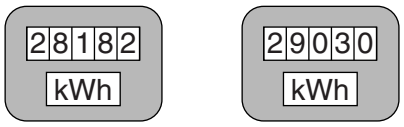
10 The Robinson family have an electricity meter.
The diagram shows their meter on two different dates.



6 January 6 February

(a) Use the meters to find the number of kilowatt hours of energy transferred between 6 January and 6 February.
Show your working clearly.

energy transferred = ... kWh **[1]**

(b) Between 6 July and 6 August, the Robinson's electricity bill showed that they used much fewer kilowatt hours than in **(a)**.
Suggest and explain **one** reason for this.

.....

.....

..... **[2]**

[Total: 3]

11 An old fridge works for 24 hours a day, every day of the year.
The power used is 150 watts.

(a) **(i)** Calculate the number of kilowatt hours of energy transferred in three months.
Assume that three months = 2000 hours.
Show your working.

number of kilowatt hours = ... **[3]**

(ii) How much does it cost to run this fridge for three months?
1 kilowatt hour costs 15 p.

cost = £ ..... **[1]**

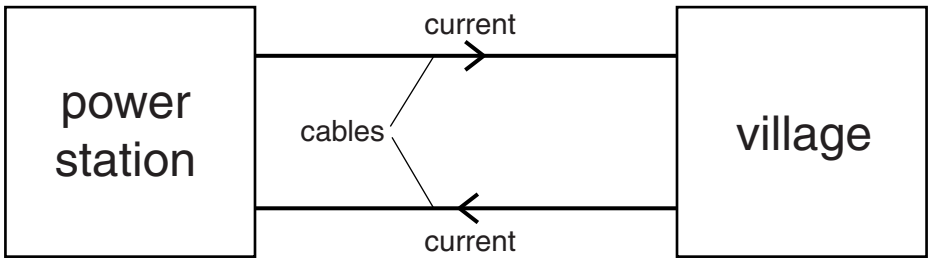
(b) A modern fridge rated A++ uses 20 watts.
This fridge will cost much less to use than the old one.
Suggest why.

.....

..... **[1]**

[Total: 5]

12 The diagram shows a small village being supplied by electricity from a power station.



The power station produces 100 000 W of electrical power.

The power station could transfer the energy at 250 V or at 2500 V.

The table below shows what happens in each case.

Power produced at power station in W	Power station voltage in V	Power wasted in heating cables in W	Power delivered to village in W
100 000	250	32 000	68 000
100 000	2500	320	99 680

Use information from the table to decide which voltage should be used.
Give reasons for your answer.

.....

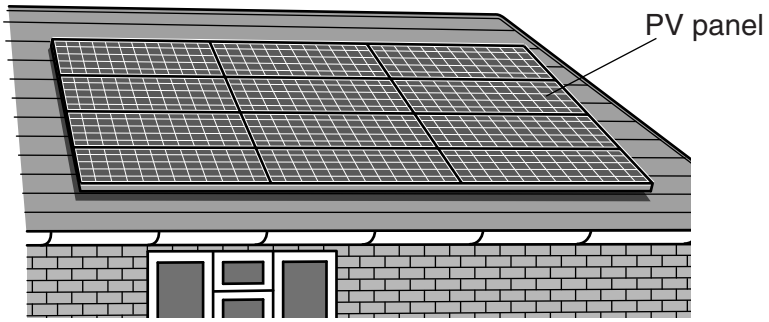
.....

.....

..... **[2]**

[Total: 2]

