# Energy Practice Questions

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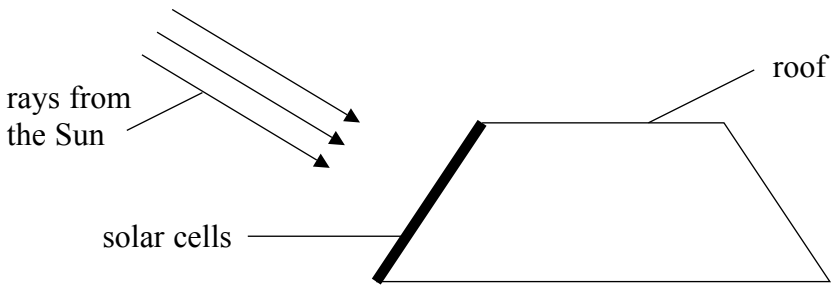
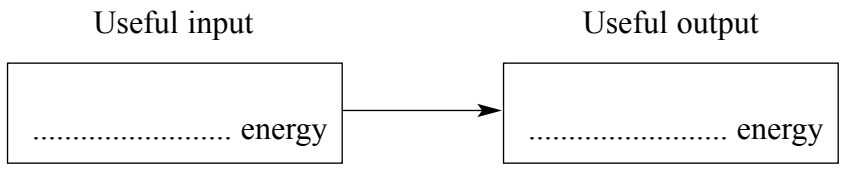
(October 2005)

**5.** There are some solar cells on the roof of a school.




(a) Complete the boxes to show the useful energy transfer taking place in the solar cells.




**(2)**

(b) At a certain time of day the amount of useful energy transferred is 6000 J during a period of 2 minutes.

(i) Calculate the rate of transfer of energy in watts during this time.

.....

.....

Rate of transfer of energy = .....W

**(2)**

(ii) Give two reasons why the rate of transfer of energy in the solar cells changes throughout the day.

1 .....

2 .....

**(2)**

**Q5**

**(Total 6 marks)**

(October 2005)

Leave blank

**12.** A lump of rock falls from a cliff. The kinetic energy of the rock just before it hits the ground is 4375 joules. The mass of the rock is 3.5 kg.

(a) Calculate the speed of the rock just before it hits the ground.
State the unit.

.....

.....

.....

Speed = .....

**(4)**

(b) As the rock falls its gravitational potential energy is transferred to kinetic energy.

(i) How much gravitational potential energy does the rock have to start with?

.....

**(1)**

(ii) What assumption have you made?

.....

.....

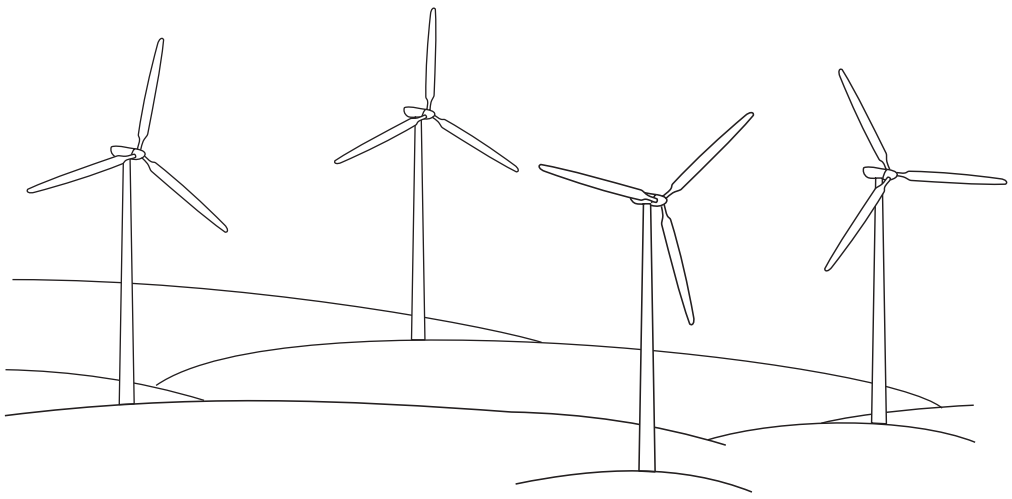
**(1)**

**Q12**

**(Total 6 marks)**

(October 2005)

**13.** Electricity may be produced on a large scale by using tall wind turbines connected to generators.



Without referring to the costs involved, state and explain

(a) one advantage of generating electricity by this method

.....

.....

.....

.....

**(2)**

(b) one disadvantage.

.....

.....

.....

