current in X increases	B1
	to supply the power used in Y / the lamp	B1

22. 0625_s20_ms_42 Q: 7

(a)(i)	primary coil wound round iron AND (labelled primary or coil OR connected to labelled supply / 12 V)	B1
	secondary coil wound round iron AND (labelled secondary OR connected to labelled output / 2 V)	B1
	significantly more coils around primary	B1
(a)(ii)	two from three <ul style="list-style-type: none"> • links magnetic fields of coils / primary and secondary • stronger magnetic field <u>in secondary</u> • better induction owtte 	B2
(a)(iii)	$V_1 I_1 = V_2 I_2$ in any form OR $(I_1 =) V_2 I_2 / V_1$ OR $(I_1 =) 2 \times 0.10 / 12$	C1
	$(I_1 =) 0.017 \text{ A}$	A1
(b)	metal case earthed	B1
	in case wire falls off / insulation fails / live(wire) touches case	B1

23. 0625_s20_ms_43 Q: 9

(a)(i)	anti-clockwise (seen from brushes)	M1
	I correctly described	A1
	F down on left / up on right	A1
(a)(ii)	arrow labelled correct direction on coil	B1
(a)(iii)	electrons -ve OR repelled from -ve connection of supply	B1
(b)(i)	rotates in opposite direction	B1
(b)(ii)	turns faster OR greater moment / turning effect	B1
(b)(iii)	turns faster OR greater moment / turning effect	B1

24. 0625_w20_ms_41 Q: 7

Question	Answer	Marks
(a)	steel (underlined)	B1
(b)(i)	the direction of the force on a N-pole and left to right / N to S	B1
(b)(ii)	beam deflects	B1
	beam deflects <u>into</u> the page	B1
	moving electrons / charges constitute a current or left-hand rule or moving electrons / current in a magnetic field experiences a force	B1
(b)	(part of) beam deflects	B1
	α -particles deflect in opposite / different direction to β -particles / electrons or all α -particles have similar deflections or α -particles deflect less	B1
	γ -rays do not deflect	B1

25. 0625_w20_ms_42 Q: 9

Question	Answer	Marks
(a)(i)	C pointing horizontally to right	B1
	B AND D pointing horizontally to left	B1
(a)(ii)	S on left AND N on right	B1
(b)	any one of the following methods:	
	1 heat magnet	C1
	to high temperature / red hot	A1
	2 hammer the magnet	(B1)
	repeatedly / in E-W direction	(B1)
3 (place) magnet in a coil / solenoid carrying a.c.		(M1)
	remove magnet from coil OR decrease current (slowly) to zero	(A1)
(c)(i)	at least 3 concentric circles	B1
	closer together near the wire AND clockwise arrow	B1
(c)(ii)	arrows OR field reverses / is in opposite direction	B1

26. 0625_w20_ms_43 Q: 9

Question	Answer	Marks
(a)	high voltage results in low current (for same power)	B1
	Any two from: <ul style="list-style-type: none"> heat loss depends on current less power / energy loss (in transmission) thinner wires can be used 	B2

Question	Answer	Marks
(b)	Efficiency = $\frac{\text{(useful) power output}}{\text{(total) power input}}$	C1
	$P = VI$ in any form	C1
	power output = $(20 \times 2.3) = 46$ (W)	C1
	power input = $46 \div 0.9 = 51$ (W)	C1
	input current = $(51 \div 240) = 0.21$ A	A1

27. 0625_w20_ms_43 Q: 10

Question	Answer	Marks
(a)	iron core / coil / solenoid becomes a magnet	B1
	iron core / coil / solenoid <u>attracts</u> iron armature	B1
	armature pivots/moves and contacts touch / there is a current in circuit B	B1
(b)	current in circuit B does not stop when switch in circuit A is opened	B1
	steel remains magnetised when there is no current in the coil	B1

28. 0625_m19_ms_42 Q: 10

(a)	If voltage is (very) high, current is (very) low NOT if resistance is low	B1
	(If current is low,) thermal energy generated / power loss is low	B1
	(If current is low:) thinner / lighter / cheaper transmission cables / cables with less resistance / cheaper pylons can be used / cheaper	B1
(b)(i)	$V_p / V_s = N_p / N_s$ in any form OR $(N_s =) N_p V_s / V_p$ OR $4000 \times 9 / 120$	C1
	$(N_s =) 300$	A1
(b)(ii)	Iron or soft iron	B1

