



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 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]

- M4.** (a) (i) correct data point identified (4, 0.96) 1
- (ii) a decrease in 1
- (b) (i) no / less atmospheric pollution 1
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
- (ii) 8 2
allow 1 mark for showing correct method ie $\frac{7600}{950}$ provided that no subsequent step is shown
- (iii) increase 1
- (iv) **these marks can score even if (b)(iii) is wrong** 1
 less / no electricity generated
accept energy for electricity
accept reduced power / voltage output
- (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

- 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 $50 \div 200$ 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]

- M8.** (a) any **two** from:
- nuclear
 - oil
 - (natural) gas
- (b) 4 (hours) 2
- (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

wind speed / strength varies

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

1

[6]

M10. (a) (i) 77 1

(ii) Oil 1

(b) water
accept H₂O 1

(c) Carbon dioxide causes global warming 1

[4]

M11. (a) (i) water 1

heated

accept boiled or turned to steam

*do **not** accept evaporated*

1

generator

1

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

1

(b) falling water

1

[5]