**(2)**

**(Total 4 marks)**

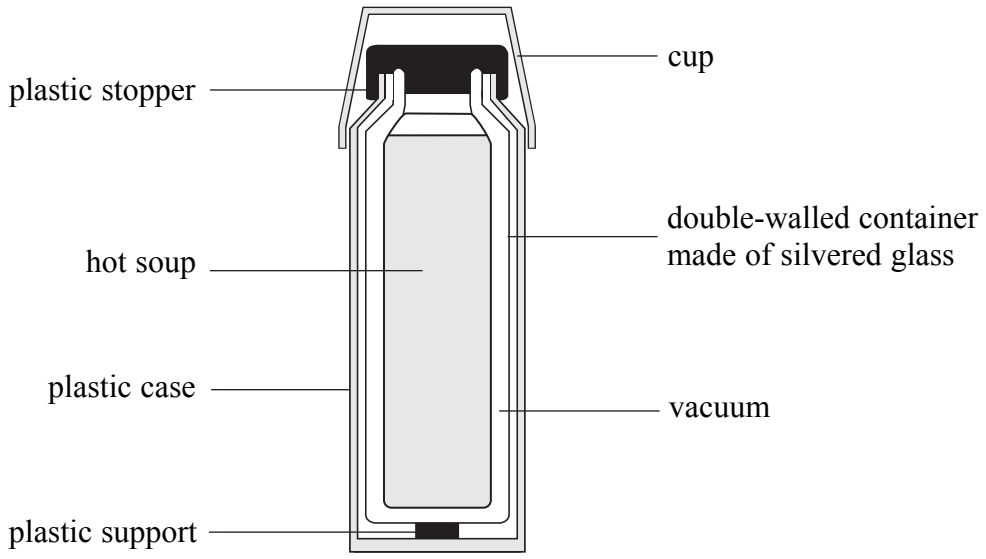
Leave blank

**Q13**

(May 2006)

Leave blank

**5.** The diagram shows the inside of a vacuum flask. It may be used to keep soup hot.




(a) Energy transfer can take place by conduction, by convection and by radiation.

Which two of these energy transfers **cannot** take place through a vacuum?

..... and .....

**(1)**

(b) Explain how the vacuum flask reduces energy transfer by radiation.

.....

.....

.....

**(2)**

(c) In some vacuum flasks both the case and the double-walled container are made of metal. These vacuum flasks are stronger. However they are heavier.

State and explain one other disadvantage apart from cost.

.....

.....

.....

**(2)**

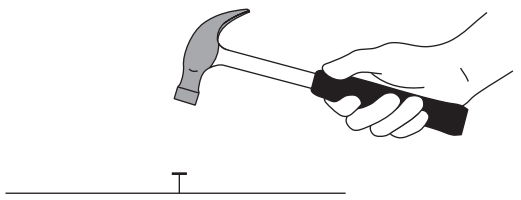
**Q5**

**(Total 5 marks)**

(May 2006)

Leave blank

**12.** (a) A technician uses a hammer to force a nail into a wooden beam.
The hammer has a mass of 0.40 kg. It has a speed of 5.0 m/s just before it hits the nail.



Calculate the kinetic energy of the hammer just before it hits the nail and give its unit.

.....

.....

Kinetic energy of the hammer = .....

**(3)**

(b) The technician raises the hammer to a height of 0.75 m above the beam before bringing it down to hit the nail.
Calculate the increased gravitational potential energy of the hammer at a height of 0.75 m above the beam.

.....

.....

Increased gravitational potential energy = .....

**(2)**

(c) (i) After raising the hammer to a height of 0.75 m, how much work does the technician do in hitting the nail with the hammer? Give its unit.

.....

Work done = .....

**(2)**

(ii) Explain your answer.

.....

.....

**(2)**

**Q12**

**(Total 9 marks)**

Leave blank

**13.** (a) Geothermal resources may be used to produce electricity.
One advantage is that geothermal resources are renewable.
Describe two other advantages and two disadvantages.

Advantages

1 .....

2 .....

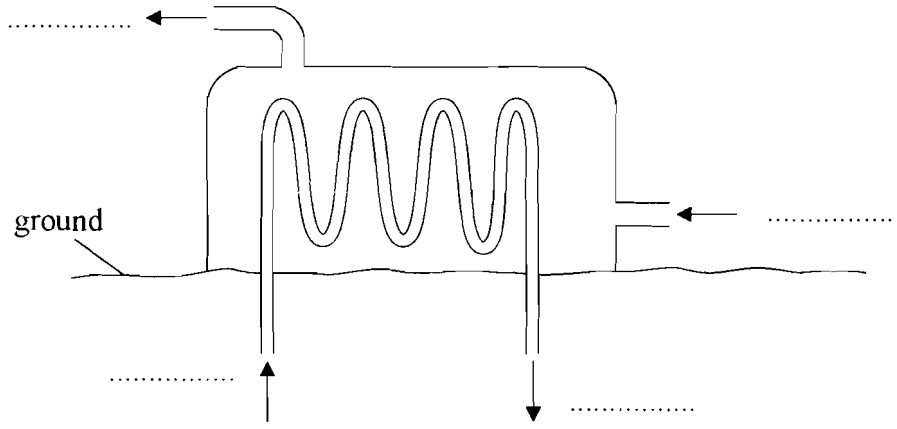
Disadvantages

1 .....