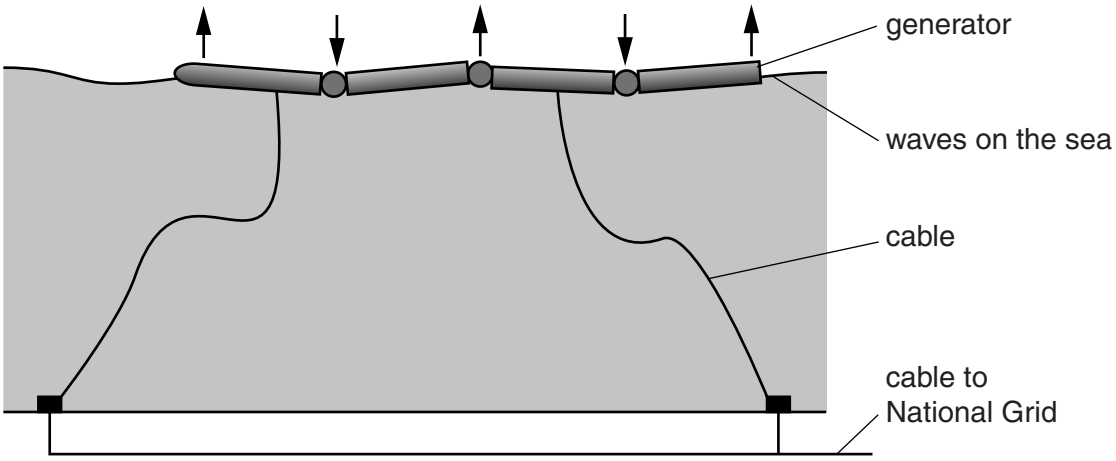
13 Many house-owners are putting sets of photovoltaic (PV) panels on their roofs to generate electricity during daylight. The panels work best if the roof used is facing south.



The data about the type of PV panel shown in the diagram are given in the table.

size of one panel (m × m)	1.5 × 0.8
average daily energy output of one panel (kWh)	0.6
cost per panel	£200

7 A type of wave power generator is being tested in the North Sea.



As the waves pass the generator they make it bend.

This bending movement is used to produce electricity.

The electricity can then be distributed using the National Grid.

(a) Waves are a **renewable** energy source.

What is meant by 'renewable energy source'?

.....

..... **[1]**

(b) The wave generator only works when the wave speed is under 10 m/s.

Waves passing the generator have a frequency of 0.2 Hz and a wavelength of 40 m.

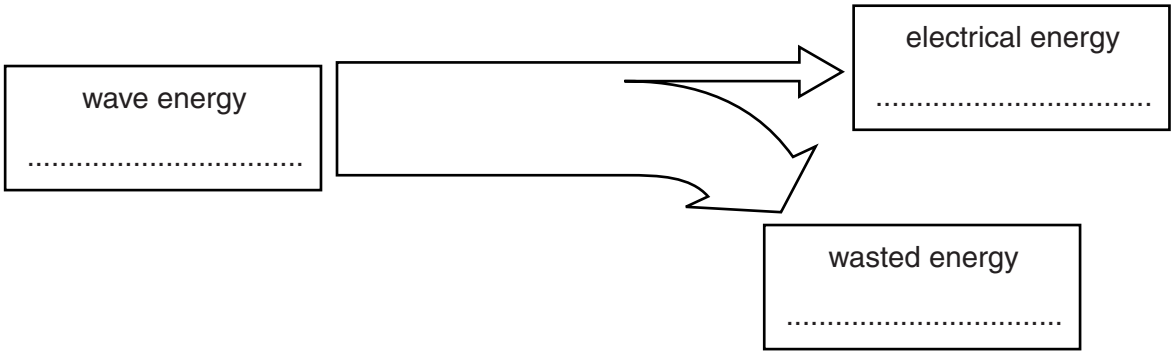
Use the data above to show whether or not the wave generator will work with these waves.

Show any calculation.

..... **[2]**

(c) The wave generator is 150 m long. When it is working, it produces 750 kJ of electrical energy from a wave energy input of 8250 kJ each second.

(i) Complete the Sankey diagram for the generator.



[2]

(ii) Calculate the efficiency of the generator.

Show your calculation.

efficiency = ... % **[2]**

(d) The average power output of the generator is 750 kW.

(i) How much energy will it produce in one day?

Give your answer in kilowatt hours.

Show your calculation.

energy = ... kWh **[2]**

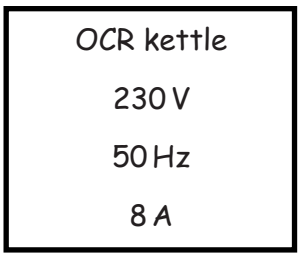
(ii) The electricity from the generator can be sold for 11p per kWh.

How much can the generator earn in one day?

answer = ... **[2]**

[Total: 11]

4 The diagram shows information written on the bottom of an electric kettle.



(a) What is the power of this kettle when it is being used?

Put a (ring) around the number closest to the power, measured in **kilowatts**.

