

Energy Transfers in a System

Mark Scheme

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.1 Energy
Sub-Topic	Energy Transfers in a System
Difficulty Level	Silver Level
Booklet	Mark Scheme

Time Allowed: 29 minutes

Score: /28

Percentage: /100

Grade Boundaries:

- M1.(a)** the store of chemical energy (in the battery) decreases 1
- the internal energy of the surrounding air increases. 1
- accept description of energy becoming less usefully stored for 2 marks*
- (b) kinetic energy = $\frac{1}{2} \text{ mass} \times \text{velocity}^2$ 1
- (c) $E_k = \frac{1}{2} \times 0.8 \times 12^2$ 1
- $E_k = 57.6 \text{ (J)}$ 1
- allow 57.6 (J) without working shown for 2 marks*
- (d) lower proportion of wasted energy
accept less energy is wasted 1
- higher proportion of energy is converted into kinetic energy
accept more kinetic energy 1
- (e) **Level 2 (3–4 marks):**
A relevant and coherent argument which demonstrates processing and numerical analysis of the information presented and draw a conclusion which is logically consistent with the reasoning and refers to payback time for the vehicles.
- Level 1 (1–2 marks):**
Simple comparisons are made which demonstrate a basic ability to numerically analyse

the information presented. The conclusion, if present, may not be consistent with the calculations.

0 marks:

No relevant content

Indicative content

- The electric car costs £12 000 more to buy
- Running cost of electric car = £3 000
- Running cost of petrol engine car = £24 000
- Total cost of electric car = £30 000
- Total cost of petrol engine car = £39 000
- The electric car cost £1 750 less to run each year
- The electric car will save £9 000
- Additional cost is covered in 6.9 years
- So the electric car will be cheaper over the 12 year lifetime

or

Electric

$$27000 / 12 = 2250$$

$$\text{Annual cost} = 2250 + 250 = 2500$$

Petrol

$$15000 / 12 = 1250$$

$$\text{Annual cost} = 1250 + 2000 = 3250$$

So electric is £750 cheaper per year

4

[11]

M2.(a) (i) 5(.0)

1

(ii) 35 or their (a)(i) $\times 7$ correctly calculated

allow 1 mark for correct substitution, ie 5 or their (a)(i) $\times 7$ provided no subsequent step shown

2

(iii) 525(p) or (£) 5.25 or their (a)(ii) $\times 15$ correctly calculated

if unit p or £ given they must be consistent with the numerical answer

1

(iv) decreases

1

temperature difference (between inside and outside) decreases

accept gradient (of line) decreases

*do **not** accept temperature (inside) decreases*

*do **not** accept graph goes down*

1

(b) air (bubbles are) trapped (in the foam)

*do **not** accept air traps heat*

foam has air pockets is insufficient

1

(and so the) air cannot circulate / move / form convection current

air is a good insulator is insufficient

no convection current is insufficient

*answers in terms of warm air from the room being trapped
are incorrect and score no marks*

1

[8]

M3.

(a) 60% sector correct

other two sectors closer to 13:7 than 12:8 or 14:6

sectors correctly labelled (w.r.t rank order of size)

each for 1 mark

3

(b) (i) *ideas that wasted energy*

is transferred to surrounding air

pan

stove

is converted to another/correctly named energy form

any 2 for 1 mark each

2

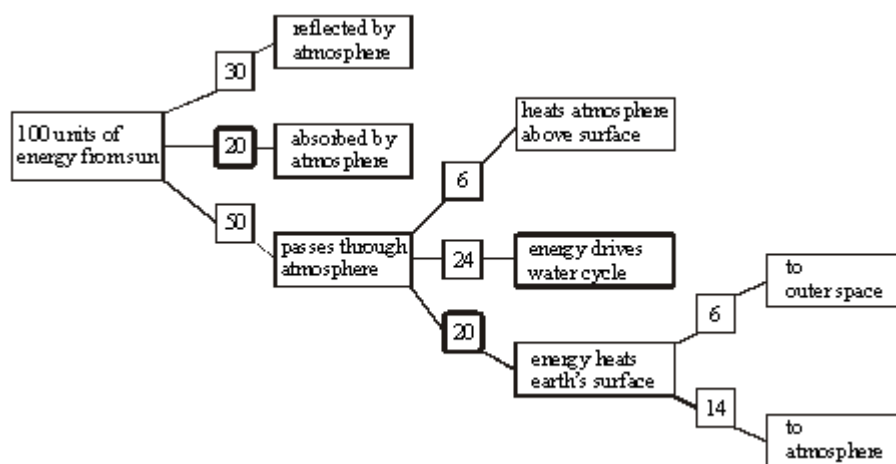
(ii) 40

for 1 mark

1

[6]

M4.



each for 1 mark

allow 'error carried forward' to the last box'

[3]