2 .....

**(4)**

(b) The diagram shows a heat exchanger in a geothermal power station.




On the dotted lines write **A**, **B**, **C** or **D** where:

| |
|---|
| **A** is the hot geothermal water in |
| **B** is the geothermal water out |
| **C** is the liquid in from condenser |
| **D** is the vapour out to turbine |

**(2)**

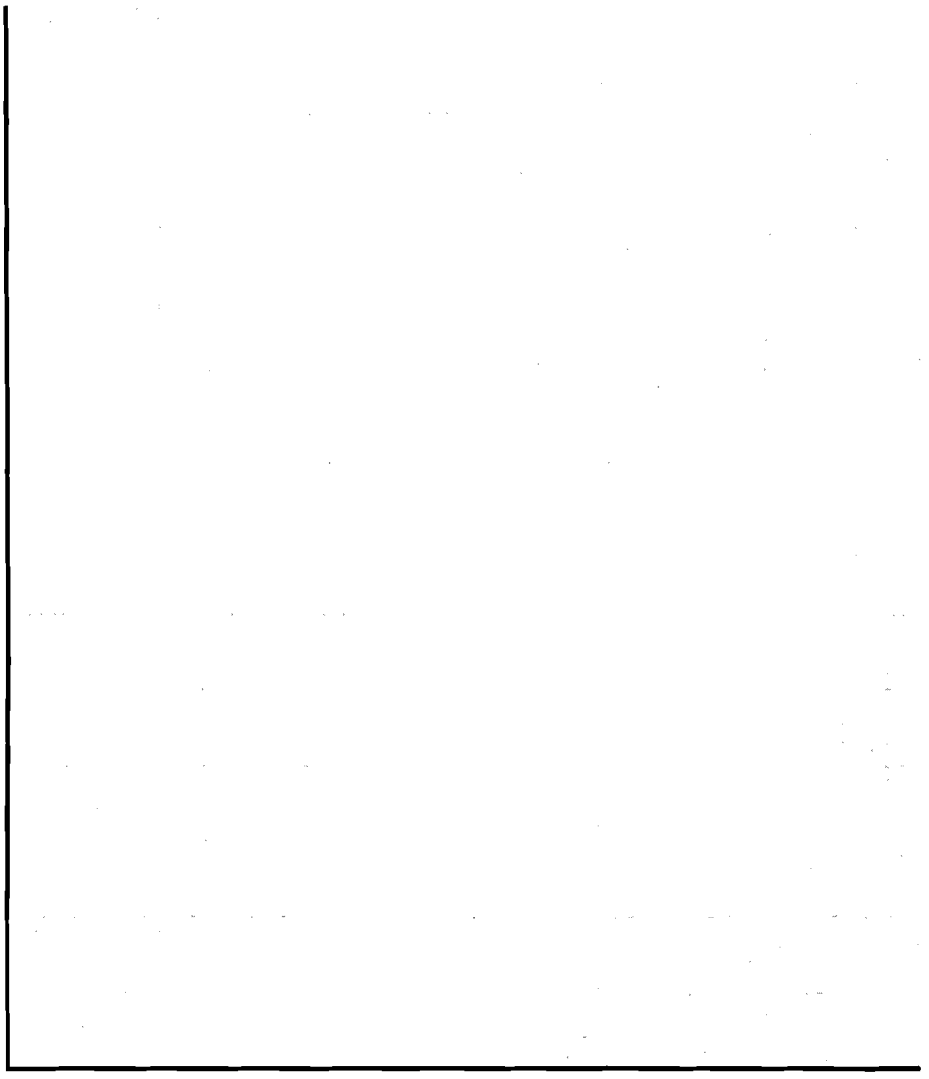
Leave blank

(c) The data show how the temperature varies with depth where the ground is suitable for geothermal electricity production.

| Temperature (°C) | 25 | 40 | 63 | 100 | 155 | 245 |
|---|---|---|---|---|---|---|
| Depth (m) | 0 | 200 | 400 | 600 | 800 | 1000 |

(i) Plot a graph of temperature ($y$-axis) against depth ($x$-axis).

