

Chapter 2 Moving heat around

Total marks 45

Chapter Test

Name: _____ Class: _____ Date: _____

Section A: Multiple choice

(10 marks)

Question 1

Which of the following is **not** a method of heat transfer?

- a. insulation
- b. conduction
- c. convection
- d. radiation

Question 2

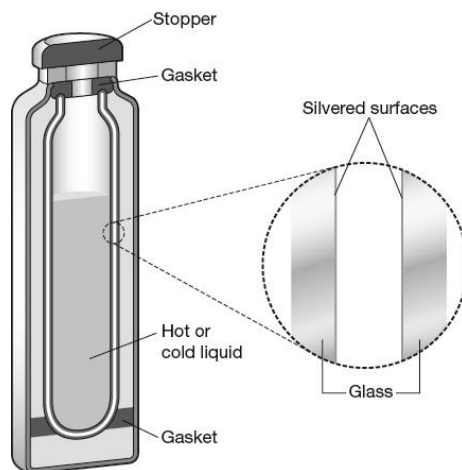
Thermal energy of an iron is transferred to the clothes by:



- a. insulation
- b. conduction
- c. convection
- d. radiation

Question 3

A vacuum flask, or 'thermos', has a reflective coating of aluminium on the internal surface. This 'silvered' surface reduces heat transfer by:



- a. conduction
- b. convection
- c. radiation
- d. all of the above.

Question 4

Which of the following is the best example of heat transfer by conduction?

- a. Heat transfer from the bottom of the ocean to the top
- b. Heat transfer from the Sun to Earth
- c. Heat transfer from Earth's crust to the layer below (mantle)
- d. Heat transfer from Earth's surface to the upper atmosphere.

Question 5

Water is poured into a stainless steel pot, which is heated over a gas flame. The heated water begins to rise to the surface. The **order** of heat transfer during this entire process is:

- a. conduction, convection, radiation
- b. convection, conduction, radiation
- c. radiation, convection, conduction
- d. radiation, conduction, convection.

Question 6

Convection currents are apparent in ovens that do not have fans. This leads to uneven temperatures throughout the oven. The air inside the oven just above the heating element:

- a. contracts and falls due to decreased density
- b. contracts and falls due to increased density
- c. expands and rises due to decreased density
- d. expands and rises due to increased density.

Question 7

A filament globe is about 3 % efficient in transforming electrical energy into light energy; the rest is transformed into heat. If the light output of the globe is 60 joules per second, what is the electrical input in joules per second?

- a. 180 J s^{-1}
- b. 200 J s^{-1}
- c. 2000 J s^{-1}
- d. $18\,000 \text{ J s}^{-1}$

Question 8

200 J of electrical energy delivered to a television. Of this total, 120 J is transformed into light, 5 J is transformed into sound and 75 J is transformed into heat. The efficiency of the television set is:

- a. 37.5%
- b. 60%
- c. 62.5%
- d. 100%

Question 9

Work done **on** a system _____ its internal energy. Work done **by** a system _____ its internal energy. The missing terms are:

- a. increases, increases
- b. increases, decreases
- c. decreases, increases
- d. decreases, decreases

Question 10

A torch is battery powered. If the torch is left on and the battery goes flat, which statement best describes what has happened to the battery's energy?

- a. It has been destroyed.
- b. It has been stored as potential energy.
- c. It has been transformed to light energy.
- d. It has been transformed to light energy and heat energy.

Section B: Short answer

(26 marks)

Question 1

Which method of heat transfer does not require the presence of any particles? Explain.

(2 marks)

Question 2

Can heat be transferred in solids by convection? Explain.

(2 marks)

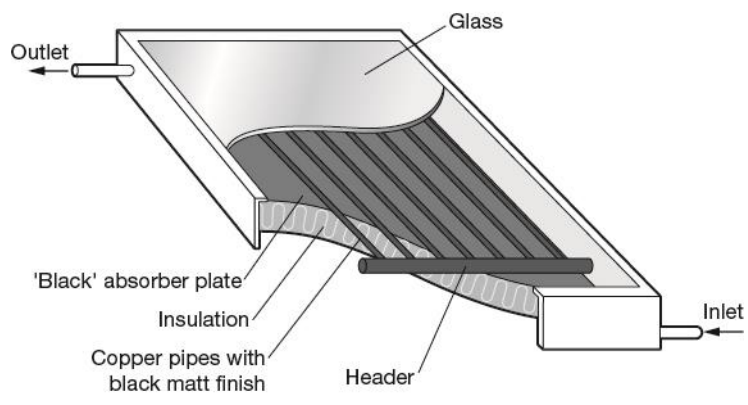
Question 3

If all objects are at 'room temperature', why do metal objects feel cooler to touch than wooden objects? Explain.

