AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



MARK SCHEME

4.1.3 NATIONAL AND GLOBAL ENERGY RESOURCES (PACK 2)

SCORE	PERCENTAGE
/223	%

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Q1.

(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 CO_2 is neutral

1

[4]

Q2.

(a) kinetic

1

(b) (i) generates a lot more energy / electricity / power

need fewer conventional large-scale hydroelectric power stations is neutral

or

can supply (energy / electricity / power) to more homes

1

(ii) Large areas of land are flooded.

1

(c) (i) National Grid

this answer only

1

(ii) less energy / heat loss (from the cables)

accept wasted for loss

accept answers in terms of fewer transformers needed

*do **not** accept less electricity lost / wasted*

*do **not** accept no energy lost*

1

(d) any **one** from:

- fewer rivers (suitable for generators)
- less mountainous (so rivers fall smaller distances)

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accept answers in terms of difficulty linking villages and towns to grid (in Nepal)

accept answers in terms of more isolated communities

accept answers in terms of UK having more resources for large-scale power stations

1

[6]

Q3.

(a) *marks are awarded only for the reason but must match the ringed answer*

*for both marks a **MAYBE** answer should include a **YES** and **NO** response answers in terms of the sources being renewable or non-renewable are insufficient*

any **two** from:

YES answers may include:

- wind produces no pollutant gases
  accept wind burns no fuel
  accept CO_2 / SO_2 / oxides of nitrogen / greenhouse gas for pollutant gases
- nuclear produces no pollutant gases
  accept nuclear burns no fuel
- (burning) gas does not produce SO_2
  accept gas does not cause acid rain
  *do **not** accept they don't / none produce pollutant gases*

NO answers may include:

- nuclear produces radioactive waste
- (burning) gas produces CO_2 / pollutant gases / air pollution
  accept contributes to global warming / greenhouse effect

2

(b) nuclear power stations use a non-renewable fuel

accept uranium / plutonium is non-renewable

*do **not** accept some are unrenewable*

1

[3]

Q4.

(a) (i) kinetic

accept KE

*do **not** accept movement*

1

(ii) 0.75

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*allow **1** mark for correct substitution ie* $\frac{60\,000}{80\,000}$

or

75 %

*an answer 0.75 % **or** 0.75 with a unit gains **1** mark only*

*an answer 75 with or without a unit gains **1** mark only*

2

(b) any **one** from:

- large areas of land are flooded

  uses large areas of land / takes up large areas of land is insufficient

- people's homes may be destroyed

- habitat (of animals and plants) lost / damaged

  construct is neutral

  very noisy is neutral

1

(c) (i) system of cables <u>and</u> transformers

both required for the mark

accept power lines / wires for cables

ignore reference to pylons

inclusions of power stations / consumers negates answer

1

(ii) less energy loss / wasted (in the cables)

accept heat for energy

*do **not** accept no energy loss*

*do **not** accept electricity for energy*

1

as the cables are shorter

1

[7]

Q5.

(a) (i) decommissioning

1

(ii) level of radiation **or** radiation dose (to workers) decreased

accept the isotope / cobalt(-60) has decayed (a lot)

accept the isotope / cobalt(-60) has decayed in 2 half lives

accept exposed to less radiation

*do **not** accept no radiation left*

1

less hazardous / dangerous (to workers' health)

accept safer

*do **not** accept there is no hazard*

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accept allows reactor to cool (down)

*an answer of radiation levels decrease by 75 % or drops to 25 % gains **2** marks*

1

(b) (i) more in favour
or
fewer against

quoting figures alone is insufficient

*do **not** accept it increases*

ignore any reasons given

1

(ii) any **one** from:

- sample too small
- do not know how many (people) were asked
- different people asked (in different years)
- sample not representative (of population)
- people did not understand the questions
- do not know who carried out the surveys
  *do **not** accept they are biased unless acceptable reason for bias given*
- do not know if surveys asked same questions

1

(iii) any **one** from:

- no / less pollutant gases produced
  accept a named gas
  accept does not contribute to global warming
- reliable source (of energy / electricity)
- running out of fossil fuels
  accept a named fossil fuel
- conserve fossil fuels
  accept fossil fuels won't have to be used
- meet increasing demand
- less reliance on imported fossil fuels / electricity
  accept named fossil fuel
- concentrated energy source(s)
- lower transportation costs for fuel
- to replace old nuclear power stations

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ignore references to efficiency / job creation / local economy / selling electricity

1

(c) economic issues

1

[7]

Q6.

