**Mark schemes**

Q1.

(a) any two from:

• nuclear

• oil

• (natural) gas

2

(b) 4 (hours)

1

(c) a system of cables and transformers

1

(d) The power output of wind turbines is unpredictable

1

(e) 1500 / 0.6

1

2500 (wind turbines)

1

allow 2500 with no working shown for 2 marks

(f) Most energy resources have negative environmental effects.

1

[8]

Q2.

(a) current that is always in the same direction

1

(b) total resistance = 30 (Ω)

1

V = 0.4 × 30

1

12 (V)

1

allow 12 (V) with no working shown for 3 marks

an answer of 8 (V) or 4 (V) gains 2 marks only

(c) P = 0.4 × 12 = 4.8

1

5 (W)

1

allow 5 (W) with no working shown for 2 marks

allow 4.8 (W) with no working shown for 1 mark

[6]

Q3.

(a) he may receive an electric shock

or

he may be electrocuted

1

if he touches the live wire

1

(b) 10 690 = I × 230

1

I = 10 690 / 230

1

46.478(260) (A)

1

46

1

allow 46 (A) with no working shown for 4 marks

(c) cost is higher

1

more energy is used (per second)

1

[8]

Q4.

(a) (because the) potential of the live wire is 230 V

1

(and the) potential of the electrician is 0 V

1

(so there is a) large potential difference between live wire and electrician

1

charge / current passes through his body

allow voltage for potential difference

1

(b) diameter between 3.50 and 3.55 (mm)

allow correct use of value of cross-sectional area of 9.5 to 9.9 (mm2) with no final answer given for 1 mark

2

(c) 18000 = I × 300

1

I = 18000 / 300 = 60

1

13 800 = (602) × R

1

R = 13 800 / 602

1

3.83 (Ω)

1

allow 3.83(Ω) with no working shown for 5 marks

answer may also be correctly calculated using P = IV and V = IR if 230 V is used.

[11]

Q5.

(a) 20

1

(b) 50

1

(c) (i) 115

1

(ii) 230

1

(iii) if one goes out the other still works

or

brighter

accept power (output) is greater

can be switched on/off independently is insufficient

1

(d) the outside/casing is plastic

there is plastic around the wires is insufficient

it is plastic is insufficient

1

and plastic is an insulator

an answer the light fitting is double insulated gains both marks

1

(e) (residual current) circuit breaker

accept RCCB

accept RCBO

accept RCCD

accept RCB

accept miniature circuit breaker / MCB

trip switch is insufficient

breaker is insufficient

do not accept earth wire

1

[8]

Q6.

(a) pin

made from brass because it is (hard and) a (good electrical) conductor

accept copper for brass

metal is insufficient

heat conductor on its own negates

1

outer case

plastic/rubber because it is a (good electrical) insulator

heat insulator on its own negates

1

(b) (i) live

1

(ii) makes it hot/warm

melts is insufficient

1

(iii) 8.7

accept an answer that rounds to 8.7

allow 1 mark for correct substitution ie 2000 = 230 × I

an answer of 0.0087 or 0.009 or 3.0(4) or 5.65 or 5.7 gains 1 mark

2

(c) a (large) current goes from the live wire to the earth wire

accept metal case for live wire

accept a current goes from live to earth

do not accept electricity for current

1

(which causes) the fuse to (overheat and) melt

accept blow for melt

break is insufficient

do not accept snap / blow up for melt

1

(d) reduce chance of an electric shock

accept to reduce the risk of an accident

accept prevent electric shock

accept prevent electrocution

accept prevent or reduce the risk of an (electrical) fire

accept an electric shock can kill you

accept it can kill you

accept so you can use it safely

1

[9]

Q7.

(a) charge

1

(b) (i) blue

1

(ii) earth wire

1

fuse

1

(c) (i) case is non-metal / non-conducting / plastic / insulator

must refer to case / outside of appliance

do not accept plastic coating / covering

1

(ii) earth (wire)

1

(d) (i) 60 (W)

P = 3 × 20 gains 1 mark

provided no subsequent step shown

2

(ii) 15

300 = 20 × Q

or

20 = 300 / Q gains 1 mark

2

C / coulombs

must clearly be upper case C accept J / V or As

1

[11]

Q8.

