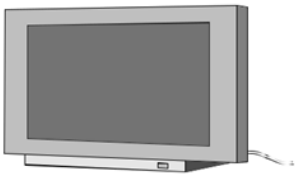
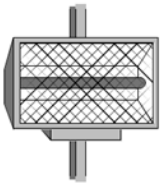
Conservation of Energy and Power and Energy Forms 2

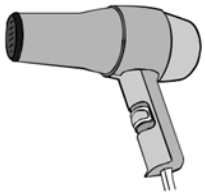
Q:1 The data included in the diagrams gives the power of the electrical appliances.



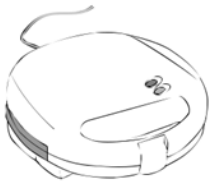
TV
160 W



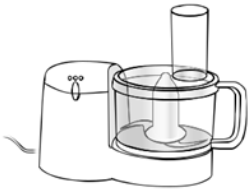
Radiant heater
1.0 kW



Hairdryer
1100 W



Sandwich toaster
1.1 kW



Food processor
0.4 kW

Table lamp
40 W

(a) (i) Which appliance is designed to transform electrical energy to light and sound?

_____

(1 mark)

(a) (ii) Which two appliances transform energy at the same rate?

_____ and _____

(1 mark)

(b) During one week, the food processor is used for a total of 3 hours.

(b) (i) Use the equation in the box to calculate the energy transferred, in kilowatt-hours, by the food processor in 3 hours.

energy transferred	=	power × time
(kilowatt-hour, kWh)		(kilowatt, kW) (hour, h)

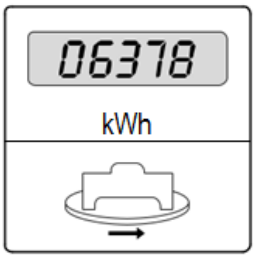
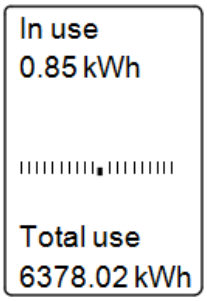
Show clearly how you work out your answer.

Energy transferred = _____ kWh

(2 marks)

(c) A homeowner decides to monitor the amount of electrical energy used in his home.

He can do this by using an electricity meter or by using a separate electronic device.

Electricity meter	Electronic device
Records to the nearest kilowatt-hour	Records to the nearest 1/100th kilowatt-hour
	

(c) (i) Use one word from the box to complete the following sentence.

precise reliable valid

The reading given by the electronic device is more _____ than

the reading given by the electricity meter. (1 mark)

c) (ii) Monitoring the electrical energy used in a home may help people to save money by encouraging them to use less electricity.

Explain why, apart from saving money, it is important for people to use less electricity.

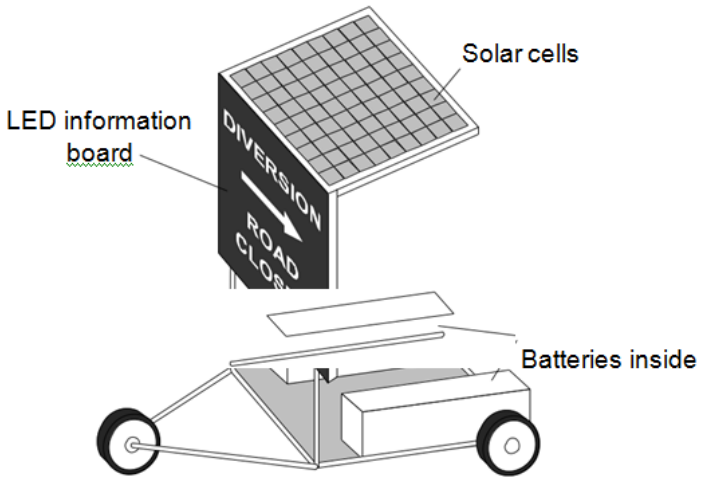
_____

_____

_____

(2 marks)

Q:2 The picture shows a temporary road traffic information board.



The batteries power the LEDs used in the information board.

The solar cells keep the batteries charged.

(a) Use words from the box to complete each of the following sentences.

chemical	electrical	light	sound

The solar cells transfer light energy to _____ energy.

The batteries transfer _____ energy to electrical energy.

The LEDs transfer electrical energy to _____ energy.

(3 marks)

(b) When the total energy input to the solar cells is 200 joules, the useful energy output from the solar cells to the batteries is 50 joules.

Calculate the efficiency of the solar cells.

Use the correct equation from the Physics Equations Sheet.

_____

_____

_____

Efficiency = _____

(2 marks)

(c) Which one of the following statements gives the reason for using solar cells to charge the batteries?

Tick (☒) one box.