(ii) Draw a smooth curve through your points.



**(5)**

(iii) Geothermal electricity production is possible using temperatures as low as 85 °C. Use your graph to find the depth in metres where this temperature occurs.

Depth = ..... m

**(1)**

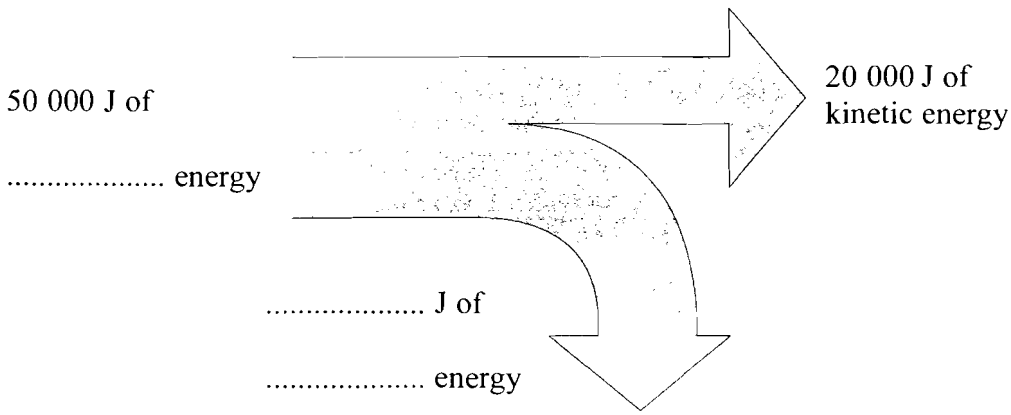
Q13

**(Total 12 marks)**

(May 2007)

Leave blank

**4.** (a) The diagram shows an energy flow for a motorbike.
Fill in the gaps in the diagram.




**(3)**

(b) The motorbike travels 2.0 km. The driving force is 700 N. Calculate the work done in joules by this driving force.

.....

.....

Work done = ..... J

**(3)**

**Q4**

**(Total 6 marks)**

(May 2007)

Leave blank

**11.** Hydroelectric power stations (HEP stations) are used to produce large quantities of electricity. There are advantages and disadvantages of producing electricity in this way.

(a) State two advantages other than cost.

Advantage 1 .....

.....

Advantage 2

.....

**(2)**

(b) State two disadvantages other than cost.

Disadvantage 1 .....

.....

Disadvantage 2 .....

.....

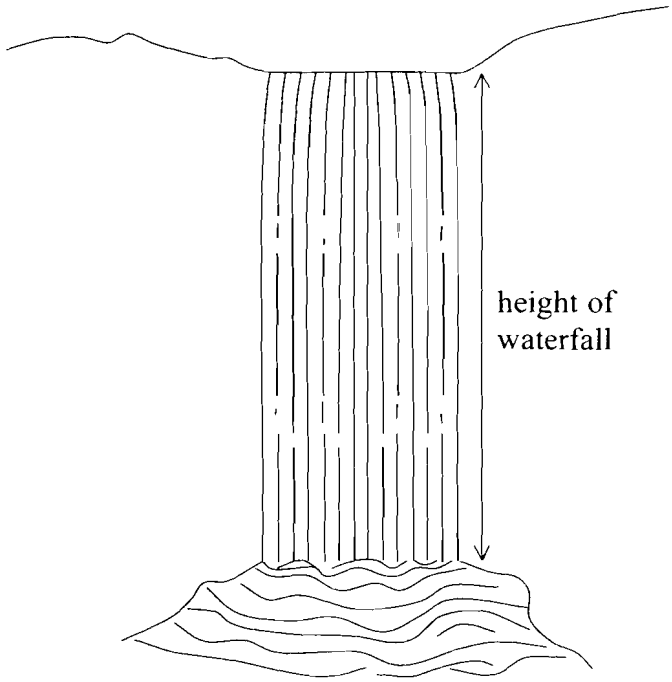
**(2)** **Q11**

**(Total 4 marks)**

(May 2007)

Leave blank

**15.** (a) The diagram shows a waterfall.




Complete the boxes to give the main energy transfer that takes place between the top of the waterfall and just before the bottom.

| | | |
|---|---|---|
| ..... energy of the water | → | ..... energy of the water |

**(2)**

(b) The scientist J P Joule measured the water temperature at the top and the bottom of waterfalls. He found that the temperature of the water was always higher at the bottom.

(i) Suggest a reason for the temperature increase.

