

M1. (a) (i) temperature (increase) and time switched on are directly proportional
accept the idea of equal increases in time giving equal increases in temperature

answers such as:

- *as time increases, temperature increases*
- *positive correlation*
- *linear relationship*
- *temperature and time are proportional*

score 1 mark

2

(ii) any **one** from:

"it" refers to the metal block

- *energy transfer (from the block) to the surroundings*
accept lost for transfer
accept air for surroundings
- *(some) energy used to warm the heater / thermometer (itself)*
accept takes time for heater to warm up
- *(metal) block is not insulated*

1

(iii) 15 000

allow 1 mark for correct substitution, ie 50×300 provided no subsequent step shown

2

(b) lead

reason only scores if lead is chosen

1

needs least energy to raise temperature by 1°C

accept needs less energy to heat it (by the same amount)
lowest specific heat capacity is insufficient

1

[7]

M2. (a) (i) 0.2 **or** 1/5

accept 20% for both marks

allow 1 mark for correct substitution answer of 0.2%

or 20 gains 1 mark

ignore units

2

(ii) wasted

accept transformed to heat / other forms

accept transferred to the air / surroundings sound = neutral

1

(b) (i) any **one** from:

- can fly at night
accept can fly when it is cloudy
accept as a back-up
- can stay in the air for longer
- can fly in the winter
- can fly faster
increases power is neutral

1

(ii) any **one** from:

- produces no (pollutant) gases
- or** no greenhouse gases
accept named gas
accept no air pollution
*do **not** accept no pollution*
accept less global warming
accept harmful for pollutant
accept produces no carbon
*do **not** accept environmentally friendly*
- produces no / less noise

- less demand for fuels
accept any other sensible environmental advantage

1

- (iii) accept any sensible suggestion eg, map the Earth's surface / weather forecasting / spying / monitoring changes to the Earth's atmosphere, etc
*do **not** accept ideas in terms of transporting*
accept use as a satellite

1

[6]

- M3.** (a) electrical 1
- chemical 1
- light 1
- (b) 25% **or** 0.25
*allow 1 mark for correct substitution, ie $50 \div 200$ provided no subsequent step shown **or** answers of 25 with a unit **or** 0.25 with a unit gain 1 mark*
*answers of 25 without a unit **or** 0.25% gain 1 mark* 2
- (c) the information board can be used anywhere it is needed 1

[6]

M4. (a) generator

*accept dynamo
accept alternator*

1

(b) (i) 1400

ignore units

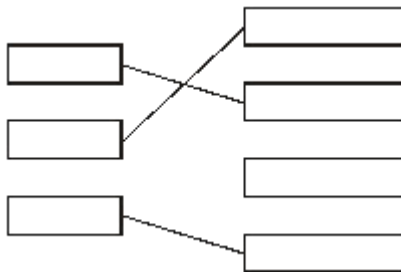
1

(ii) 0.3 or 30%

*any incorrect unit penalise 1 mark
allow 1 mark for the correct use of 600
or 0.3% or 30*

2

(c) 1 mark for each correct link



*if more than 3 lines are drawn, mark only
3 lines starting with those that are incorrect*

3

(d) (i) 110

no tolerance

1

(ii) 12

no tolerance

1

(iii) wind speed may be too low to operate the generator

accept wind may not always blow

accept power depends on wind speed

accept does not generate if wind speed is too high

accept does not generate if wind speed is above 12 (m/s)

accept does not generate if wind speed is below 1.6 (m/s)

accept it is unreliable

*do **not** accept answers referring to cost only*

1

[10]

M5. (a) heat / thermal
or / and
sound

*do **not** accept noise
other forms of energy eg light negates answer*

1

(b) 0.4
or
40 %

*allow 1 mark for $\frac{2000}{5000}$
or
equivalent fraction
an answer 0.4 % gains 1 mark
answers 0.4 or 40 given with any unit gains 1 mark
40 without % gains 1 mark*

2

[3]