(a) (i) 4

*allow **1** mark for correct transformation and substitution*

ie $\frac{0.6}{0.15}$

substitution only scores if no subsequent steps are shown

2

(ii) diagram showing two output arrows with one arrow wider than the other with the narrower arrow labelled electrical / electricity / useful

1

(b) any **one** from:

- to check reliability / validity / accuracy
- to avoid bias

1

(c) any **two** from:

- produce no / less (air) pollution
  accept named pollutant
  accept produces no waste (gases)
- energy is free
  accept it is a free resource
  *do **not** accept it is free*
- (energy) is renewable
- conserves fossil fuel stocks
- can be used in remote areas
- do not need to connect to the National Grid

2

[6]

Q7.

(a) (i) gas

1

(ii) one variable is categoric, the other is continuous

1

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(iii) fuel is **not** burned

accept nothing is burned

*do **not** accept they don't use fossil fuels*

1

(b) (i) boiler

1

steam

1

turbine

1

generator

1

(ii) any **one** from:

- wind
  accept wind turbines
- waves
- tidal
  accept tide
- geothermal
- solar
  accept the Sun / sunlight
  accept solar panels / cells
  *do **not** accept light*
- falling water
  accept hydroelectric
  *do **not** accept water*
  *do **not** accept any named biofuel*

1

(iii) 18 000

*allow **1** mark for showing a correct method*

ie 36 000 000 ÷ 2 000

*an answer of 0.018 gains **1** mark*

2

[10]

Q8.

(a) (i) (dismantle and) remove radioactive waste / materials / fuels

accept nuclear for radioactive

*do **not** accept knock down / shut down*

1

(ii) increases it

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*do **not** accept it has a negative effect*

1

(b) (i) *if efficiency is not mentioned it must be implied*
answers in terms of energy
generated only gains no credit

K most efficient
or
M least efficient
*accept **K** and / or **L** are more efficient than **M***

1

(efficiency) of **K** and **L** increases, (efficiency) of **M** (almost) constant / slightly reduced
all 3 power stations must be mentioned to get this mark

1

(ii) any **two** from:

- do not know how many (nuclear) power stations there will be
- power stations may continue to increase in efficiency
- do not know what type of power station new ones will be
  accept new methods may be found to generate electricity / energy
  accept other ways of generating energy may be expanded
- do not know future energy / electricity demands
  accept we may become more energy efficient
- may be new uses for uranium

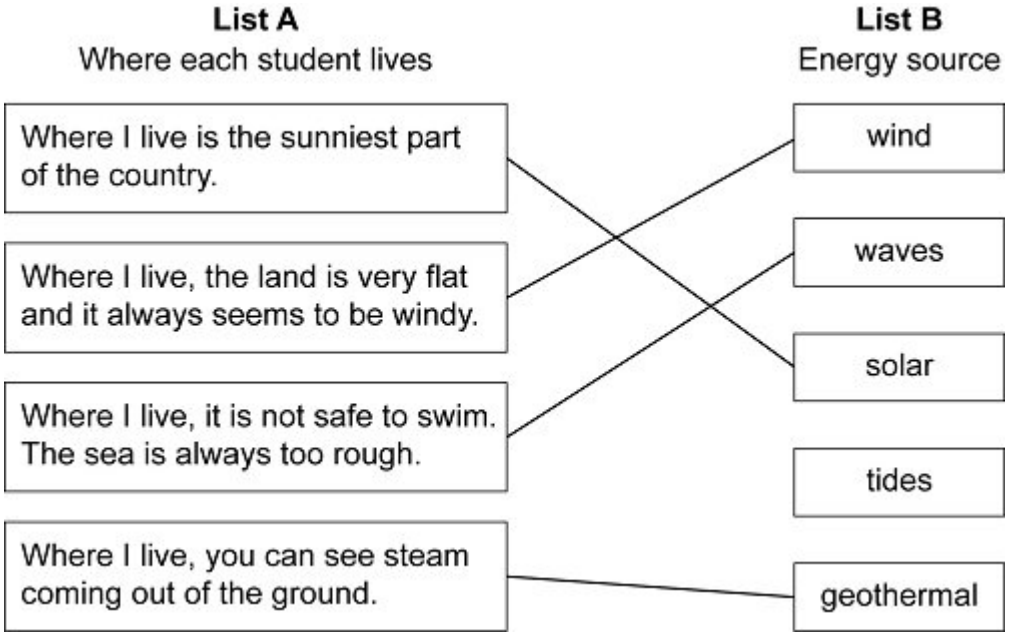
2

[6]

Q9.