(3 marks)

Question 4

Solar water heating is an effective method for providing hot water for domestic and industrial applications. One of the main components of a solar water heating system is the collector. A common type of collector is the flat plate. It consists of insulated boxes made of a transparent material cover (usually glass) and copper pipes painted **black**, set against a **black** coloured absorber plate.



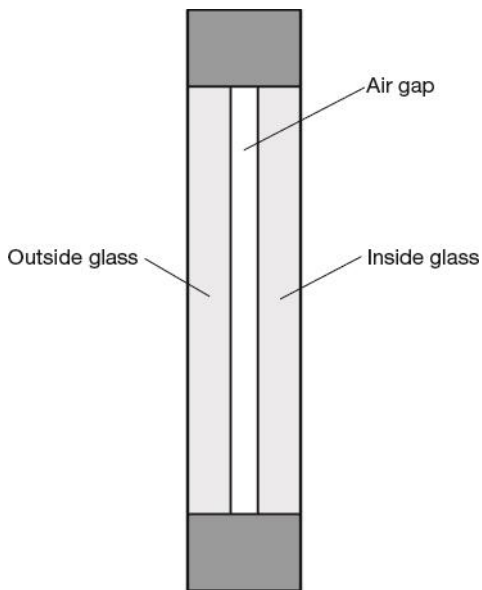
Why are the copper tubes and absorbing plate **black**? Explain. (1 mark)

Question 5

The energy input of a particular gas heater is 12 MJ. The energy transfer from chemical energy to heat is 75%. What is the energy output of the heater? (3 marks)

Question 6

Double-glazed windows involve two layers of glass that have a narrow gap of air between them. In terms of heat transfer, name two ways in which double-glazed windows reduce heat loss from homes. (4 marks)



Question 7

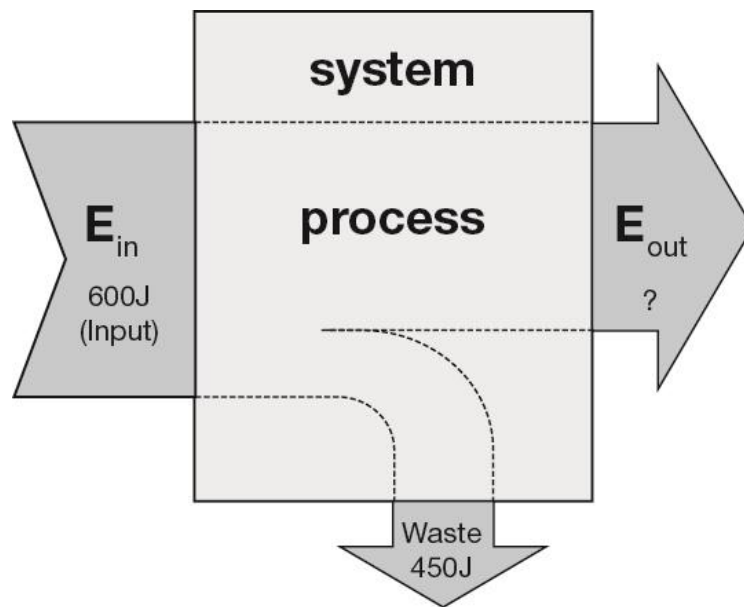
The total energy supplied to a car in a given time is 800 kJ and 360 kJ of this energy is usefully transformed.

a. Calculate efficiency of this car. (2 marks)

b. The 440 kJ supplied to the engine that is not usefully transformed is called the wasted energy. Name the two forms of energy produced by the engine that are classed as wasted energy. (1 mark)

Question 8

The following diagram shows energy changes in an electric model train:



- a. How much energy is transferred into useful energy? (1 mark)

- b. What useful energy transformation takes place in the motor? (1 mark)

- c. Calculate the efficiency of the model train. (2 marks)

Question 9

A student places an ice cube into a test tube, and a piece of metal gauze to trap the ice cube at the bottom of the test tube. They fill the test tube with water and place the top of the test tube into the flame of a Bunsen burner. The water at the top comes to boil, while the ice cube remains unmelted.

Explain what is happening.

(4 marks)

