Sec1 Sci P7e EQ Energy and energy resources 79marks 18Pgs

**Q1.**          Energy comes from a variety of sources.

          Complete the table below.

          The first one has been done for you.

|  |  |
| --- | --- |
|   | **source of energy** |
| **energy source** | **directly from the Sun** | **indirectly from the Sun** | **not from the Sun** |
| nuclear |   |  |   |
| hydro-electric |   |   |   |
| solar |   |   |   |
| geothermal |   |   |   |
| oil |   |   |   |

5 marks

**Q2.**          Coal is a non-renewable energy resource.

(a)     Give **two other** non-renewable energy resources.

1. ..................................................................................................................

2. ..................................................................................................................

2 marks

          Wood is a renewable energy resource.

(b)     Why can wood be described as a renewable energy resource?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (c)     Give **two other** renewable energy resources.

1. ..................................................................................................................

2. ..................................................................................................................

2 marks

(d)     Complete the statement below to describe what happens when wood burns.

When wood burns, chemical energy in the wood is transformed

into .............................. energy, which is transferred to the surroundings.

1 mark

**Q3.**          Each of these things found in the home uses a **different** fuel.

          Draw **one** line from each item to the fuel it uses.

          Use each fuel only **once**.



3 marks

**Q4.**          Oil is an important energy resource. It provides about 38% of the energy used for transport, heating and generating electricity.

(a)     The energy stored in oil came from the Sun.

Describe how energy from the Sun became stored in oil.

.....................................................................................................................

.....................................................................................................................

2 marks

(b)     (i)      Oil can be described as a non-renewable energy resource. Explain why.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (ii)     Tick the boxes by **two** other non-renewable energy resources.

coal                                               wind            

solar                                              tidal             

natural gas                                    wave           

2 marks

Q5.

          (a)     Many substances burn. Some of them are used as fuels. Some fuels are burned in power stations to generate electricity.

Tick the boxes by the **two** fuels which are **most often** burned in power stations.

|  |  |
| --- | --- |
| coal |  |
| paraffin wax |  |
| natural gas |  |
| petrol |  |
| paper |  |

2 marks

 (c)     Some power stations do not burn fuels. They use other energy resources to generate electricity.

          Give **two** energy resources which are **not** fuels and which are used to generate electricity.

1  .................................................................................................................

2  .................................................................................................................

2 marks

**Q6.**          Peter burns a piece of crispbread to find out how much energy is stored in it. Energy from the burning crispbread raises the temperature of the water in the test-tube.



1. Describe one way Peter has arranged the apparatus so that he is working safely.

......................................................................................................................

......................................................................................................................

2 marks

(b)     Peter wants to find out if potato crisps contain as much energy as crispbread. He does the experiment again using a piece of potato crisp.

Suggest **two** things he must do to make the experiment a fair test.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

          The table shows some of the nutritional information from a packet of crispbread and a packet of potato crisps.



(c)     Peter burns 1.0 g of potato crisp instead of 1.0 g of crispbread in a similar experiment. What result will he get when he burns the potato crisp? Tick the correct box.

The change in the temperature of the water will be greater.          

The change in the temperature of the water will be the same.      

The change in the temperature of the water will be smaller.         

There will be no change in the temperature of the water.              

1 mark

(ii)     Use the table in part (b) to give **two** reasons for choosing crispbread rather than potato crisps as part of a balanced diet.

1. .........................................................................................................

2. ......................................................................................................... 2 marks

Q6.           Fossil fuels are used to generate electricity, but over half of the world’s population uses biomass as a fuel.

(a)     What is ‘biomass’, which is used as a fuel?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (b)     Biomass and fossil fuels are both energy resources. What is the original source of this energy?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

1. Give the names of **three** fossil fuels which are often burned to generate electricity.

1.  ........................................................ 2.  ........................................................

3.  ........................................................

1 mark

(d)     Fossil fuels are often described as non-renewable energy resources.

Explain why they are called ‘non-renewable’.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (e)     There are advantages and disadvantages of burning different fuels.