(a) all 4 lines correct

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*allow **1** mark for each correct line*

*if more than 1 line goes from a box in **List A** then all those lines are incorrect*

4

(b) all renewable

accept a correct description of renewable

*eg replaced faster than used **or** never run out*

*do **not** accept can be used again*

accept any other common feature

eg do not produce pollution /

polluting (gases)

no fuel is burnt

(energy input) is free

eco-friendly / environmentally friendly / natural resources / sustainable sources are insufficient

1

(c) large areas of land are flooded

1

[6]

Q10.

(a) (i) tidal / tides

*do **not** accept water / waves*

1

(ii) any **three** from:

- shorter journey time

  accept easier to go from town to town
  accept less petrol / fuel used

- less pollution from traffic

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accept CO_2 / carbon emissions reduced

- energy source is free
- energy source / tides are predictable
- produces less / no pollutant gases (than fuel burning power stations)
  accept no CO_2 / greenhouse gases produced
  accept air pollution for pollutant gases
- conserves supplies of fossil fuels
- uses renewable energy (to generate electricity)
- provides employment
- no visual / noise pollution
  less harm to the environment is insufficient
  the electricity is cheaper is insufficient
  *do **not** accept produces no radioactive waste*
  the pollution mark scores twice only if it is clear one reference is to traffic and the other is to electricity generation

3

(b) (i) (sometimes) electricity demand may be greater than supply (of electricity from the system)
accept in case turbines / generators fail
or
can sell (excess) electricity (to the National Grid)

1

(ii) decreases the current
accept increases the voltage

1

reducing energy loss (along cables)
accept less heat / thermal energy lost / produced

1

[7]

Q11.

(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:

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- 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]

Q12.

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

- waves
  *do **not** accept water*
- tides
- falling water
  accept hydroelectric
- biofuel / biomass
- solar

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accept sun / sunlight
*do **not** accept light*
accept solar cells / panels

- geothermal
  *do **not** accept heat*

1

(ii) decrease

1

(b) (i) increases from 4am (to 8am) remains constant from 8am (to 10am)
accept increases from 30 000
accept stays constant from 40 000
*allow **1** mark for goes up then stays the same*
for full credit must be some indication of time or power

2

(ii) natural gas

1

[5]

Q13.

(a) 1/25 **or** 1:25 **or** 0.04

accept 4 % or $\frac{15}{375}$ *or* $\frac{3}{75}$ *or 1 in 25 for both marks*

*allow **1** mark for total of 375*
*allow **1** mark for a clearly correct method using a clearly incorrect total*
*do **not** accept 1:26*

2

(b) (i) **B**
*do **not** credit reason if **B** is not chosen*

1

(only) burning fossil fuels produces carbon dioxide / carbon (emissions)
or nuclear fuels don't produce carbon dioxide
insufficient – smallest amount of fossil fuels
accept less carbon dioxide

1

(ii) accept anything reasonable eg

increased level of insulation

use energy efficient light bulbs

do not leave appliances on standby

switch thermostats down (1°C)

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generate own electricity

install solar panels

accept insulate

accept specific examples eg loft

1

(c) (i) any **three** from:

- no power output until wind speed exceeds 4m/s
- output rises rapidly after 4m/s
- output begins to level out / rises less rapidly at / after 13m/s
- output peaks at 21 / 22m/s
- output constant between 21 / 22 and 25 / 26 m/s
- output falls (rapidly) after 25 / 26m/s

*accept for **1** mark goes up then comes down*

3

(ii) any **one** from:

- unreliable energy source
- dilute energy source
- take up too much land

accept wind does not always blow

accept need thousands / lots of turbines

ignore reference to visual / noise pollution

ignore reference to kill birds

1

[9]

Q14.

(a) grid

accept any unambiguous indication

1

(b) (i) A (only)

1

(ii) D (only)

1

(c) more than

accept any unambiguous indication

1

[4]

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Q15.

(a) (i) an unreliable energy source

1

(ii) a predictable energy source

1

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

1

(c) greater than 4 %

1

[4]

Q16.