29. 0625_s19_ms_41 Q: 8

(a)(i)	<u>magnetic</u> field mentioned	B1		
	coil / wire cuts (magnetic) field OR changing (magnetic) field (through coil)	B1		
	e.m.f. / voltage <u>induced</u> OR produced by electromagnetic <u>induction</u>	B1		
(a)(ii)	(plane of coil) horizontal OR in position shown in diagram	B1		
	coil cutting magnetic field the fastest	B1		
(b)	current in coil	OR	energy supplied to / lost from lamp	B1
	current in (magnetic) field experiences a force		student must do more work / supply more energy / more energy needed	B1
	opposes the change causing it		greater force to do more work	B1

30. 0625_s19_ms_42 Q: 9

(a)	place magnet in coil	B1
	EITHER	
	(gradually) withdraw magnet...	B1
	...with ac (in coil) switched on	B1
	OR	
	reduce current...	(B1)
	...to zero	(B1)
(b)(i)	<u>keeps</u> coil rotating (in the same direction) o.w.t.t.e.	B1
	by changing direction of current (in the coil)	B1
	every half cycle/180 degrees	B1
(b)(ii)	(coil rotates) faster	B1

31. 0625_s19_ms_43 Q: 10

(a)	Correct shape of graph showing one rotation	B1
	Graph starts from maximum voltage (positive or negative) (labelled horizontal)	B1
	Graph passes through zero twice, labelled 1/4 and 3/4 revolution	B1
(b)	induced e.m.f. caused by coil cutting magnetic field OR coil moving in magnetic field	B1
(c)	slip rings	B1
	(provide) continuous connection while coil rotating	B1
(d)	Any two of: increase strength of magnetic field increase speed of rotation of the coil increase numbers of turns of coil	B2

32. 0625_w19_ms_42 Q: 7

(a)(i)	deflection	B1
	(then) reverse deflection / current / voltage OR greater deflection OR deflection for shorter time OR <u>change</u> of (magnetic) field / flux	B1
(a)(ii)	larger deflection OR deflection for shorter time	M1
	higher speed OR larger (rate of) <u>change</u> of magnetic field / flux	A1
(b)	{current / power too high OR trip hazard} AND cut (in insulation) AND plug / socket on damp / wet (grass)	B1
	<u>overheating</u> / <u>fire</u> in extension lead OR trip hazard	B1
	short circuit / shock / electrocution through cut (in insulation)	B1
	short circuit / shock / electrocution through plug on damp / wet (grass)	B1

33. 0625_w19_ms_43 Q: 10

(a)(i)	movement of magnet relative to coil OR induces emf / pd / current (across / in LED)	B1
	light goes off when magnet no longer directly below coil	B1
(a)(ii)	door closes more quickly than it was opened so higher current in LED	B1
	door / magnet moving for shorter length of time	B1
(b)	Any two from: <ul style="list-style-type: none"> • quick response • protects against electric shock • protects against overheating • (easily) re-settable • avoids damage to lawnmower 	B2

34. 0625_m18_ms_42 Q: 10

(a)	Strength of magnetic field / magnet	B1
	Speed (of movement of wire)	B1
	Length of AB / wire (within field)	B1
(b)(i)	$V_p / V_s = N_p / N_s$ OR ($N_s =$) $8000 \times 12 / 240$	C1
	400 (turns)	A1
(b)(ii)	Circuit connected to A and B with resistor and diode with correct circuit symbols in series	B1

35. 0625_s18_ms_41 Q: 9

(a)	Would not be effective OR No	1
	With current on OR the (alternating) current should not be switched off	1
	Magnet should be withdrawn from the coil	1
	OR Magnet would be alternately magnetised in different directions	(1)
	Would remain magnetised in the direction occurring at the moment of switching off	(1)
(b)(i)	Coil turns	1
	Clockwise/continuously	1
	Current (in coil) reverses every half turn/when coil is in vertical position OR force on current in a magnetic field	1
(b)(ii)	$1 \times (4 \times T)$	1
	$2 \times (2 \times T)$	1
	$3 \times (T + 2)$	1