(i)      Give **one** advantage of using biomass rather than fossil fuel as an energy resource.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (ii)     Give **one** advantage of using fossil fuel rather than biomass as an energy resource.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (iii)     Give **one disadvantage** of using both fossil fuel and biomass.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

**Q8.**          The tides can be used to generate electricity. A dam is built across a river estuary, as shown below.



 (a)     The water is higher on one side of the dam than on the other. As the water begins to flow through the dam it turns a turbine. The turbine generates electricity.

Describe the useful energy changes which take place in this process.

......................................................................................................................

......................................................................................................................

......................................................................................................................

2 marks

(b)     Explain why tides are classified as a renewable energy source.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (c)     Give **one** way, **other** than from the tides, of generating electricity by using the sea.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (d)     Apart from cost, give **one** advantage and **one** disadvantage of an oil-fired power station compared with a tidal power station.

advantage ....................................................................................................

disadvantage ...............................................................................................

2 marks

**Q10.**          Some pupils are designing a web page about energy resources. Their design is shown below. It is not quite finished.



(a)     To complete the web page, the pupils want to add a drawing of some fossil fuels.

Give the names of **two** fossil fuels.

1. ..................................................................…

2. ..................................................................…

2 marks

(b)     Four energy resources are labelled on the web page:

          **water behind dams**            **the wind**           **fossil fuels**         **wood**

          How many of these can be used to generate electricity?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

**Q11.**          (a)     The photographs show ways of getting energy from three different energy resources.

          On the line under each photograph write the name of the energy resource.

Choose from the list below.

**batteries**             **biomass**            **wind**           **sunlight**            **tides**

(i)



(ii)



 (iii)



3 marks

(b)     Name **one** fossil fuel.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (c)     Complete the sentence below.

          The purpose of the machine in photograph (i) is to generate ………………..

1 mark

Maximum 5 marks

**Q12.**          Meera used the Internet to find out about energy resources. The drawing below shows

what Meera saw on her computer screen.



                                                                  © 1996-2002 Ask Jeeves, Inc

(a)     Coal is a fossil fuel.

Give the names of **two** other fossil fuels in the list on the screen.

.....................................................and.....................................................

2 marks

(b)     (i)      Wave energy is an example of a renewable energy resource.

         From the list on the screen above choose **two** other renewable energy resources.

.....................................................and.....................................................

2 marks

(ii)     Meera found out how wave energy can be used to generate electricity.

She saw the diagram below on the Internet.



         Each box below shows a stage in generating electricity.

|  |  |
| --- | --- |
| A | The air turns the turbine. |

|  |  |
| --- | --- |
| B | The turbine turns the generator. |

|  |  |
| --- | --- |
| C | The waves move up the chamber. |

|  |  |
| --- | --- |
| D | The generator produces electricity. |

|  |  |
| --- | --- |
| E | The waves push the air up the chamber. |

         On the lines below write the letters of the stages in the correct order.

Two have been done for you.

.....C.....    ...........     ......A......     ...........     ............

2 marks

**Q13.**          The drawing shows Mark’s house. He uses three methods to generate electricity.



(a)     Draw a straight line from each of the **two** methods below to the main energy resource used to generate electricity.

Draw only **two** lines.



2 marks

(b)     (i)      The solar cells **cannot** work at night.

Give the reason for this.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (ii)     The wind turbine **cannot** generate electricity all the time.

Give the reason for this.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

**Q14.**         The table below gives information about three fuels that can be used in cars.

  shows a substance is produced when the fuel burns.

**X**  shows a substance is **not** produced when the fuel burns.

|  |  |  |  |
| --- | --- | --- | --- |
| **fuel** | **physical** | **energy****released,** | **some of the substances produced****when the fuel burns** |
|  | **state** | **in kJ/kg** | **carbon****monoxide** | **sulphur****dioxide** | **water** |
| petrol | liquid | 48 000 |  |  |  |
| hydrogen | gas | 121 000 | **X** | **X** |  |
| ethanol (alcohol) | liquid | 30 000 |  | **X** |  |

(a)     Which fuel, in the table, releases the **least** energy per kilogram (kg)?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (b)     Some scientists say that if hydrogen is burned as a fuel there will be less pollution.