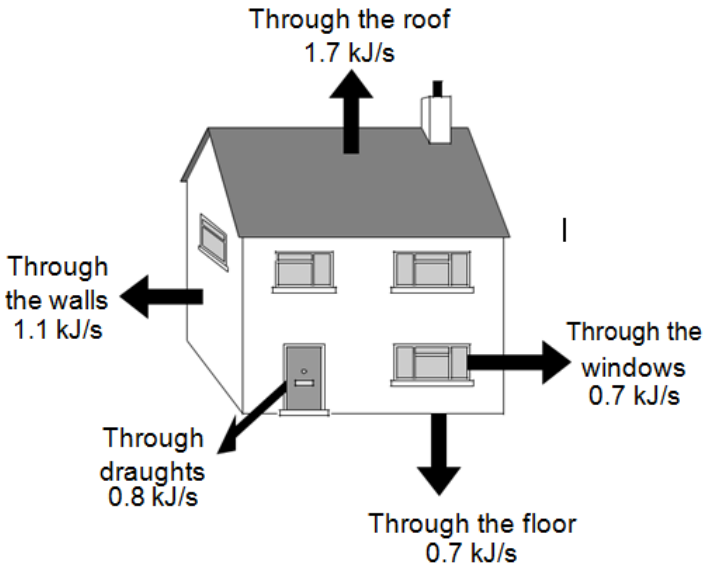
Solar cells will charge the batteries day and night. ☐

The information board can be used anywhere it is needed. ☐

A small number of solar cells produce a lot of electricity. ☐

(1 mark)

Q:3 Diagram 1 shows the energy transferred per second from a badly insulated house on a cold day in winter.



(a) (i) When the inside of the house is at a constant temperature, the energy transferred from the heating system to the inside of the house equals the energy transferred from the house to the outside.

Calculate, in kilowatts, the power of the heating system used to keep the inside of the house in Diagram 1 at a constant temperature.

1 kilowatt (kW) = 1 kilojoule per second (kJ/s)

Power of the heating system = _____ kW

(1 mark)

(a) (ii) In the winter, the heating system is switched on for a total of 7 hours each day.

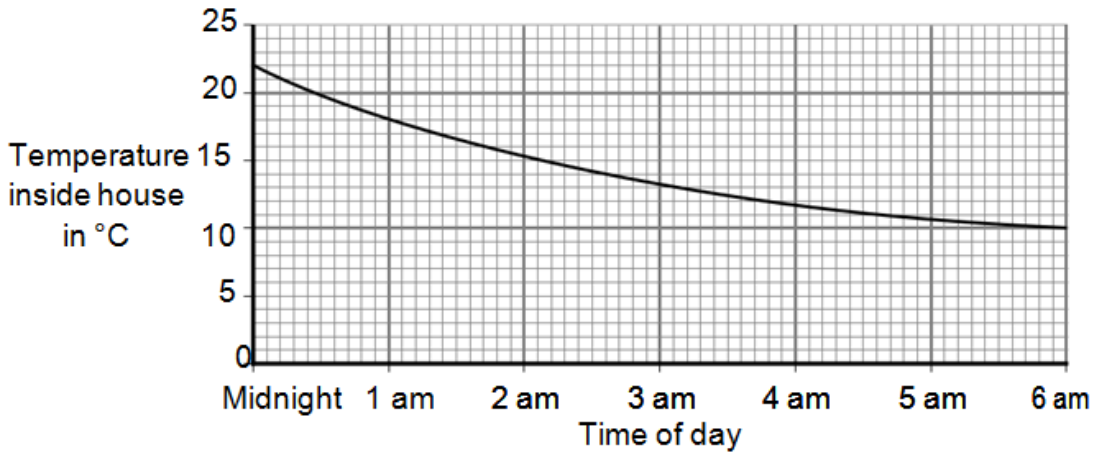
Calculate, in kilowatt-hours, the energy transferred each day from the heating system to the inside of the house.

Use the correct equation from the Physics Equations Sheet.

Energy transferred each day = _____ kWh

(2 marks)

(a) (iii) The heating system is switched off at midnight. The graph shows how the temperature inside the house changes after the heating system has been switched off.



Draw a ring around the correct answer in the box to complete the sentence.

Between midnight and 6 am the rate of energy transfer the house

decreases.
decreases then stays constant.
increases.

Give the reason for your answer.

_____

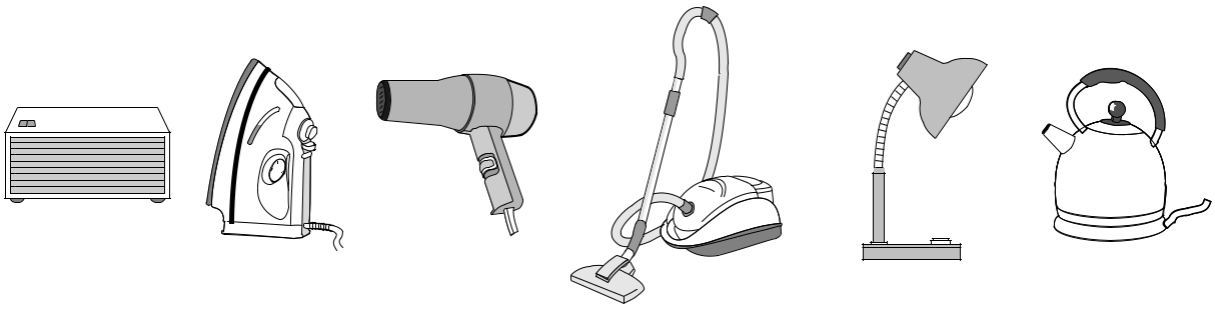
_____

_____

(2 marks)

Q:4 The pictures show six different household appliances.