1.5 **2.0** **2.5** **1500** **2000** **2500**

[1]

(b) A different kettle has a power of 1.2 kW.

(i) In a whole week, this kettle is used for a total of 45 minutes.

Calculate the amount of energy, in **kilowatt hours**, transferred to heat in this time.

Show your working.

energy = ... kilowatt hours **[1]**

(ii) It takes 1 minute to boil a cup of water for tea with this 1.2 kW kettle.

Calculate how much energy, in **joules**, is provided.

Show your working.

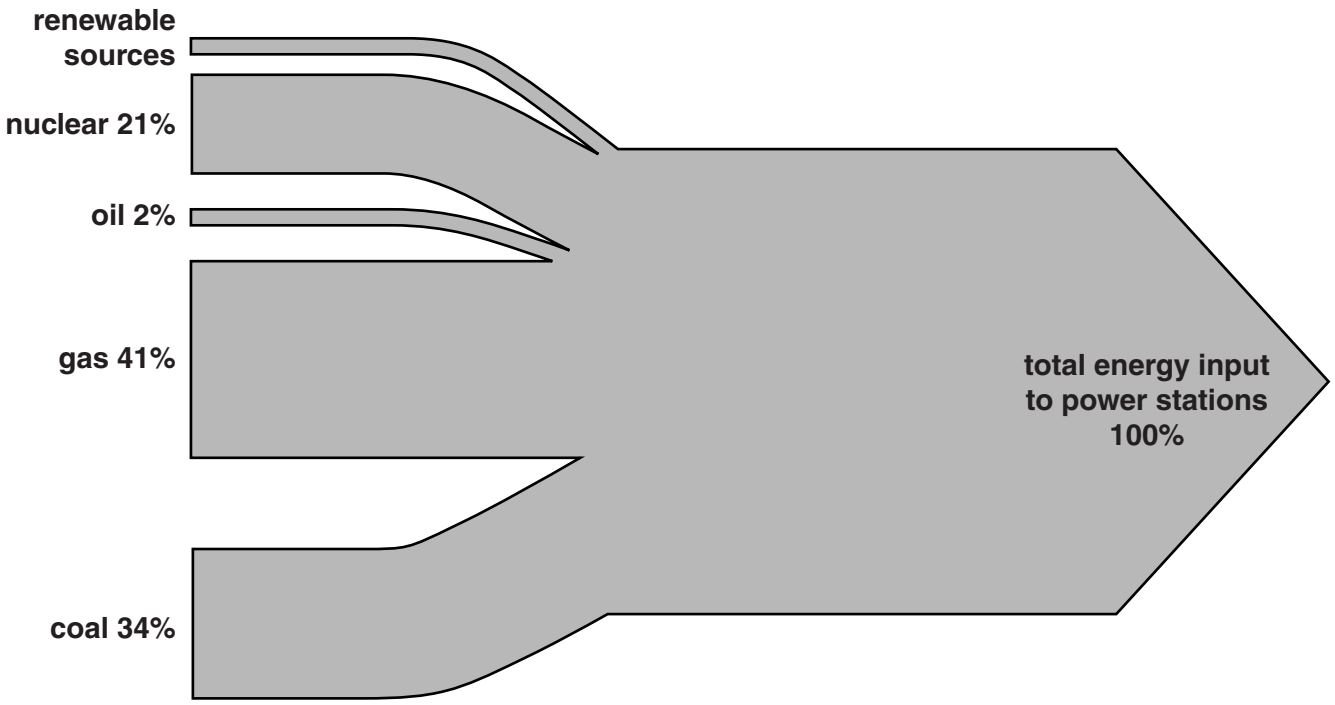
energy = ... joules **[2]**

[Total: 4]

Answer **all** the questions.

1 This question is about the generation of electrical energy in the UK in 2009.

(a) The diagram below shows the different energy sources that made up the total energy input to power stations in 2009.



(i) The labels on the diagram show that gas provided more energy than any other source in 2009 (41%).

What **other** feature of the diagram shows that gas provided the most energy?

.....

..... **[1]**

(ii) It is claimed that renewable sources provided less energy than any of the other sources.

Is this correct?