From the information in the table, give **one** reason why there will be less pollution.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (c)     Which of the three **fuels** in the table can be compressed into a small container?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (d)     Which gas in the air is needed for fuels to burn?

Tick the correct box.

|  |  |
| --- | --- |
| carbon dioxide |  |
| nitrogen |  |
| oxygen |  |
| water vapour |  |

1 mark

(e)     Petrol and ethanol are both fuels. Petrol is made from oil.

Scientists say that oil could run out in 100 years.

In some countries people plant sugar cane and use it to make ethanol.

Sugar cane will **not** run out. Explain why.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

**Q15.**          The drawing below shows a solar panel fixed to the roof of a house in Britain.



(a)     Daniel measured the energy output from this solar panel during one day in June. The graph below shows his results.



(i)      Why does the energy output from the solar panel vary during the day?

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

 (ii)     Daniel used the solar panel to run a motor.

The motor needs 0.7 kJ/s to run at full speed.

Use the graph to find out how long Daniel’s motor would run at full speed.

............... hours

1 mark

(b)     Daniel measured the energy output from a different solar panel.

This type of solar panel turns so that it always faces the Sun.



          The graph below shows the energy output for this panel during one day in **mid-summer**.



(i)      On the graph above draw another curve to show how the energy output for this solar panel might vary on a day in **mid-winter**.

2 marks

(ii)     Between 7am and 7pm the solar panel turns through an angle of 180°.

Calculate the angle the solar panel turns through each hour.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

**Q16.**          The drawing below shows a garden water feature. It is solar-powered.



          The solar cell absorbs energy from the Sun.

The solar cell is connected to a motor in the bowl.

The motor drives a pump.

Water is pumped up to the jug and it flows back down to the bowl.

(a)     Use the information above to help you to complete the following sentences.

Choose words from the list.



(i)      The useful energy change in the solar cell is from

light to .................................... energy.

1 mark

(ii)     The useful energy change in the motor is from

electrical energy to .................................... energy.

1 mark

(iii)     As the water flows from the jug to the bowl .......................................

energy is changed into .................................... energy.

2 marks

(b)     Give **one** advantage and **one** disadvantage of using a solar cell to power the

water feature.

advantage ....................................................................................................

1 mark

disadvantage ................................................................................................

1 mark

maximum 6 marks

**Q18.**          The drawings below show six ways of providing energy.



1. From the drawings, give the names of **two** fossil fuels.

1. ..............................................................

2. ..............................................................

2 marks

(b)     (i)      What is the source of energy for a solar panel?

.........................................................

1 mark

(ii)     Why can the solar panel **not** work at night?

.........................................................

1 mark

(c)     What makes the blades of the turbine in drawing B go round?

..................................................................

1 mark

(d)     Renewable energy resources will **not** run out.

          From the drawings, give **one** energy source that will **not** run out.

………… ………… ………… ………… ………… ………… ………… ………… ……….. ……….. 1 mark

# Mark Scheme

**M1.**

|  |  |  |  |
| --- | --- | --- | --- |
| **energy source** | **directly from the Sun** | **indirectly from the Sun** | **not from the Sun** |
| nuclear |   |   | \*   |
| hydro-electric |   | \*   |   |
| solar | \*   |   |   |
| geothermal |   |   | \*   |
| oil |   |   |   |

*if more than one box is ticked in any row*

*award no mark for that row*

**[5]**

**M2.**          (a)     any **two** from

•    oil                                       *accept ‘petrol*

•    gas

•    uranium **or** nuclear

*accept ‘geothermal’* ***or*** *‘peat’*

*do* ***not*** *accept ‘fossil fuel’* ***or*** *‘coal’*

**2**

(b)     can be grown **or** more trees can be planted

*accept ‘can be replaced’*

*do* ***not*** *accept ‘can be used again’* ***or*** *‘can be recycled’*

**1**

(c)     any **two** from

•    wind

•    wave                                   *do* ***not*** *accept ‘water’*

•    tidal

•    solar                                    *accept ‘the Sun’* ***or*** *‘sunlight’*