.....

.....

**(1)**

(ii) Suggest the relationship between the temperature increase and the height of the waterfall.

.....

.....

**(1)**

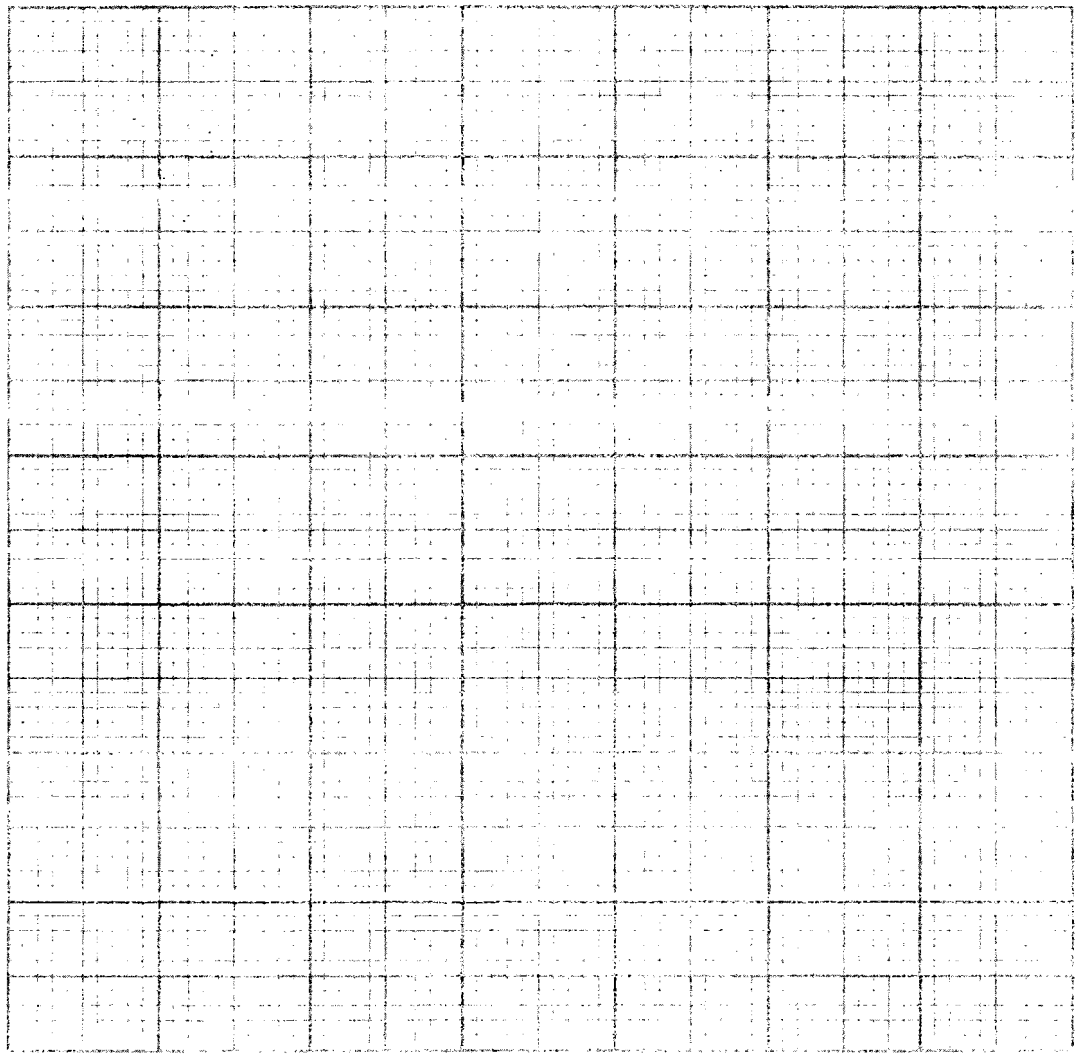
(May 2007)

Leave blank

(c) Waterfalls sometimes cause rocks to fall. The table gives the speed and the kinetic energy of a falling rock.

| **Speed (m/s)** | 3.0 | 5.0 | 8.0 | 10.0 | 13.0 |
|---|---|---|---|---|---|
| **Kinetic energy (kJ)** | 0.2 | 0.7 | 1.7 | 2.7 | 4.6 |

(i) On the grid draw a graph of kinetic energy against speed. Label the axes, use appropriate scales, and draw a curve of best fit for your points.



**(6)**

(ii) Use your graph to find the kinetic energy in kilojoules of the rock when its speed is 12 m/s.

Kinetic energy = ..... kJ

**(1)**

**Q15**

**(Total 11 marks)**