(a) (i) France

1

(ii) any **one** from:

- different homes have different appliances(*)
- different homes have different numbers of appliances(*)
  (*) accept all homes are different
- standby power not the same for all appliances
- some people will switch appliances off
  accept named appliances
  accept people waste different amounts of energy
- homes have different numbers of residents
- can't measure every (individual) home
  accept any sensible suggestions
  *do **not** accept answers in terms of accurate / precise etc*

1

(b) (i) increases amount of energy wasted
accept (encourages) people to leave appliances on (standby)
accept increases it

1

(ii) any **two** from:

- less electricity needed / generated
- fewer power stations needed
- less coal is burned
  *do **not** accept coal is non-renewable / running out*
  answers in terms of fuel stocks neutral
- less pollutant <u>gases</u> produced

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accept named gases
accept harmful for pollutant
accept greenhouse gases
accept reduce / slow / stop global warming
accept reduces acid rain

2

(c) joule

1

(d) (i) 6800

*accept £68 for **3** marks an answer of 68 gains **2** marks*
*allow **2** marks for correct substitution ie 400 × 17*
*allow **1** mark for obtaining 400*
*answers of 7480, 4760, 12920, 4080 gain **2** marks*

3

(ii) a small . . . . . electricity

1

[10]

Q17.

(a) decrease in oil

PLUS

any **one** from:

- increase in (proportion of) coal
- increase in (proportion of) nuclear
- increase in (proportion of) gas

must have decrease in (proportion of) oil and increase in (proportion of) coal / nuclear / gas

1

(b) (i) (nuclear) fission

accept fision
*do **not** accept any answer that looks like fusion*

1

(ii) water heated to produce (high pressure) steam

1

steam turns turbine which drives generator

1

(iii) any **two** from:

- produces no pollutant gases

accept named gas or greenhouse gases
accept no atmospheric pollution
accept harmful for pollutant
accept does not contribute to global warming

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*do **not** accept no pollution on its own*
*do **not** accept better for the environment unless qualified*

- it is reliable **or** can generate all of the time
- concentrated energy source **or** produces a lot of energy from a small mass
- produces only small volume of (solid) waste
- fossil fuels will last longer
  accept a named fossil fuel
  accept fossil fuels are running out
  *do **not** accept fossil fuels are non-renewable unless qualified*
- will need to buy less fuel from other countries
  accept no new fossil fuel power stations needed
  *do **not** accept it is cheap*
  *do **not** accept import less electricity*

2

(iv) it is / can be radioactive
*do **not** accept answers in terms of kills cells / cancer*

or emits radiation (from the nuclei)
accept emits gamma (rays)

1

(c) coal (burning) power stations / burning coal produces carbon dioxide
they refers to coal-burning power stations
accept sulfur dioxide / nitrogen oxides for CO_2

1

(increased) CO_2 increases / contributes to / causes global warming / greenhouse effect
mention of ozone layer negates this mark
*do **not** accept CO_2 warms atmosphere*

1

[9]

Q18.

(a) any **two** from:

- (burning) fossil fuels produces greenhouse gases / pollutant gases / acid rain / leads to global warming
  accept a named fossil fuel
  accept a named pollutant gas
- nuclear fuels produce dangerous waste
  accept radioactive for dangerous
  accept reference to dangers of nuclear fuels
- fossil fuels are non-renewable

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accept running out of fuels

- renewable energy resources produce no pollutant gases
- large amounts of energy are available
  accept renewable won't run out
- running costs are low
  accept any reasonable benefit of renewables
  accept any reasonable drawback of non-renewables
  *do **not** accept better for the environment on its own*

2

(b) **R U S T**

all in correct order
*allow **2** marks for 2 correct*
*allow **1** mark for one correct*

3

[5]

Q19.