•    biomass **or** a stated biomass, such as straw

*accept ‘alcohol’ do* ***not*** *accept ‘wood’*

*accept ‘hydroelectric’*

*accept ‘geothermal’* ***unless*** *used as the answer to (a)*

*do* ***not*** *accept ‘nuclear’*

**2**

(d)     any **one** from

•    thermal                                *accept ‘heat’*

•    radiant

•    light

**1**

**[6]**

**M3.**



*award a mark for each correct line*

*if more than one line is drawn from any item,* ***or*** *to any fuel,*

*deduct one mark for each extra line; minimum mark zero*

*accept central heating boiler ------  coal*

*accept central heating boiler ------  gas*

*accept fireplace  --------------------  gas*

**[3]**

**M4.**          (a)     **one mark is for storing  energy by photosynthesis; the other mark**

**is for the formation of oil from living things**

living things use energy from the Sun to grow

*accept ‘plants and animals store energy from the Sun’*

**1 (L5)**

          oil is formed from the remains of living things

*accept ‘oil is made of dead animals* ***or*** *plants’*

**1 (L5)**

(b)     (i)      because it cannot be replaced once it is used **or** because it

takes a long time to form

*do* ***not*** *accept ‘you cannot use it over and over again’*

***or*** *‘it cannot be recycled’*

**1 (L6)**

(ii)     coal 

**1 (L5)**

         natural gas 

**1 (L5)**

*if more than two boxes are ticked, deduct*

*one mark for each incorrectly ticked box*

*minimum mark zero*

**[5]**

**M5.**          (a)     coal 

**1 (L3)**

          natural gas 

*if more than two boxes are ticked, award no mark*

*deduct one mark for each incorrectly ticked box*

*minimum mark zero*

**1 (L3)**

(b)     any **two** from

•    soot **or** carbon

•    ash

•    smoke

•    sulphur dioxide

*accept ‘sulphur’*

•    carbon monoxide

•    oxides of nitrogen

*accept ‘nitrogen oxide’*

*accept ‘carbon dioxide*

*accept ‘lead’*

*accept ‘acid rain’*

*do* ***not*** *accept ‘greenhouse gases’* ***or*** *‘water’* ***or*** *‘gas’*

**2 (L3)**

(c)     any **two** from

•    geothermal

•    wind

•    solar

*accept ‘Sun’*

•    running water

*accept ‘hydro’* ***or*** *‘HEP’* ***or*** *‘water power’*

•    tidal

*do* ***not*** *accept ‘water’*

•    waves

*accept ‘nuclear’* ***or*** *‘uranium’*

**2 (L3)**

**[6]**

**M6.**          (a)     any **one** from

•    the test-tube is pointing away from him

*accept ‘the test-tube is pointing away from the edge*

*of the bench’ do* ***not*** *accept ‘the test-tube is at an angle’*

•    he used a cork and a pin to hold the burning crispbread

*accept ‘he used a pin’* ***or*** *‘he is not holding the crispbread’*

***or*** *‘the cork is on the stand’*

•    the test-tube is held in a clamp

*accept ‘he used a clamp’* ***or*** *‘the test-tube is held tightly’*

•    it is away from the edge of the bench

•    the apparatus is arranged over the base of the stand for stability

*accept ‘the tube is over the base’*

*do* ***not*** *accept ‘he is wearing goggles*

**1 (L5)**

(b)     any **two** from

•    use the same amount of water

•    use the same mass **or** weight of crisp

*accept ‘use the same mass of food’*

*do* ***not*** *accept ‘use the same amount of food’*

•    the crisp must be the same distance from the test tube as the

crispbread was

•    start with water at the same temperature

•    shield both experiments from the draught

*do* ***not*** *accept ‘use the same apparatus’*

***or*** *‘heat for the same amount of time’*

**2 (L4)**

(c)     The change in the temperature of the water will be greater. 