(a) (i) (3-pin) plug

do not accept plug socket

1

(ii) live and neutral

1

(iii) double

1

(b) direct current (d.c.) only

1

(c) (i) live

1

(ii) too great a current flows

accept a surge of current

accept too great a power

accept an electrical fault

do not accept voltage / energy / electricity too high

1

(iii) can be reset

accept does not need replacing

1

(disconnects circuit) faster

cheaper is insufficient

does not melt is insufficient

quicker to fix / replace is insufficient

1

[8]

Q9.

(a) (i) 150

1

(ii) transferred to the surroundings by heating

reference to sound negates mark

1

(iii) 0.75

450 / 600 gains 1 mark

accept 75% for 2 marks

maximum of 1 mark awarded if a unit is given

2

(iv) 20 (s)

correct answer with or without working gains 2 marks

correct substitution of 600 / 30 gains 1 mark

2

(b) (i) to avoid bias

1

(ii) use less power and last longer

1

1 LED costs £16, 40 filament bulbs cost £80

or

filament costs (5 times) more in energy consumption

1

(iii) any one from:

• availability of bulbs

• colour output

• temperature of bulb surface

1

[10]

Q10.

(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]

Q11.

(a) (i) any six from:

• switch on

• read both ammeter and voltmeter

allow read the meters

• adjust variable resistor to change the current

• take further readings

• draw graph

• (of) V against I

allow take mean

• R = V / I

allow take the gradient of the graph

6

(ii) resistor would get hot if current left on

1

so its resistance would increase

1

(iii) 12 (V)

0.75 × 16 gains 1 mark

2

(iv) 15 (Ω)

1

16 is nearer to that value than any other

1

(b) if current is above 5 A / value of fuse

1

fuse melts

allow blows / breaks

do not accept exploded

1

breaks circuit

1

[15]

Q12.

(a) attempt to draw four cells in series

1

correct circuit symbols

circuit symbol should show a long line and a short line, correctly joined together

example of correct circuit symbol:

1

(b) (i) 6 (V)

allow 1 mark for correct substitution, ie

V = 3 × 2 scores 1 mark

provided no subsequent step

2

(ii) 12 (V)

ecf from part (b)(i)

18 – 6

or

18 – their part (b)(i) scores 1 mark

2

(iii) 9 (Ω)

ecf from part (b)(ii) correctly calculated

3 + their part (b)(ii) / 2

or

18 / 2 scores 1 mark

provided no subsequent step

2

(c) (i) need a.c.

1

battery is d.c.

1

(ii) 3 (A)

allow 1 mark for correct substitution, ie

18 × 2 = 12 × Is scores 1 mark

2

[12]

Q13.

(a) there is a magnetic field (around the magnet)

1

(this magnetic field) changes / moves

1

and cuts through coil

accept links with coil

1

so a p.d. induced across coil

1

the coil forms a complete circuit

1

so a current (is induced)

1

(b) ammeter reading does not change

must be in this order

accept ammeter has a small reading / shows a current

1

zero

1

greater than before

accept a large(r) reading

1

same as originally but in the opposite direction

accept a small reading in the opposite direction

1

(c) 0.30

allow 1 mark for correct substitution, ie 0.05 = Q / 6

2

C / coulomb

allow A s

1

[13]

Q14.

(a) (i) live

1

(ii) react faster

1

(iii) live and neutral

1

(b) (i) ammeter

1

to measure current

accept to measure amps

1

plus any one from:

• variable resistor (1)

to vary current (1)

accept variable power supply

accept change or control

• switch (1)

to stop apparatus getting hot / protect battery

or

to reset equipment (1)

• fuse (1)

to break circuit if current is too big (1)

2

(ii) any two from:

• use smaller mass(es)

• move mass closer to pivot

• reduce gap between coil and rocker

• more turns (on coil)coil / loop

• iron core in coil

accept use smaller weight(s)

2

[9]

Q15.

(a) (black) is a good absorber of (infrared) radiation

1

(b) (i) amount of energy required to change (the state of a substance) from solid to liquid (with no change in temperature)

melt is insufficient

1

unit mass / 1kg

1

(ii) 5.1 × 106 (J)

accept 5 x 106

allow 1 mark for correct substitution ie E = 15 × 3.4 × 105

2

(c) (i) mass of ice

allow volume / weight / amount / quantity of ice

1

(ii) to distribute the salt throughout the ice

1

to keep all the ice at the same temperature

1

(iii) melting point decreases as the mass of salt is increased

allow concentration for mass

accept negative correlation

do not accept inversely proportional

1

(d) 60 000 (J)

accept 60 KJ

allow 2 marks for correct substitution ie E = 500 × 2.0 × 60

allow 2 marks for an answer of 1000 or 60

allow 1 mark for correct substitution ie

E = 500 × 2.0 or 0.50 × 2.0 × 60

allow 1 mark for an answer of 1

3

(e) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also apply a ‘best-fit’ approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

There is an attempt at a description of some advantages or disadvantages.

