1. State two methods of transferring energy

2. How does the way energy is stored change when a ball is thrown upwards?

3. State the equation that links an object's kinetic energy with it's mass and velocity.

4. A motor lifts a mass of 17kg. The load gains 157.6 J of gravitational potential energy.

  a) Calculate the height to which the mass is lifted

  b) The motor releases the load and it falls.
     Describe the changes in the energy stores as it falls. Ignore air resistance.

  c) How would your answer be different if you had not ignored the effects of air resistance?

5. 42kJ of energy is transferred to heat a 0.8kg concrete block from20C to 100C.

  a) Calculate the heat capacity of the concrete block.

  b) This transfer takes 7 minutes. Calculate the power developed in this transfer

  c) Energy is transferred to the thermal energy store of an electric heater at night, then transferred away to the thermal energy stores of the surroundings during the day.
     Lead has a specific heat capacity of 126J/kgC
     Use your answer to a) to explain why concrete blocks are used in storage heaters instead of lead blocks.

Q2.   Complete the boxes on the chart to show what happens to the energy from the Sun.
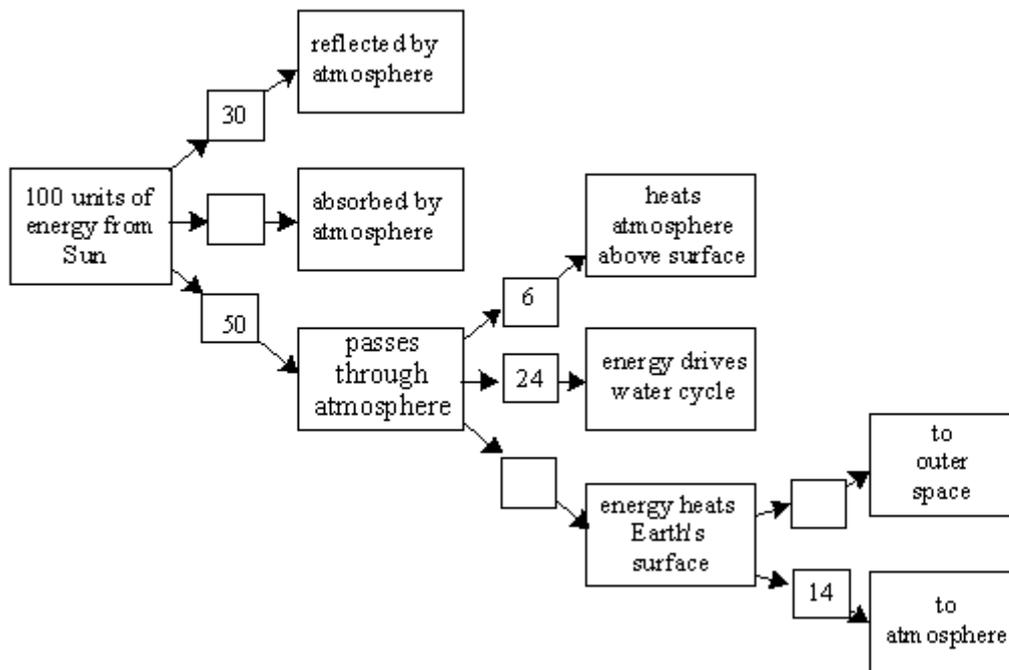
(Total 3 marks)

Q1.   A gas burner is used to heat some water in a pan.

Of the energy released by the burning gas by the time the water starts to boil:

60% has been transferred to the **water**.

20% has been transferred to the **surrounding air**.

13% has been transferred to the **pan**.

7% has been transferred to the **gas burner** itself.

(a)   Use the above information to complete the pie-chart.
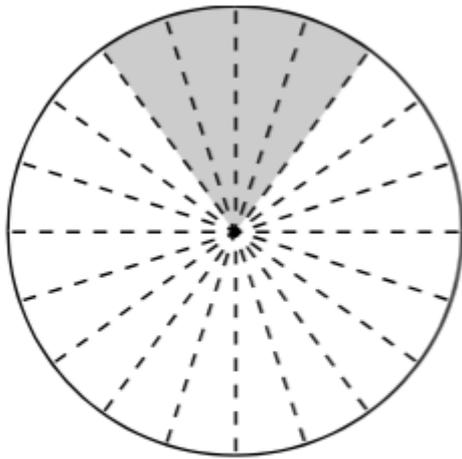
☐ = surrounding air

☐ =

☐ =

☐ =

(3)

(b)   Some of the energy released by the burning gas is wasted.

(i)   What happens to this wasted energy?

....

....

(2)

(ii)   What percentage (%) of the energy from the gas is wasted? Answer: ....
        %

(1)
(Total 6 marks)

Q4. The miners working in a salt mine use smooth wooden slides to move quickly from one level to another.

Vertical drop = 15 m

(a) A miner of mass 90 kg travels down the slide.

Calculate the change in gravitational potential energy of the miner when he move 15 m vertically downwards.

gravitational field strength = 10 N/kg

Show clearly how you work out your answer.

....

....

Change in gravitational potential energy = ... J

(2)

(b) Calculate the **maximum** possible speed that the miner could reach at the bottom of the slide.

Show clearly how you work out your answer.

Give your answer to an appropriate number of significant figures.

....

....

....

....

Maximum possible speed = ... m/s

(3)

(c)   The speed of the miner at the bottom of the slide is much less than the calculated maximum possible speed.

Explain why.

....

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....

....