*if more than one box is ticked,  award no mark*

**1 (L6)**

(d)     (i)      fibre is not digested

*accept ‘it is not absorbed’*

***or*** *‘it does not get broken down’*

*do* ***not*** *accept ‘it is insoluble’*

**1 (L6)**

(ii)     any **two** from

•    it contains less fat

*accept ‘it is less fattening’*

*or ‘it contains less energy’*

•    it contains more fibre

•    it contains more protein

*do* ***not*** *accept ‘more carbohydrate’*

**2 (L6)**

(e)     oranges 

*if more than one box is ticked, award no mark*

**1 (L5)**

**[8]**

**M7.**          (a)     **answers must give a definition of biomass and not just provide**

**examples**

material from living things **or** plant matter

**1 (L6)**

(b)     the Sun

*accept ‘sunlight’* ***or*** *‘the Big Bang’*

*do* ***not*** *accept ‘light’* ***or*** *‘photosynthesis’*

**1 (L6)**

(c)     coal

oil

natural gas **or** methane

*answers may be in any order*

***all three*** *fossil fuels are required for the mark*

*accept ‘gas’ for natural gas*

*accept ‘peat’ as one of the three fossil fuels*

**1 (L5)**

(d)     they cannot be replaced **or** no more can be produced

*accept ‘they get used up’*

*do* ***not*** *accept ‘they cannot be used again’*

**1 (L6)**

(e)     (i)      any **one** from

•    it is renewable

•    it is widely available

*accept ‘you can grow more of it’*

*accept ‘it will conserve fossil fuels’*

*do* ***not*** *accept ‘it is cheaper to produce’*

**1 (L6)**

(ii)     any **one** from

•    it takes up less space

•    it is more suitable for use in vehicles

•    it contains more energy per unit mass

*accept ‘it is more concentrated’*

*accept ‘it can be transported more easily’*

**1 (L6)**

(iii)     any **one** from

•    pollution

•    they release greenhouse gases

*accept a specific example of a pollutant*

*eg. ’carbon dioxide is released’*

**1 (L6)**

**[7]**

**M8.**          (a)     **The first marking point is for the transfer of energy from water to turbine.**

**The second marking point is for the transfer of energy from turbine to generator.**

**The third marking point is for the transfer of energy away from the generator.**

any **two** from

•    potential energy in the water to kinetic energy in the turbine

*accept ‘P.E. to K.E.’*

*accept ‘transferred from the water to the turbine’*

*accept ‘K.E. in the water to K.E. in the turbine’*

*accept ‘P.E. in the water to K.E. in the water’*

•    kinetic energy in the turbine to kinetic energy in the generator

*accept ‘transferred from the turbine to the generator’*

•    kinetic energy in the generator to electrical energy in the circuit

*accept ‘KE. to electrical energy’*

*accept ‘from the generator to the circuit’*

*accept ‘transferred from the generator by electricity’*

*accept ‘KE. in the turbine to electrical energy in the circuit’*

*accept ‘potential energy in the water to electrical energy in*

*the circuit’ for both marks*

*accept ‘P.E. to electrical energy****’***

***or ‘****from the water to the circuit’ for one mark*

**2**

(b)     any **one** from

•    because the Moon’s pull **or** gravity is always there

•    because the tides **or** the water cannot run out **or** be used up

*accept ‘because there are tides every day’*

***or*** *‘because there is an endless supply’*

**1**

(c)     •    from wave energy **or** from the waves

*accept ‘Ocean Thermal Energy Conversion’* ***or ‘****OTEC’*

*do* ***not*** *accept ‘hydro-electric power’*

**1**

(d)     it is easier to control or it can be turned on when it is needed

*accept ‘the tides only give power at certain times****’***

***or ‘****you can build an oil-fired power station anywhere****’***

***or ‘****it is smaller`*

any **one** from