Level 2 (3–4 marks)

There is a basic description of some advantages and / or disadvantages for some of the methods

Level 3 (5–6 marks)

There is a clear description of the advantages and disadvantages of all the methods.

examples of the points made in the response

extra information

energy storage

advantages:

• no fuel costs

• no environmental effects

disadvantages:

• expensive to set up and maintain

• need to dig deep under road

• dependent on (summer) weather

• digging up earth and disrupting habitats

salt spreading

advantages:

• easily available

• cheap

disadvantages:

• can damage trees / plants / drinking water / cars

• needs to be cleaned away

undersoil heating

advantages:

• not dependent on weather

• can be switched on and off

disadvantages:

• costly

• bad for environment

6

[18]

Q16.

(a) (i)

Wire Plug terminal

Live C

Neutral A

Earth B

all 3 correct for 2 marks

allow 1 mark for 1 correct

2

(ii) plastic

or

rubber

accept:

 ABS

 UF / urea formaldehyde

 nylon

 PVC

1

(b) (i) 600

allow 1 mark for correct substitution,

ie P =

provided no subsequent step

2

(ii) power is greater than 820 (W)

power is 1200 W is insufficient

1

the lead /cable / wire will overheat / get (too) hot

accept lead / cable will melt

may overheat / get hot is insufficient

1

so there is a risk of fire

accept causing a fire

1

(c) X

any one from:

• most / more efficient

• smallest energy input (per second)

• cheapest to operate

mark only scores if X is chosen

mark is for the reason

accept smallest input (power) for same output (power)

accept wastes least energy

smallest (power) input is insufficient

uses least electricity is insufficient

1

[9]

Q17.

(a) water heated by radiation (from the Sun)

accept IR / energy for radiation

1

water used to heat buildings / provide hot water

allow for 1 mark heat from the Sun heats water if no other marks given

references to photovoltaic cells / electricity scores 0 marks

1

(b) 2 (minutes)

1.4 × 103 =

gains 1 mark

calculation of time of 120 (seconds) scores 2 marks

3

(c) (i) 150 (kWh)

1

(ii) £60(.00) or 6000 (p)

an answer of £6000 gains 1 mark

allow 1 mark for 150 × 0.4(0) 150 × 40

allow ecf from (c)(i)

2

(iii) 25 (years)

an answer of 6000 / 240

or

6000 / their (c)(ii) × 4

gains 2 marks

an answer of 6000 / 60

or

6000 / their (c)(ii) gains 1 mark, ignore any other multiplier of (c)(ii)

3

(iv) any one from:

• will get £240 per year

accept value consistent with calculated value in (c)(iii)

• amount of light is constant throughout the year

• price per unit stays the same

• condition of cells does not deteriorate

1

(d) any one from:

• angle of tilt of cells

• cloud cover

• season / shade by trees

• amount of dirt

1

[13]

Q18.

(a) (i) to obtain a range of p.d. values

accept increase / decrease current / p.d. / voltage / resistance

accept to change / control the current / p.d. / voltage / resistance

to provide resistance is insufficient

a variable resistor is insufficient

do not accept electricity for current

1

(ii) temperature of the bulb increases

accept bulb gets hot(ter)

accept answers correctly

expressed in terms of collisions between (free) electrons and ions / atoms

bulb gets brighter is insufficient

1

(iii) 36

allow 1 mark for correct substitution, ie 12 × 3 provided no subsequent step shown

2

watt(s) / W

accept joules per second / J/s

do not accept w

1

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance, and apply a ‘best-fit’ approach to the marking.

0 marks

No relevant content.

Level 1 (1-2 marks)

There is a basic comparison of either a cost aspect or an energy efficiency aspect.

Level 2 (3-4 marks)

There is a clear comparison of either the cost aspect or energy efficiency aspect

OR

a basic comparison of both cost and energy efficiency aspects.

Level 3 (5-6 marks)

There is a detailed comparison of both the cost aspect and the energy efficiency aspect.

For full marks the comparisons made should support a conclusion as to which type of bulb is preferable.

