

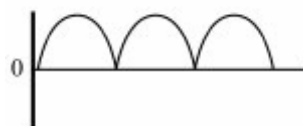
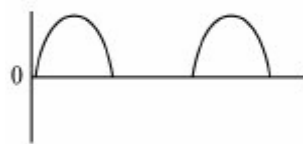
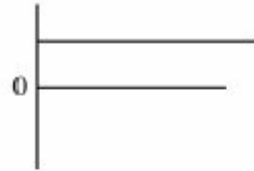
Using mains electricity safely and the power of electrical appliances

1.	(a)	A - fuse B - (cable) grip	<i>for 1 mark each</i>	2	
	(b)	X - brown/red Y - green + yellow/green Z - blue/black	<i>for 1 mark each</i>	3	
	(c)	any plastic/rubber	<i>for 1 mark</i>	1	
	(d)	(i) earth	<i>for 1 mark</i>	1	
		(ii) metal appliance needs earthing/safety qualified	<i>for 1 mark</i>	1	
	(e)	cut less insulation on earth; neutral wire needs connecting; fit fuse properly; cable grip needs to be an outer cable or allow identifying faults	<i>for 1 mark each</i>	4	
					[12]
2.	(a)	(i) 0.0046	<i>accept 4.6 mA allow 1 mark for correct substitution and transformation i.e. current = $\frac{230}{50\,000}$ an answer of 4.6 gains 1 mark</i>	2	
		(ii) increases overall resistance		1	
		• (in event of a shock) gives a smaller current	<i>accept gives smaller shock do not accept no shock/current</i>	1	
	(b)	(i) 50 (hertz)	<i>ignore units</i>	1	
		(ii) NO	<i>has the lowest current at which people cannot let go answer and reason needed accept a sensible reason in terms of their answer to (b) (i)</i>		
		or YES	<i>changing the frequency changes the current by only a small amount</i>	1	
	(c)	a current flows through from the live wire/metal case to the earth wire	<i>accept a current flows from live to earth do not accept on its own if the current is too high</i>		
		this current causes the fuse to melt	<i>accept blow for melt</i>	1	
					[8]
3.	(i)	either 210 C		3	
		or 1260 (joules of energy transferred)	<i>unit not required</i>	1	

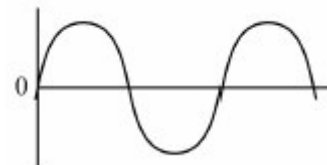
210		1
coulomb(s) C	<i>allow J/V</i>	1
(ii) either 0.7 A		3
or charge = current × time		
or $210^* = \text{current} \times 300$		1
or $Q = It$		
or <i>* same as candidate's answer to part (a)(i) provided correct unit given in part (a)(i) or* as follows from above</i>		1
current = 0.7* amp(s) or A		1

[6]

4. (a)	d.c. flows in (only) one direction	1
	a.c. <u>changes</u> direction (twice every cycle)	1
	<i>accept a.c. constantly changing direction</i>	
	<i>ignore references to frequency</i>	
	<i>accept answers presented as a clear diagram e.g.</i>	

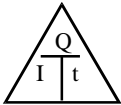
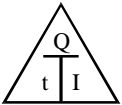


ac:



(b) (i)	10	2
	<i>allow 1 mark for correct transformation</i>	
	<i>and substitution i.e. $\frac{2.3}{230}$ or $\frac{2300}{230}$</i>	
	<i>an answer 0.01 gains 1 mark</i>	
(ii)	13 A	1
	<i>e.c.f.</i>	
	<i>accept the fuse size that is the next listed value greater than answer (b)(i)</i>	

[5]

5. (a) any **two** from 2
 (risk of) cutting (through the) cable
accept cutting the wire
 grass may be wet
or it may rain
 wires may be loose (because cable experiences a lot of movement)
accept cable may be loose
 (risk of) touching exposed part(s)
- (b) some current will go through (the rest of) the lawnmower / the user / to earth 1
do not credit any reference to the electromagnet
- (c) (i) charge = current × time 1
or any transposed version
accept $Q = I \times t$
or any transposed version
accept $C = A \times s$
or coulombs = amperes × seconds
or any transposed version
or  **or** 
but only if subsequently used correctly
- (ii) **EITHER** 3
 1200 microcoulombs / μC
or 1.2 millicoulombs / mC
or 0.0012 coulombs /C
- OR 1
 correct arithmetic
Either converting milliamps to amps and milliseconds to seconds
or correct multiplication
 unit given as coulombs /C
or millicoulombs / mC
or microcoulombs / μC
example :
charge = 30 × 40 = 1200 millicoulombs
should be credited with 2 marks

[7]