....
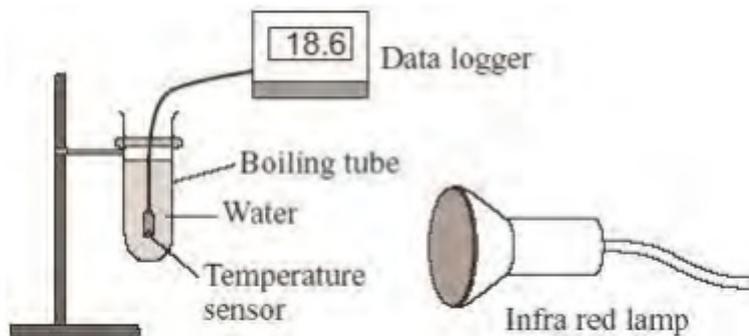
(3)
(Total 8 marks)

Q4.　　A student had read about a glacier that had been covered in insulating material. The idea was to slow down the rate at which the glacier melts in the summer.

She investigated this idea using the apparatus shown in the diagram.

(a)　These are the steps taken by the student.

- Measure 30 cm³ of cold water into a boiling tube.

- Place the boiling tube 25 cm from an infra red lamp.

- Record the temperature of the water.

- Switch on the infra red lamp.

- Record the temperature of the water every minute for 5 minutes.

- Repeat with boiling tubes covered in different insulating materials.

(i)　Why did she use an infra red lamp?

....

(1)

(ii)　Name **one** control variable in this investigation.

....
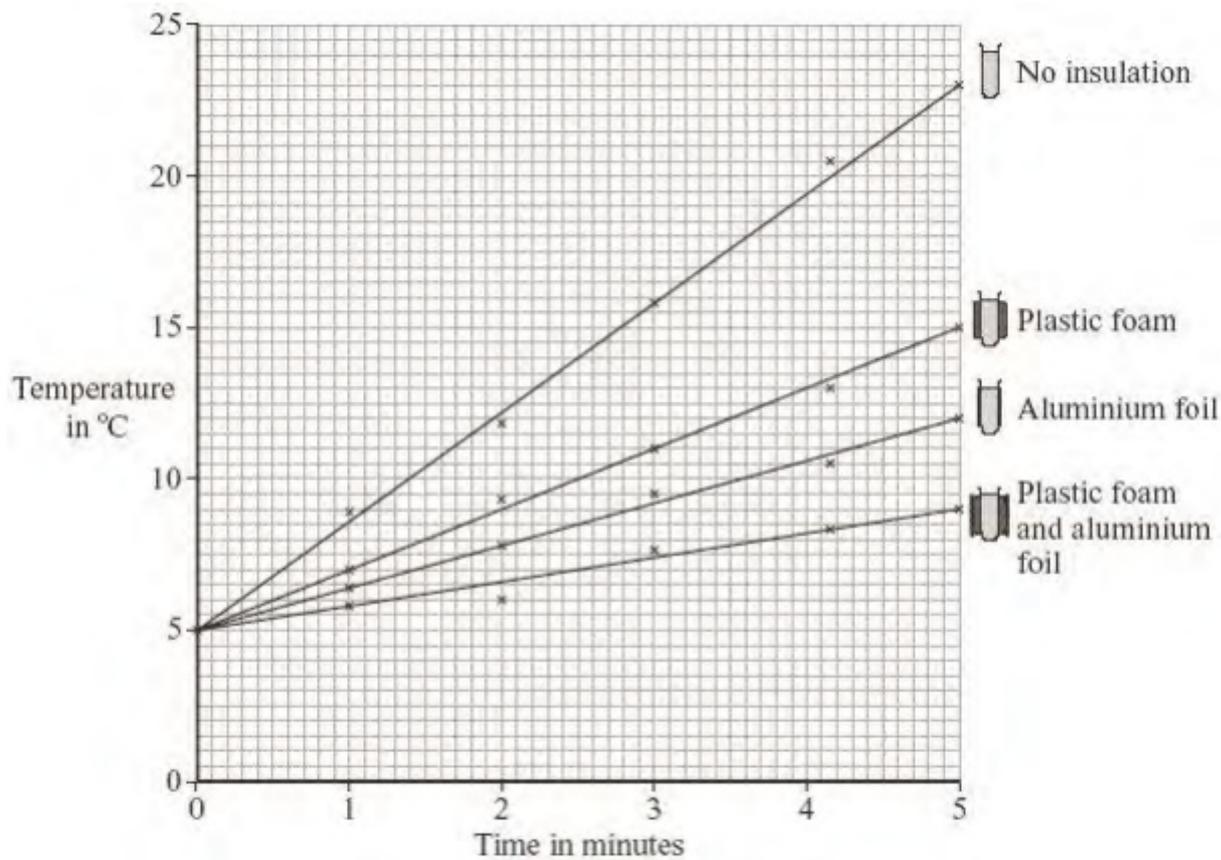
(1)

(iii)　Give **one** advantage of using a temperature sensor and data logger instead of a glass thermometer to measure temperature.

....

....

(1)

(b) The results of the investigation are shown in the graph.

(i) Why did the student use a boiling tube with no insulation?

....

....

(1)

(ii) From her results, what should she recommend is used to insulate the glacier?

....

(1)

(iii) Explain why the insulation recommended by the student will reduce the heat transfer from the Sun to the glacier.

....

....

....

....

....

(2)

(c)   Explain, in terms of particles, how heat is transferred through the glass wall of a boiling tube.

....

....

....

....

(2)
(Total 9 marks)