•    oil is non-renewable

*accept ‘oil will run out’*

•    it causes pollution

*accept ‘it gives out greenhouse gases’*

***or*** *‘it can cause oil spills’*

**1**

**[6]**

**M10.**          (a)     any **two** from

•    oil

*accept ‘petrol’* ***or*** *‘diesel****’ or ‘****kerosene’*

•    coal

•    natural gas

*accept ‘gas’*

*accept ‘peat****’ or ‘****turf*

**2**

(b)     four **or** all of them

*accept ‘water behind dams, the wind, fossil fuels and wood’*

**1**

**[3]**

**M11.**          (a)     (i)      wind

**1 (L3)**

(ii)     sunlight

**1 (L3)**

(iii)     tides

**1 (L4)**

(b)     any **one** from

•    coal

•    gas

*accept ‘methane’*

•    oil

*accept ‘petrol’* ***or*** *‘diesel’* ***or*** *‘kerosine’*

•    peat

*accept ‘turf’*

**1 (L4)**

(c)     electricity

**1 (L3)**

**[5]**

-

**M12.**          (a)     oil

**1 (L4)**

          natural gas

*accept ‘gas’*

*answers may be in either order*

**1 (L4)**

(b)     (i)      any **two** from

*answers may be in either order*

•    wind

•    solar

•    tidal

•    biomass

•    geothermal

**2 (L4)**

(ii)         *C*         E         *A*       B       D

*if all three letters are correct, award two marks*

*if one letter is correct, award one mark*

**2 (L4)**

**[6]**

**M13.**          (a)



*if more than one line is drawn from either method,*

*award no mark for that method*

**2 (L3)**

(b)     (i)      no light

*accept ‘no rays from the Sun’*

*do* ***not*** *accept ‘no heat from the Sun’*

*accept ‘no sunshine’*

*accept ‘not enough light’*

*accept ‘it is dark’*

*accept ‘they cannot collect the Sun’s energy at night’*

*accept ‘because they need light to work’*

*accept ‘no Sun’*

**1 (L3)**

(ii)     it might not be windy the wind might not be strong enough

*accept ‘no wind’*

*accept ‘needs air movement’* ***or*** *‘wind’*

*accept ‘sometimes the wind is weak’*

*accept ‘sometimes the wind is stronger’*

**1 (L3)**

**[4]**

**M14.**          (a)     ethanol **or** alcohol

*if more than one box is ticked, award no mark*

**1 (L3)**

(b)     any **one** from

•    burning hydrogen does not produce carbon monoxide

*accept ‘petrol* ***or*** *ethanol*

***or*** *alcohol produces carbon monoxide’*

•    burning hydrogen does not produce sulphur dioxide

*accept ‘petrol produces sulphur dioxide’*

•    burning hydrogen only produces water

•    burning petrol causes acid rain

*accept ‘hydrogen* ***or*** *ethanol*

***or*** *alcohol does not cause acid rain’*

**1 (L4)**

(c)     hydrogen

*accept ‘H2’’*

*accept ‘gas’*

**1 (L4)**

(d)     oxygen 

*if more than one box is ticked, award no mark*

**1 (L4)**

(e)     any **one** from

•    it can be grown

*accept ‘it does not take long to grow’*

•    it can be replanted

*accept ‘it can be replaced’*

•    it is renewable

•    it can be reproduced

*accept ‘it produces seeds’*

**1 (L4)**

**[5]**

**M15.**          (a)     (i)      any **one** from

•    the Earth rotates

*accept ‘the Sun appears to move across the sky’*

*accept ‘the Sun is in a different position at*

*different times of day’*

•    the amount of sunlight varies

*accept ‘different cloud cover’*

•    the angle of the Sun varies

*accept ‘in the middle of the day the*

*energy received is greatest’*

*do* ***not*** *accept ‘in the middle of the day*

*the Sun is hottest* ***or*** *brightest’*

**1 (L7)**

(ii)     6.0

*accept any number from 5.8 to 6.2*

**1 (L6)**

(b)     (i)      a graph starting after 6 am and ending before 6 pm

**1 (L7)**

a line below the existing line and flat

**or** reaching a maximum between 12 noon and 1 pm

**1 (L7)**

(ii)     15

*accept ‘’*

**1 (L7)**

**[5]**

**M16.**          (a)     (i)      electrical

**1 (L5)**

(ii)     kinetic