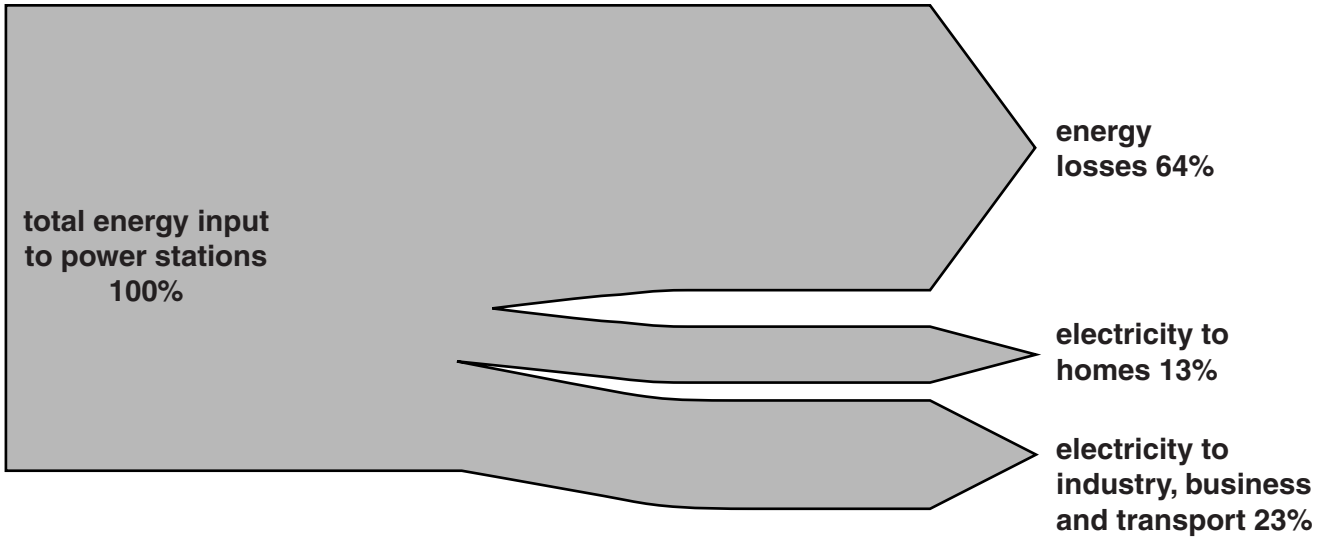
Justify your answer.

.....

.....

..... **[2]**

(b) The next diagram shows what happened to this energy in power stations in 2009.



(i) The energy losses from generating and distributing electricity are 64%.

Suggest **one** way in which energy may be lost.

.....

..... **[1]**

(ii) Which of the following figures was the efficiency of production of electricity in British power stations in 2009?

Put a (ring) around the correct value.

0.13 **0.23** **0.36** **0.64** **0.77**

[1]

(iii) The generators in power stations have large magnets.

Write down what else must be found in a generator, and describe how this works with the magnets to generate electricity.

.....

.....

..... **[2]**

[Total: 7]

2 This question is about the **advantages** and **disadvantages** of using nuclear power stations.

(a) The following statements about nuclear power stations are all **true**.

Put a tick (✓) in the correct box after each statement to show whether it is an advantage or a disadvantage.

statement	advantage	disadvantage
An accident could release radioactive materials.		
Each tonne of fuel gives a lot of energy.		
No carbon dioxide is given out by the fuel when the power station is working.		
Radioactive waste is produced.		
Nuclear fuel will last for many years.		

[2]

(b) People who handle nuclear fuel must take precautions because it emits ionising radiation.

Write down the effect of ionising radiation on the body.

.....

..... **[1]**

[Total: 3]

8 Here are some data about kettles.

Kettle	Maximum volume in litres	Power rating in kilowatts
A	2	2.5
B	1	2
C	2	3
D	1.5	1.5

(a) Use data from the table to suggest which kettle will boil 1 litre of water the fastest.

answer = ... **[1]**

(b) How many seconds will it take kettle **B** to transfer 6 kilojoules of energy?

answer = ... seconds **[1]**

(c) When kettle **C** is full, it takes about 0.1 hours to boil.

The cost of 1 kilowatt hour of electricity is 25p.

How much does it cost to boil the water?

cost = ... p **[3]**

(d) The mains voltage is 230 V.

One of the kettles has a current of 6.5 A when it is heating water.

Which kettle is it?

Justify your answer.

kettle .....

because .....

.....

..... **[2]**

[Total: 7]