Fan heater Iron Hairdryer Vacuum cleaner Table lamp Kettle



(a) Four of the appliances, including the fan heater, are designed to transform electrical energy into heat.

Name the other three appliances designed to transform electrical energy into heat.

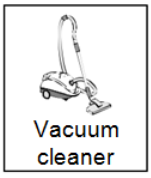
1 _____

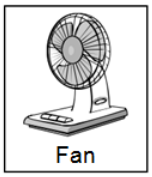
2 _____

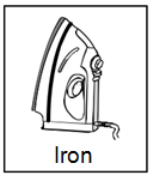
3 _____

(3 marks)

Q:5 The appliances shown below transfer electrical energy to other types of energy.







(a) The vacuum cleaner is designed to transfer electrical energy to kinetic energy.

Three more of the appliances are also designed to transfer electrical energy to kinetic energy. Which three?

Draw a ring around each correct appliance. (3 marks)

(b) Which two of the following statements are true?

Tick (☒) two boxes.

Appliances only transfer part of the energy usefully. ☐

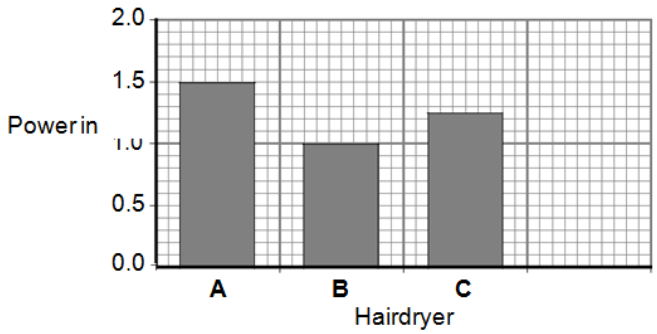
The energy transferred by appliances will be destroyed. ☐

The energy transferred by appliances makes the surroundings warmer. ☐

The energy output from an appliance is bigger than the energy input. ☐

(2 marks)

Q:6(a) The bar chart shows the power of three different electric hairdryers.



(a) (i) Which one of the hairdryers, A, B or C, would transfer the most energy in 5 minutes?

Write the correct answer in the box. ☐

(1 mark)

(a) (ii) A small 'travel' hairdryer has a power of 500 watts.

Draw a fourth bar on the bar chart to show the power of the 'travel' hairdryer.

(1 mark)

(b) A family shares the same hairdryer. The hairdryer has a power of 1.2 kW. The hairdryer is used for a total of 2 hours each week.

(b) (i) Calculate how many kilowatt-hours (kWh) of energy the hairdryer transfers in 2 hours.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

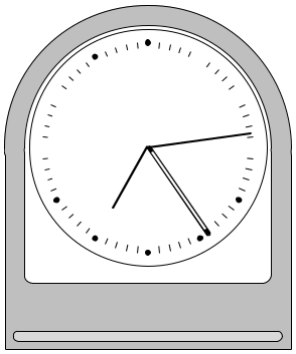
_____

_____

Energy transferred = _____ kWh

(2 marks)

Q:7 The drawing shows a battery-operated alarm clock.



Match types of energy, A, B, C and D, with the numbers 1– 4 in the sentences.

A chemical

B electrical

C kinetic

D thermal

The clock contains a battery and an electric motor.

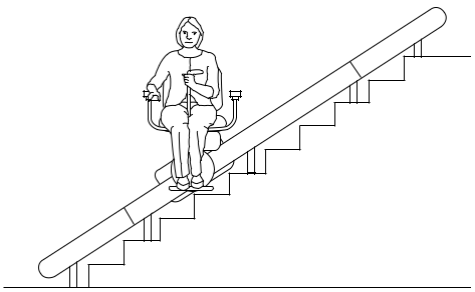
The battery is designed to transform . . . 1 . . . energy to . . . 2 . . . energy.

The motor is designed to transform electrical energy to . . . 3 . . . energy.

In the motor, some energy is wasted as . . . 4 . . . energy.

(4 marks)

Q:8 The drawing shows a woman being moved upstairs by a stair lift.



Match words, A, B, C and D, with the numbers 1– 4 in the sentences.

A electrical energy

B gravitational potential energy

C sound energy

D thermal energy

As the stair lift moves upwards, . . . 1 . . . is usefully transformed to . . . 2 . . . .

Some energy is wasted, mainly as . . . 3 . . . , but also as . . . 4 . . . .

(4 marks)

TOTAL MARKS=38