*accept ‘movement’*

**1 (L6)**

(iii)     •    gravitational potential

*accept ‘gravitational’* ***or*** *‘potential’*

**1 (L6)**

•    kinetic **or** sound **or** thermal

*accept ‘heat’ for thermal*

*accept for two marks ‘kinetic into sound’*

***or****’kinetic into thermal’*

*answers must be in the correct order*

**1**

(b)     *advantage*

•    the energy will always be replaced

*accept ‘it will not run out’*

•    it is renewable

*accept ‘it does not use fuel* ***or*** *mains electricity’*

•    it is free to run

*accept ‘it is cheap’*

•    a battery might leak

*accept ‘no pollution with a solar cell’*

**1 (L5)**

          *disadvantage*

•    if the Sun goes in the pump will stop

•    it will not work at night **or** in the dark

*accept ‘it must be in the Sun to work’*

*accept ‘it is not sunny all the time’*

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

**1 (L5)**

**[6]**

**M17.**          (a)     (i)      •    100

*accept ‘5 ×20’*

**1 (L7)**

•    Ncm

*accept ‘cmN’*

*accept ‘1.0 Nm’ for two marks*

*do* ***not*** *accept lower case n*

**1 (L7)**

(ii)     100

*accept ‘the same’*

*accept the numerical answer to part a i*

*the mark for the unit may be awarded in part* ***a ii***

*if not given in part* ***a i***

*the unit is not required for the mark*

**1 (L7)**

(iii)     •    10

*accept the numerical answer to* ***a ii*** *÷ 10*

**1 (L7)**

(b)     •    it decreased

*accept ‘it slowed down’*

          any **one** from

•    less light energy changed to electrical energy

*accept ‘less light to power plane’*

*accept ‘it received less energy’*

*both the answer and the correct explanation*

*are required for the mark*

*do* ***not*** *accept ‘it stopped*

•    the voltage produced by the solar cell was lower

*accept ‘less electrical* ***or*** *kinetic energy produced’*

*‘less light’ is insufficient do*

***not*** *accept ‘no light to provide energy*

**1 (L7)**

**[5]**

**M18.**          (a)     •    coal

**1 (L4)**

•    gas

*accept ‘coal fire’* ***or*** *‘A’*

*accept ‘gas boiler’* ***or*** *‘D’*

*answers may be in either order*

*accept ‘petrol’ or ‘petrol generator’* ***or*** *‘C’* ***or*** *‘oil’*

*answer may be in either order*

*‘fire’ is insufficient*

*‘boiler’ is insufficient*

*‘generator’ is insufficient*

**1 (L4)**

(b)     (i)      •    the Sun

*accept ‘solar energy’* ***or*** *‘solar’*

*accept ‘light’ or ‘sunlight’*

*references to heat are insufficient*

**1 (L4)**

(ii)     any **one** from

•    it is dark

•    no light

•    the Sun has set

*accept ‘it needs light’*

*accept ‘no Sun’*

*references to heat are insufficient*

**1 (L3)**

(c)     •    wind

*accept ‘moving air’* ***or*** *‘air’*

*accept ‘air currents’*

**1 (L3)**

(d)     any **one** from

•    Sun **or** solar energy

•    waves

•    wind

*accept ‘solar panel’* ***or*** *‘E’*

*accept ‘wave turbine’* ***or*** *‘F’*

*accept ‘wind turbine’* ***or*** *‘turbine’* ***or*** *‘B’*

*‘water’ is insufficient*

**1 (L4)**

**[6]**

**M19.**          (a)     •

              

*award two marks for all* ***four*** *correct lines*

*award one mark for any* ***two*** *or* ***three*** *correct lines*

*if more than one line is drawn from any box,*

*do not credit either line*

**2 (L3)**

(b)     •    off 

     off 

*both ticks are required for the mark*

*if more than one box is ticked in any row, award no mark*

**1 (L3)**

          •    on 

     on 

*both ticks are required for the mark*

*if more than one box is ticked in any row, award no mark*

**1 (L4)**

(c)     •    battery

*accept ‘cell’ or ‘cells’*

**1 (L4)**

(d)     •    Copper is a good conductor of electricity. 

