

National and Global Energy Resources

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.1 Energy
Sub-Topic	National and Global Energy Resources
Difficulty Level	Bronze Level
Booklet	Mark Scheme 1

Time Allowed: 56 minutes

Score: /56

Percentage: /100

Grade Boundaries:

M1.(a)	(i)	<u>water</u>	1
		heated <i>accept boiled or turned to steam</i> <i>do not accept evaporated</i>	1
		<u>generator</u>	1
	(ii)	geothermal power stations provide a reliable source of electricity	1
	(b)	falling water	1
			[5]
M2.(a)	(i)	77	1
	(ii)	Oil	1
	(b)	water <i>accept H₂O</i>	1
	(c)	Carbon dioxide causes global warming	1

[4]

M3.(a) (i) changing the distance may / will affect / change the voltmeter reading

accept so only one independent variable

accept distance affects speed of wind (turbine)

accept it is a control variable

accept to give valid results

fair test is insufficient

to make the results accurate is insufficient

1

(ii) any sensible practical suggestions, eg

- so fan reaches a steady / full speed
accept power for speed
- so wind (turbine) reaches a steady / full speed
- so voltmeter reaches / gives a steady reading
accept accurate or valid reading a correct reading is insufficient
*do **not** accept precise reading*

1

(iii) as the number of blades increases so does the (voltmeter) reading / output / voltage

number of blades affects the reading / output is insufficient

1

further relevant detail, eg

- voltmeter increase is greatest up to 3 blades
- voltmeter reading hardly changes with 4, 5 or 6 blades
accept does not change between 4 and 6 blades
- increase is directly proportional up to 3 blades
- it reaches a limit
accept does not change after 4 / 5 blades

- a numerical example giving two pairs of numbers, eg 2 blades = 0.6V, 4 blades = 1V

1

(b) C

reason scores only if C is chosen

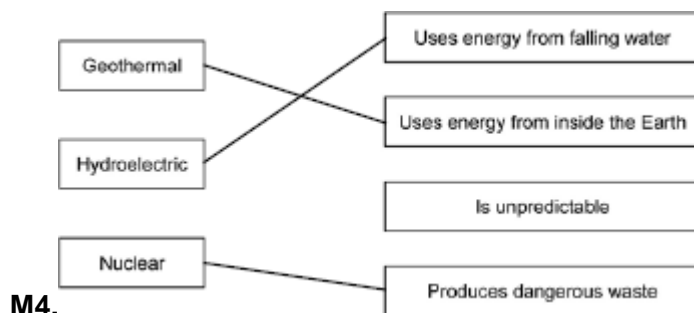
1

wind speed / strength varies

*accept wind is **not** constant / reliable*

1

[6]



allow 1 mark for each correct line

if more than one line goes from an energy source then all lines from that energy source are wrong

[3]

M5.(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
*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]

M6.(a) (i) an unreliable energy source

1

(ii) a renewable energy source

1

(b) plant / grow (at least) one new tree

1

(c) greater than 4%

1

[4]

M7.(a) light

correct order only

1

electrical

1

(b) 0.2 or 1/5

accept 20% for both marks

allow 1 mark for correct substitution ie

$$\frac{35\,000}{175\,000}$$

*answers of 0.2% **or** 20 gain 1 mark only*

2

(c) 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

[5]

M8. (a) (i) correct data point identified (4, 0.96)

1

(ii) a decrease in

1

(b) (i) no / less atmospheric pollution

accept specific examples eg no CO₂ / greenhouse gases produced
accept no harmful gases / fumes
accept reduced pollution from transportation (of coal)
accept does not contribute to global warming
it / they refers to solar cells

*do **not** accept no / less pollution*
does not harm the environment is insufficient
it is a renewable energy source is insufficient

1

(ii) 8

*allow 1 mark for showing correct method ie $\frac{7600}{950}$ provided
that no subsequent step is shown*

2

(iii) increase

1

(iv) **these marks can score even if (b)(iii) is wrong**

less / no electricity generated
accept energy for electricity
accept reduced power / voltage output

1

(because) lower light intensity (hitting solar panel / cell)
or
so decreases money paid / gained (from selling electricity)
allow less light / sun (hitting solar panel / cell)

1

[8]

M9. (a) (i) any **one** from:

- produces no (air / atmospheric) pollution
accept named pollutant eg CO₂
accept no harmful gases
accept produces no emissions
accept does not add to global warming

environmentally friendly is insufficient

- energy (source) is free
accept no fuel costs
accept the wind / it is free

1

(ii) any **one** from:

- waves
- tides
- falling water
accept hydroelectric
*do **not** accept water (flow)*
- solar
accept Sun / sunlight
accept solar panels / cells
- geothermal
- biofuel / biomass
accept a named biofuel

1

- (b) (i) 3000 (kilowatts)
accept 3 megawatts / MW
accept 3 000 000 watts / W

1

- (ii) (average) wind speed below 6 m/s
answers giving a wind speed greater than 3 but less than 6 m/s gain both marks
allow 1 mark for calculating the output as 500 kW (maximum)
and
allow 1 mark for wind speed too low or wind not strong enough
*do **not** accept wind above 25 m/s*
*do **not** accept the turbines are frozen*

2

- (iii) A small amount of nuclear fuel generates a large amount of electricity.
both required

Nuclear power stations do not depend on the weather to generate electricity.
1

[6]

M10. (a) gas (burning) 1

- (b) (i) (transmission) cables and (step-up and step-down) transformers
*if transformers are named ie step-up transformer then both
step-up and step-down must be given
mention of power station or consumer negates mark*

1

(ii) voltage 1

more efficient 1

(c) increase 1

[5]

M11. (a) (i) solar and wind
both required for mark either order 1

- (ii) 37(%)
*accept their **two** sources in a(i)*

correctly added as an error carried forward (ecf)

1

(b) **A**

1

(c) gas is non-renewable

*do **not** accept they are not all renewable*

statements such as gas produces CO₂ is neutral

1

[4]