(a) (i) small proportion of energy / power is wasted
accept little / less energy / power / heat is wasted
*do **not** accept it wastes no energy / power*

or transfers most / more / a lot of energy power usefully

1

(ii) it decreases the current / uses low current

or *it* increases the voltage / potential difference
accept pd for potential difference

1

or uses high voltage / potential difference

smaller the current the smaller the energy loss
accept power / heat for energy

1

(b) (i) as a control
accept to make a comparison
*do **not** accept fair test on its own*

1

(ii) so people know how much data the link was based on
accept idea that larger numbers are better

or

people can judge the significance / reliability of the link
*do **not** accept significance / reliability on its own*
ignore reference to accuracy

1

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(iii) other possible factors may be responsible

1

or have not been investigated

named factor eg environment / genetic

1

(iv) first box ticked plus reason

acceptable reason such as so people know there may be a risk as soon as possible / so that other scientists can use findings

or second box plus reason

acceptable reason such as no point to worry / confuse / panic people (until the research has been confirmed)

accept idea that it may lead to wrong advice

*do **not** accept in case they are wrong*

1

[8]

Q20.

(a) gas

1

oil

1

(b) (both) use steam to drive a turbine

accept (both) use turbines to drive generators

*do **not** accept both have a turbine /generator / use steam must describe a step in the process*

accept heat / thermal energy transformed to kinetic / electrical energy

1

(c) 140 (°C)

correct answer only

*allow **1** mark for method clearly shown on graph*

accept a cross or other indication at correct position on the line

accept correct description

accept even if numerical answer is incorrect

2

(d) any **one** from:

*do **not** accept answers purely in terms of disadvantages of other methods except for fossil fuels are running out*

- very large energy source / reserves
- no polluting / harmful gases produced

accept named gas CO_2 SO_2 NO_x
accept reduces harmful carbon emissions

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- reduces carbon emissions
  accept does not contribute to global warming
- no fuel needed
- energy is free
- can generate energy for a long time
  accept energy available for a long time
- renewable (energy source)
- fossil fuels are running out
  accept it saves fossil fuels / non-renewable
  accept reduces the amount of fossil fuels being burnt
  accept a named fossil fuel
  Better for the environment / environmentally friendly
  insufficient
  it is cheaper is insufficient

1

[6]

Q21.

(a) (i) replaced <u>faster than it is used</u>
accept replaced as quick as it is used
accept will never run out
*do **not** accept can be used again*

1

(ii) any **two** from:
***two** sources required for the mark*

- wind
- waves(*)
- tides(*)
  *(*)do **not** accept water / oceans*
  accept OTEC
- fall of water
  accept hydroelectric
- biomass
- geothermal
  accept a named biomass / biofuel eg wood

1

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

- increases from 20° to 30°
- reaches maximum value at 30°

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- then decreases from 30°
- same pattern for each month
  *accept peaks at 30° for **both** marks*
  *accept goes up then down for **1** mark*
  ignore it's always the lowest at 50°

2

(ii) 864

*an answer of 108 gains **2** marks*
*allow **1** mark for using 720 value only from table*
*allow **2** marks for answers 852, 816, 768, 825*
*allow **1** mark for answers 106.5, 102, 96, 103 (.125)*

3

(c) the solar cells will not meet demand at all times of the year / day
accept to maintain a constant supply of electricity / energy

or to make up the shortfall in energy required at certain times of the year

or to be able to sell surplus electricity (to the National Grid)
accept to provide energy at night
*do **not** accept because it's cloudy on it's own*

1

[8]

Q22.

(a) only accept answers in terms of the argument of the nuclear power scientist any **three** from:

- produces a lot of energy for a small mass of fuel **or** is a concentrated energy source
  accept amount for mass
- it is reliable **or** it can generate all of the time
- produces no pollutant gases
  *accept named gas or greenhouse gases do **not** accept no pollution*
- produces only a small volume of (solid) waste
  accept amount for volume
- advances in technology will make fuel reserves last much longer
  accept an argument in terms of supply and demand

3

(b) any **one** from:

- may leak into the ground / environment
- geological changes
  accept earthquakes etc

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- may get into the food chain
  *do **not** accept answers in terms of property prices or 'damages the environment'*
- over time if location not correctly recorded it may be excavated

1

(c) any **three** from:

- overall add no carbon dioxide to the environment
  accept do not add to global warming
  accept they are carbon neutral
- power companies can sell electricity at a higher price
  accept power companies make more profit
- opportunity to grow new type crop
  accept specific examples e.g. growing plants in swamps
  accept extends the life of fossil fuel reserve
- more jobs
- more land cultivated **or** different types of land utilised

3

[7]

Q23.