*if more than one box is ticked, award no mark*

**1 (L3)**

**[6]**

**M20.**          (a)     chemical

*accept ‘potential’*

*accept ‘kinetic* ***or*** *movement’*

**1 (L6)**

(b)     (i)      50 *J*

**1 (L7)**

(ii)     any **one** from

*accept ‘some energy* ***or*** *heat* ***or*** *sound is wasted’*

*‘heat* ***or*** *sound* ***or*** *friction’ are insufficient*

*•*    energy is transferred as heat

*‘some of the energy is lost’ is insufficient*

*•*    energy is transferred as sound

•    friction or air resistance slows it down

*accept ‘as it is still falling, some is still gravitational’*

**1 (L7)**

(c)     any **two** from

*•*    lift it to a greater height

*accept ‘make the rod longer’*

*‘change the height* ***or*** *mass’ is insufficient*

*•*    make the mass more streamlined **or** aerodynamic

*‘make the rod bigger’ is insufficient*

*‘drop it faster’ is insufficient*

•    push the mass down

*accept ‘push it’*

*‘push the rod down’ is insufficient*

•    put grease **or** oil on the rod (to decrease friction)

*accept ‘make the rod smoother’*

*‘use more force’ is insufficient*

*‘make the rod thinner’ is insufficient*

*accept ‘increase the mass’*

**2 (L7)**

(d)     A

***both*** *blade A, and the correct explanation*

*are required for the mark*

          if you divide the force by a smaller area, the pressure will be larger

*accept ‘it has a smaller area (at that point)’*

*‘it is more pointed’ or ‘is it sharper’ are insufficient*

*‘force is more concentrated’ is insufficient*

*accept ‘the force is more concentrated on a smaller area’*

*do* ***not*** *accept ‘there will be more force’*

*do* ***not*** *accept responses that refer to ‘concentrated pressure’*

**1 (L7)**

**[6]**

**M21.**          (a)     walls

**1 (L3)**

(b)     (i)      roof

**1 (L3)**

(ii)     any **one** from

*•*    it now loses 700 (J)

*accept ‘it is only 700’*

*‘it is 700’ is insufficient*

•    the energy is less (than before)

*accept ‘it was 3 400 (J)’*

•    the energy or heat is different

*accept ‘it has gone down’*

•    all the others do not change

*accept ‘insulation reduces heat loss’*

*‘insulation keeps heat in’ is insufficient*

**1 (L4)**

(c)     (i)      coal

*‘solid’ is insufficient*

*‘25 000 J’ is insufficient*

**1 (L4)**

(ii)     it is a gas

*accept ‘physical state’*

**1 (L4)**

(iii)     no sulphur dioxide (is given off)

*accept ‘it says no in the sulphur dioxide column’*

*do* ***not*** *accept ‘it has no sulphur dioxide in it’*

*accept ‘there is no sulphur in it’*

**1 (L4)**

**[6]**

**M22.**         (a)     (i)      •    a continuous straight line from the lamp to the screen **and** from

     the screen to George’s eye

**1 (L5)**

•    angle of incidence approximately equal to the angle of reflection



*accept a reflection anywhere between the dotted lines*

*on the laptop screen*

**1 (L5)**

•    arrows in the correct direction on the incident and reflected ray

*accept one arrow on a continuous ray showing reflection*

**1 (L5)**

(ii)     the reflected ray **or** the light image misses George’s eyes

*accept ‘the ray of light is reflected at a different angle’*

*accept ‘it moves down’*

*‘the lamp is not shining in his eye’s is insufficient*

*do* ***not*** *accept responses referring to scattering*

*‘it changes’ is insufficient*

*do* ***not*** *accept ‘the ray of light is reflected above his eye’*

**1 (L6)**

(b)     *from* electrical *energy* to sound *energy*

***both*** *answers are required for the mark*

*answers must be in the correct order*

**1 (L5)**