Examples of the points made in the response:

cost

• halogen are cheaper to buy

simply giving cost figures is insufficient

• 6 halogen lamps cost the same as one LED

• LEDs last longer

• need to buy 18 / more halogen lamps to last the same time as one LED

• 18 halogens cost £35.10

• costs more to run a halogen than LED

• LED has lower maintenance cost (where many used, eg large departmental store lighting)

energy efficiency

• LED works using a smaller current

• LED wastes less energy

• LEDs are more efficient

• LED is 22% more energy efficient

• LED produces less heat

• LED requires smaller input (power) for same output (power)

6

[11]

Q19.

(a) 35

an answer with more than 2 sig figs that rounds to 35 gains 2 marks

allow 2 marks for correct method, ie

allow 1 mark for I = 6.5 (A) or R =

an answer 8.8 gains 2 marks

an answer with more than 2 sig figs that rounds to 8.8 gains 1 mark

3

(b) (maximum) current exceeds maximum safe current for a 2.5 mm2 wire

accept power exceeds maximum safe power for a 2.5 mm2 wire

or

(maximum) current exceeds 20 (A)

(maximum) current = 26 (A) is insufficient

1

a 2.5 mm2 wire would overheat / melt

accept socket for wire

do not accept plug for wire

1

(c) a.c. is constantly changing direction

accept a.c. flows in two directions

accept a.c. changes direction

a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

[7]

Q20.

(a) (i) 50 (Hz)

1

(ii) 2760 (W)

1

(b) 12

allow 1 mark for correct substitution, ie 2400/200

or

allow 1 mark for 2760/230 provided no subsequent step shown

2

amps

1

(c) the charge is directly proportional to the time switched on for

accept for 1 mark the longer time (to boil), the greater amount of charge

or positive correlation

or they are proportional

2

[7]

Q21.

(a) (i) 50(Hz)

ignore any unit given

1

(ii) any two from:

• (some) current flows to Earth

accept ground for Earth

• current flows through copper braid

accept current flows through the earth wire

accept electricity for current in either the first or second marking point but not both

• RCCB detects difference between current in live and neutral wire

2

(iii) can be reset

accept does not need replacing

or

faster acting

accept switches circuit off faster

1

(b) (i) 79 200

allow 1 mark for correct substitution, ie 11 =

an answer 22 gains 1 mark

2

coulombs / C

do not accept c

1

(ii) 18 216 000

accept for 2 marks 18 216 kJ or 18.216 MJ

or

230 × their (b)(i) correctly calculated

allow 1 mark for correct substitution, ie 230 × their (b)(i) or

allow 1 mark for power calculated as 2530(W)

2

(c) increases temperature of thermistor

1

changes resistance (of thermistor)

do not accept increases resistance (of thermistor)

an answer decreases resistance (of thermistor) gains 2 marks

1

[11]

Q22.

(a) iron

1

hairdryer

1

kettle

1

answers can be in any order

(b) (i) Y

1

(ii) bar drawn with any height greater than Y

ignore width of bar

1

(c) (bigger volume) takes more time (to boil)

accept explanation using data from graph

1

(so) more energy transferred

do not accept electricity for energy

1

(and) this costs more money

ignore reference to cost of water

wasting more money because heating more water than needed is insufficient

1

[8]

Q23.

(a) (i) connect the earth wire (to pin)

answers must be in terms of correcting the faults

1

screw cable grip (across cable)

accept tighten the cable grip

1

(ii) any two from:

• fuse gets (very) hot

• fuse melts

accept blows for melts

do not accept break / snap fuse / blow up

• circuit breaks / switches off

accept stops current flowing

2

(b) any two from:

• hairdryer is plugged into mains (electricity socket)

it refers to hairdryer

hairdryer works from the mains

or

hairdryer is using 230 V

accept 240 for 230

• water conducts electricity

do not accept water and electricity don’t mix

• radio is low power / current / pd / voltage

accept radio not connected to the mains

do not accept radio is waterproof

• (the current in / pd across) hairdryer more likely to give a (fatal) electric shock

accept the idea of electrocution if hairdryer is wet

accept the idea of radio not causing electrocution if wet

2

[6]

Q24.

(a) d.c. flows in (only) one direction

1

a.c. changes direction (twice every cycle)

accept a.c. constantly changing direction

ignore references to frequency

1

(b) a current flows through from the live wire / metal case to the earth wire

accept a current flows from live to earth

do not accept on its own if the current is too high

1

this current causes the fuse to melt

accept blow for melt

do not accept break / snap / blow up for melt

1

[4]

Q25.