(a) (i) grid
accept any way of indicating correct answer

1

(ii) increases voltage
accept any way of indicating correct answer

1

(iii) 230 V
accept any way of indicating correct answer

1

(iv) reduce
accept any way of indicating correct answer

1

(b) (i) increases the temperature
accept make it hotter / heat goes into the air
accept convection currents
accept sensible comment eg sound energy / it buzzes
ignore pollutes the air

1

(ii) less than 100%

1

[6]

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Q24.

(a) coal

1

(b) fossil fuels can be used to generate electricity at any time

if more than 2 boxes ticked, mark incorrect boxes first

1

a few large power stations can generate the electricity for a million homes

1

(c) (i) no fuel is burnt

accept a named fuel
accept nothing is burnt
accept does not use (fossil) fuel

1

(ii) kinetic

1

(iii) any **two** from:

- cause noise pollution
- cause visual pollution

accept causes pollution for 1 mark

- need concrete for bases
- new roads / infrastructure needed
- may interfere with TV / radio / mobile phone signals
- dangerous to birds
- do not generate all of the time

  accept generates only when the wind blows
  *do **not** accept 'generate when the wind blows'*
- need a lot of generators

  *do **not** accept 'take up a lot of space / land'*
- high initial / capital costs
- reduces house prices

2

[7]

Q25.

(a) (i) national grid

1

(ii) increases voltage / potential difference

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accept decrease current
accept step-up / boosts the voltage
*do **not** accept increases energy / power / current*
ignore reference to voltage going through

1

(iii) any **two** from:

- reduce current
  ignore increased voltage / pd
- reduces energy loss / power loss (from cables)
  accept reduces heat loss
  *do **not** accept <u>stops</u> energy loss*
- increases efficiency (of distribution)

2

(b) any **one** from:

- produces pollutant gases
  accept produces carbon dioxide / sulfur dioxide / nitrogen oxides
  accept global warming / greenhouse effect / carbon emissions / air pollution / acid rain
  ignore ozone layer
  *do **not** accept carbon monoxide*
- produces solid waste / ash / smoke
  accept global dimming
  ignore produces pollution

1

(c) (i) any **two** from:
any two valid points gains the marks

- using renewable energy
  accept don't use up non-renewable / fossil fuels
  accept named fuels
- non-renewable fuels can be used for other processes
- no pollutant gases produced
  accept the opposite of (b)
  ignore no pollution
- land can still be used for farming
  ignore economic issues

2

(ii) any **two** from:

- cause <u>noise</u> pollution

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- cause <u>visual</u> pollution
  accept spoils the landscape
  accept sunlight flicker
- may interfere with TV / radio / mobile phone signals
- need to put in new infrastructure
  accept new roads needed
- not reliable owtte
- dangerous to birds
- lots of concrete needed for the bases
  or
  producing cement is environmentally damaging
  accept reduces house prices
  ignore any references to cost / jobs / number required
  ignore takes up a lot of land
  accept reference to obstruction of shipping etc. if clear reference tooffshore wind farm

2

[9]

Q26.

(a) gas

1

(b) fuel burning stations produce electricity at any time / all the time
accept fuel available all the time

1

wind generator can only produce when the wind is strong enough
accept it's not always windy

1

(c) no fuel is burnt **or** no fuel is used **or** uses only energy from wind **or** does not emit harmful gases / soot / smoke
*do **not** accept wind is natural / environmentally friendly / renewable*
*answer must be in terms of wind, **not** negative of fuel burning*
specific examples of gases CO_2, SO_2,
acid rain and greenhouse gases can be accepted
ozone negates credit

1

[4]

Q27.

(a) generator
accept dynamo
accept alternator

1

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(b) (i) 1400

ignore units

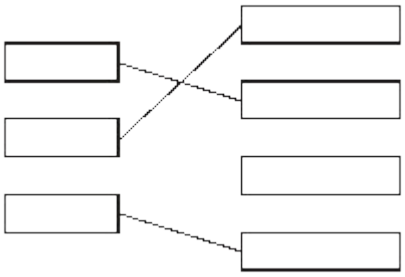
1

(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]

Q28.

(a) hydrogen converted to helium

1

(nuclear) fusion

1

((small) loss in mass) which is converted to large amount of energy

1

(b) (i) any **two** from

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it is running out/ takes millions of years/finite

not *non renewable*

allow acid rain ***do not*** *allow waste*

pollution **or** problem with CO_2 production

allow a specific example

more responsible to use fossil fuels for (important) chemical functions

2

(ii) any **three** from

need lots of land for generators **or** many generators needed

generators may not be conveniently located

uncertainty of supply

accept the wind may not always blow

social resistance **or** visual pollution

noise pollution

high initial costs

(possible) interference with (local) radio and TV signals

3

[8]

Q29.

