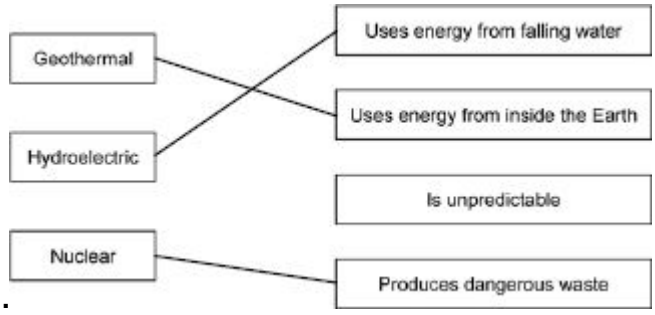
M1.



*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]

M2. (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]

M3. (a) (i) any **one** from:

- produces no (air / atmospheric) pollution
  accept named pollutant eg CO_2
  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]

M4. (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 CO_2 / 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]

M5. (a) grid

accept any unambiguous indication

1

(b) (i) A (only)

1

(ii) D (only)

1

(c) less than

1

[4]

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) electrical

1

chemical

1

light

1

(b) 25% **or** 0.25

*allow **1** mark for correct substitution, ie 50 ÷ 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]

M8. (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]

M9. (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

<u>wind</u> speed / strength varies

*accept <u>wind</u> is **not** constant / reliable*

1

[6]

M10. (a) (i) 77

1

(ii) Oil

1

(b) water

accept H_2O

1

(c) Carbon dioxide causes global warming

1

[4]

M11. (a) (i) <u>water</u>

1

heated

accept boiled or turned to steam

*do **not** accept evaporated*

1

<u>generator</u>

1

(ii) geothermal power stations provide a reliable source of electricity

1

(b) falling water

1

[5]