(a) A

only scores if A chosen

1

it is alternating / a.c.

accept because B and C are d.c.

or

it changes direction/p.d.

accept voltage for p.d.

it goes up and down is insufficient

it is constantly changing is insufficient

an answer B and/or C with the reason because it is direct current/d.c scores 1 mark

1

(b) too much current (through socket)

accept electricity for current

accept too much power

accept socket/circuit overloaded

do not accept voltage/p.d for current

1

wiring / socket gets hot

accept melts for gets hot

accept risk of fire

risk of fire in appliances is insufficient

ignore reference to sparking

overloaded plugs and plugs getting hot or fuses melting is insufficient

1

[4]

Q26.

(a) (i) earth wire

1

(ii) double

1

(b) if too much current flows through the wire

accept power for current

do not accept electricity for current

accept if more than 20 amps flows through the wire

1

the fuse (overheats and) melts

accept ‘blows’ for melts

do not accept explodes / breaks / snaps etc

1

breaking the circuit

accept stopping the current flow

1

[5]

Q27.

(a) (i) 50 000

allow 1 mark for correct substitution, ie

6 = 0.00012 × R

or 6 = 0.12 × R

or answers of 25 000 or 50 gain 1 mark

or allow 1 mark for an incorrect answer caused by one error only ie using 3V or an incorrect conversion of current

2

ohm / Ω

an answer 50kΩ gains 3 marks

1

(ii) (body) resistance changes

or

body fat/resistance affected by (many) factors

accept named factor, eg age, gender, height, fitness, bone structure, muscle, drinking water related to body fat / resistance

1

(iii) gives misleading / wrong/inaccurate value

do not credit if specifically linked to a change in mass / weight

1

(because) high water content changes body resistance

accept a specific change to resistance

water changes body mass is insufficient

1

(b) (i) RCCB – detects difference between current in live and neutral (wires)

accept RCCB can be reset

1

fuse – (overheats and) melts

accept blows for melts

1

(ii) switches the circuit / hedge trimmers off within 60 milliseconds

allow for 1 mark the RCCB / it is (very) fast.

do not accept the bigger the current the faster the RCCB

switches off

2

[10]

Q28.

(a) (i) 0.6

or

60%

allow 1 mark for correct substitution ie provided no subsequent step shown

an answer of 0.6 / 60 with a unit gains 1 mark only

an answer of 60 gains 1 mark only

2

(ii) heat

allow thermal

1

(b) 12 000 p

or

£120

to score both marks the unit must be consistent with the numerical answer

answers 12 000 and 120 gain 1 mark only

allow 1 mark for correct substitution ie 800 × 15 or 800 × 0.15

provided no subsequent step shown

2

[5]

Q29.

(a) (i) 720

allow 1 mark for correct substitution,

ie 72 × 10 provided no subsequent step shown

2

(ii) 720

or

their (a)(i)

1

(b) (i) gravitational potential

allow gravitational

allow potential

1

(ii) 432

allow 1 mark for correct substitution, ie provided no subsequent step shown

2

watt / W

1

[7]

Q30.

(a) (i) circuit not complete

accept circuit is broken

accept switch / s are open / off

1

(ii) 9

allow 1 mark for correct substitution, ie 0.5 × 18 provided no subsequent step shown

2

(iii) 36

1

(b) can be switched on / off from top or bottom of stairs

1

(c) (i) (electric) shock

accept fitting becomes live

accept answers giving a possible consequence of electric shock, eg death

1

(ii) connect the earth wire

1

[7]

Q31.

(a) (i) D

1

(ii) plastic or rubber

accept a specific type of plastic

accept electrical insulator

1

(b) 460

allow 1 mark for correct substitution ie 2 × 230

2

(c) any two from:

• not all appliances need a 13 A fuse

idea that 13 A is (much) bigger than required by many appliances

do not accept some appliances require more than 13 A

do not accept 13 A fuse will blow

• can choose the most suitable fuse (for the appliance)

accept install correct fuse for the appliance

• (in the event of a fault) 13 A fuse may allow too much current to flow

through an appliance

or

fuse may not melt (before appliance is damaged)

• may already have the fuse

idea of reusing a fuse

do not accept cheaper unless explained correctly

2

[6]

Q32.

(a) (i) 0.25 (A)

1

(ii) 75

allow 1 mark for converting 5 minutes to 300 seconds

or allow 1 mark for correct substitution

ie 0.25 × 300

allow 1 mark for an answer 1.25

allow 1 mark only for their (a)(i) × 300 correctly calculated

2

coulombs or C

do not accept c

1

(b) any two from:

• fault not repaired

accept if a fault was to occur

• larger current will (still) flow

• aluminium foil will not melt (if a fault)

accept aluminium foil needs a higher current / charge to melt

• wiring will overheat / (may) cause a fire

accept idea of fire hazard

do not accept explode etc

2

[6]

Q33.