(a) internal **or** thermal **or** heat **or** kinetic **or** movement

electrical

both answers required for ***one*** *mark*

1

(b) (i) Sun **or** solar

do ***not*** *accept sunshine*

1

(ii) any **one** of the follow:

- wind turbines produce no (gaseous) pollutants
- wind turbines use renewable energy
- wind turbines produce no (solid) waste
- reduced running costs

do ***not*** *allow safety*

1

a supporting statement **or** comparison **or** explanation

1

[4]

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Q30.

(a) (i) 3

1

(ii) 1

accept a definition of frequency ignore units

1

(iii) hertz

1

(b) straight line in correct direction

judge by eye (from 'a' of waves to 's' of across) ignore arrow
accept equal angles shown on waves

1

(c) (i) gets smaller

1

(ii) kinetic

accept movement

1

(iii) renewable

1

[7]

Q31.

(a) (i) photosynthesis for growth

accept plants require sunlight for growth

1

plants change into coal

any mention of animals negates second mark

1

(ii) burning

*do **not** accept heating*
accept combustion

1

(b) (i) heat

1

(ii) less heat radiated into space

accept increased insulation round earth
accept reflects heat back to earth
accept greenhouse effect
*accept traps heat **or** energy*

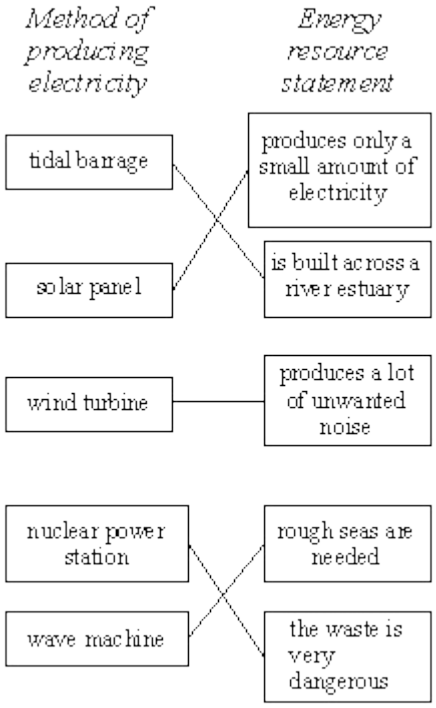
1

[5]

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Q32.

(a) (i) correct links shown



4

*1 link for **1** mark*
*2 links for **2** marks*
*3 links for **3** marks*
*4 links for **3** marks*
*5 links for **4** marks*
*do **not** credit if more than one link goes to **or** from any box*

(ii) nuclear (power station)

*do **not** accept power station*

1

(b) (i) heat from the Sun

1

(ii) kinetic

1

(iii) insufficient wind (to turn turbine)

accept wind does not always blow
*do **not** allow it does not always work or it is switched off*
*do **not** accept wind in wrong direction*

1

[8]

Q33.

any **one** from:

*basic idea of reduced use of fuels to heat homes **or** offices **or** shops for **1st** mark*

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less (heat) energy wasted (to the environment)

reduced demand for fuels to heat homes etc

simply re-quoting figures gets no credit

1

any **one** from:

*idea of less pollution for the **2**nd mark*

<u>reduced</u> (air) pollution

*do **not** accept no pollution*

fewer power stations required **or** less electricity needs to be produced

less (fossil) fuels being burnt (in power stations)

reduced greenhouse effect

reduced global warming

1

[2]

Q34.

(a) (i) sources of energy

for 1 mark

(ii) wood coal
oil
gas

all correct gains 2 marks
3 correct gains 1 mark

3

(b) geothermal nuclear
tides
wind
solar

all correct gains 2 marks
4 correct gains 1 mark

2

(c) non-renewable fuels cause pollution (or reverse)
conserve/limit use of coal/gas/oil;
so supplies last longer/renewable sources can be replaced

any 2 from 4 for 1 mark each

2

[7]

Q35.

(i) reduces

for 1 mark

1

(ii) less heat/energy/power wasted (in power lines)

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for 1 mark

1

(iii) for safety

for 1 mark

1

[3]

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