36. 0625_s18_ms_41 Q: 10

(a)	To produce an alternating/changing magnetic field	1
	so that current/voltage is <u>induced</u> (continuously) in the <u>secondary coil</u> OR <u>secondary circuit</u>	1
(b)(i)	$N_s + N_p = V_s + V_p$ in any form OR $(N_s =) N_p \times V_s + V_p$ OR $8000 \times 6 + 240$	1
	200	1
(b)(ii)	$I_p V_p = I_s V_s$ in any form OR $(I_p =) I_s \times V_s + V_p$ OR $2.0 \times 6 + 240$	1
	0.050 A	1
(b)(iii)	(Number of lamps =) $2 \div 0.05 = 40$	1

37. 0625_s18_ms_42 Q: 9

(a)(i)	forces on AB and CD in opposite (vertical) directions	1
(a)(ii)	Column 2 increased by factor 3 Box 6	1
	Column 3 increased by factor 3 Box 6	1
	Column 4 decreased by factor 2 Box 3	1
(b)(i)	deflects OR shows I/V/p.d.	1
	returns to zero	1
(b)(ii)	produces/changes magnetic field	1
	S pole at bottom OR magnetic field opposes motion/(magnetic) field of magnet	1

38. 0625_s18_ms_43 Q: 10

(a)(i)	there is a reading OR shows //V/p.d.	M1
	then returns to zero/centre	A1
(a)(ii)	S/south-pole at the right-hand end which attracts the magnet	B1
	opposes the change (causing the deflection)	B1
(b)(i)	(turns ratio or $N_p \div N_s =) V_p \div V_s$ OR $240 \div 12$	C1
	20 OR $20 \div 1$ OR 20:1	A1
(b)(ii)	<u>diode</u> underlined	B1

39. 0625_w18_ms_41 Q: 10

(a)	(soft) iron	B1
(b)(i)	Alternating / changing magnetic field in primary (coil)	B1
	Alternating / changing (magnetic) field in core (and in secondary coil) OR (magnetic) field lines / flux link secondary	B1
	e.m.f. / voltage <u>induced</u> (in secondary coil)	B1
(b)(ii)	$V_p / V_s = N_p / N_s$ in any form OR ($V_p =$) $V_s \times N_p / N_s$ OR $78 \times 560 / 910$	C1
	48 V	A1
(c)	Lower current	B1
	(Power loss from cables =) I^2R so lower current means less power loss OR less heat loss	B1

40. 0625_w18_ms_42 Q: 9

(a)	steel, nickel, cobalt	B1
b(i)	magnetic field (lines) cut OR changing magnetic field / flux linkage (in coil)	B1
	e.m.f. / voltage <u>induced</u>	B1
(b)(ii)	(end Q) is an N-pole	B1
	repels / opposes (approaching) N-pole / magnet	B1
(c)	any two from: withdraw N-pole (from end Q) OR move magnet to the right insert S-pole (into end Q) insert N-pole into other end withdraw <u>S-pole</u> from other end or carry on past mid-point	B2

41. 0625_w18_ms_43 Q: 9

(a)	(a d.c. has) constant value / magnitude or direction does not change or has only one direction	B1
(b)(i)	sinusoidal curve in phase with voltage and maximum value of 0.75 A and same frequency	B1
(b)(ii)	($P =$) VI or 7.2×0.75	C1
	5.4 W	A1
(c)(i)	vertical, upward arrow labelled M on side AB	B1
(c)(ii)	A to B and (Fleming's) right-hand rule (in some way)	B1
	rule explained (i.e. fingers explained or labelled 3D diagram)	B1
(c)(iii)	greater (maximum) voltage	B1
	greater frequency or smaller time period or changes direction <u>more often</u> or alternates faster	B1

42. 0625_m17_ms_42 Q: 8

(a)(i)	Copper	B1
	Copper has (very) low resistance OR is a (very) good (electrical) conductor	B1
(a)(ii)	(Soft) iron / mu metal	B1
	(Soft) iron / mu metal) can be easily magnetised and demagnetised	B1
(b)(i)	X is step-up (transformer) Y: is step-down (transformer)	B1
(b)(ii)	High voltage means low current OR high voltage lowers current	B1
	Power / heat / energy / voltage loss is less	B1
	Thinner cables / wires suitable for low current	B1
(b)(iii)	240 V safe / safer (for use by consumers)	B1
Total:		9