(a) brown

1

(b) outside / case is plastic / an insulator

accept is double insulated

accept non-conductor for plastic

do not accept it / hairdryer is plastic

1

(c) (i) (1) S1

and no other

1

(2) S1 and S3

both required, either order

1

(ii) S1 must be ON (for either heater to work)

do not accept reference to ‘fan’ switch

1

S1 switches the fan on

1

(d) 1495

allow 1 mark for correct substitution

ie, 6.5 × 230

2

watt(s) or W

an answer of 1.495 kW gains 3 marks

although the unit is an independent mark for full credit

the unit and numerical value must be consistent

accept joules per second or J/s

1

[9]

Q34.

(a) (i) ammeter and battery in series with the gauge

symbols must be correct

ignore a voltmeter drawn in series

or cells reversed to cancel out

1

voltmeter in parallel with the gauge

symbol must be correct

accept a freestanding circuit

diagram provided strain gauge is labelled or a resistor symbol used for the strain gauge

1

(ii) d.c. flows only in one direction

a.c. changes direction is insufficient

1

(b) (i) 75

this answer only

allow 1 mark for correct substitution and transformation,

ie resistance =

2

(ii) increases

1

(iii) elastic / strain potential

do not accept potential

1

[7]

Q35.

(a) transferred to surroundings / surrounding molecules / atmosphere

‘it escapes’ is insufficient

or

becomes dissipated / spread out

accept warms the surroundings

accept degraded / diluted

accept a correct description for

surroundings eg to the washing machine

do not accept transformed into heat on its own

1

(b) a smaller proportion / percentage of the energy supplied is wasted

owtte

accept a statement such as ‘less energy is wasted’ for 1 mark

do not accept costs less to run

ignore references to uses less energy

2

(c) (i) 2.4 (p)

accept 2 p if it is clear from the working out this is rounded from 2.4 p

allow 1 mark for correct substitution of correct values

ie 0.2 × 12

allow 1 mark for calculating cost at 40 °C (13.2 p)

or

cost at 30 °C (10.8 p)

2

(ii) any one from:

• less electricity needed

ignore answers in terms of the washing machine releasing less energy

an answer in terms of the washing machine releasing CO2 negates the mark

do not accept less energy is produced

• fewer power stations needed

• less fuel is burned

accept a correctly named fuel

do not accept less fuel is needed

1

[6]

Q36.

(a) (i) connect the earth wire (to pin)

answers must be in terms of correcting the faults

1

screw cable grip (across cable)

accept tighten the cable grip

1

(ii) earth (wire)

accept the green and yellow (wire)

1

(iii) any two from:

• fuse gets (very) hot

• fuse melts

accept blows for melts

do not accept break / snap fuse / blow up

• circuit breaks/ switches off

accept stops current flowing

2

(b) any two from:

it refers to hairdryer

• hairdryer is plugged into mains (electricity socket)

hairdryer works from the mains

 or

 hairdryer is using 230 V

accept 240 for 230

• water conducts electricity

do not accept water and electricity don't mix

• radio is low power / current / pd / voltage

accept radio not connected to the mains

do not accept radio is waterproof

• (the current in / p.d.across) hairdryer more likely to give a (fatal) electric shock

accept the idea of electrocution if hairdryer is wet

accept the idea of radio not causing electrocution

if wet

2

[7]

Q37.

(a) 125

allow 1 mark for obtaining time period = 0.008 (s)

or

frequency = 1 / time period (or their calculated time period)

2

hertz

or

Hz

do not accept hz

1

(b) 50 (hertz)

1

[4]

Q38.

(a) (rate of) flow of charge / electrons / ions

accept movement for flow

do not accept flow of electricity

1

(b) 7(.0)

accept 6.96 / 6.95 or an answer that would approximate to 6.96 if rounded

allow 1 mark for obtaining correct power and changing to watts ie 1600

or

allow 2 marks for correct substitution and transformation

ie 1600 ÷ 230

an answer 0.00696 / 0.007 gains 2 marks

allow 1 mark for 1.6 / 230 or 1.7 / 230

an answer 7.39 or 7.4 gains 2 marks

3

amp (ere)

accept A

1

[5]