43. 0625_s17_ms_41 Q: 8

(a)	Steel/aluminium/nickel/cobalt/alnico/neodymium/ferrite/alcomax	B1
(b)(i)	Mention of <u>magnetic</u> field or <u>magnetic</u> flux OR field created by bar magnet	B1
	(Magnetic) field (lines) of magnet cut by coil OR (magnetic) field (lines) linked with/through/in the coil <u>changes</u> OR(magnetic) flux (through coil) <u>changes</u>	B1
	e.m.f. <u>induced</u>	B1
(b)(ii)	Direction of movement of magnet through the coil OR which pole of magnet enters the coil	B1
	Direction of induced e.m.f. opposes change producing it OR (coil) end near magnet/left-hand end becomes a N-pole OR (coil) repels magnet (when moved in)	B1
(c)	Hammer the magnet	M1
	repeatedly/until demagnetised/in E/W direction	A1
	OR Heat the magnet	(M1)
	high temperature/red hot/in E-W direction	(A1)
	OR Place magnet in coil carrying A.C.	(M1)
	Remove magnet from coil OR decrease the current (slowly) to zero	(A1)
Total:		8

44. 0625_s17_ms_42 Q: 9


(a)(i)	arrow left to right and horizontal, labelled (M)	B1
(a)(ii)	if M L to R arrow downwards, labelled (F) if M R to L arrow upwards, labelled (F)	B1
(b)	<u>force</u> reversed/opposite of 9(a)(i)	B1
(c)(i)	one ring (roughly circular) centred on wire	M1
	(at least) three rings (roughly circular)	A1
	field lines clockwise (as drawn)	B1
(c)(ii)	(magnetic field is) stronger or field lines closer together	B1
(d)	(vertically) downwards	B1
Total:		8

45. 0625_s17_ms_43 Q: 10

(a)(i)	<u>magnetic</u> field mentioned	B1
	changing (magnetic) field in core/Q	B1
	<u>induction</u> in Q	B1
(a)(ii)	(iron is) magnetic and temporary magnetic	B1
(b)(i)	$(V_S =)V_P \times N_S \div N_P$ OR $4.0 \times 340 \div 200$	C1
	6.8 V	A1
(b)(ii)	$(I_P =)I_S V_S / V_P$ OR $3.5 \times 6.8 \div 4.0$	C1
	6.0 A	A1
(c)	less energy wasted (in cables)	B1
	cheaper and one from: thinner cables fewer pylons fewer power stations/less fuel required	B1
Total:		10

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46. 0625_w17_ms_41 Q: 10

(a)(i)		B1
(a)(ii)	To allow flow (of current) in one direction	B1
(b)(i)	Wire from B to + or – terminal of battery and wire from A to other terminal of battery	B1
	Diode to allow current in at + terminal or out at – terminal	B1
(b)(ii)	Alternating current in coil Y sets up alternating magnetic field OR causes change in magnetic flux	B1
	Alternating field / change in flux cuts coil X OR Alternating field links with coil X	B1
	(Alternating) voltage / current is <u>induced</u> in coil X OR (Alternating) voltage / current is produced in coil X by electromagnetic induction	B1

47. 0625_w17_ms_42 Q: 10

(a)(i)	clockwise arrows on <u>at least 3</u> circles	B1
(a)(ii)	(magnetic) field becomes weaker / decreases (as distance from wire increases)	B1
(b)(i)	any four from these six: <ul style="list-style-type: none"> • charge flows OR current in solenoid / wire / circuit • solenoid becomes magnet / magnetised • bolt becomes magnet / magnetised • (such that) unlike poles (of solenoid and bolt are) facing o.w.t.t.e. • bolt is attracted • bolt moves / (door) locks / spring stretched 	B4
(b)(ii)	solenoid OR bolt no longer magnetised OR bolt no longer attracted	B1
	(spring contracts and pulls) bolt back / bolt returns (to original position) / (door) unlocked	B1

48. 0625_w17_ms_43 Q: 9

(a)(i)	cosine or sine curve and maximum value equal to minimum value	B1
	two complete cycles of 0.02 s between 0 and 0.040 s	B1
(a)(ii)	point marked A where output voltage is zero	B1
(b)(i)	<u>magnetic</u> field (due to a.c.) mentioned	B1
	changing / alternating (magnetic) field or field lines cut solenoid	B1
	e.m.f. / voltage <u>induced</u> (in coil)	B1
(b)(ii)	diode	B1
	prevents / stops the backward current or allows only one direction of current	B1