

Chapter 1.2 WACE Q

page 1

Question 1

(3 marks)

When you walk across a bridge you sometimes see expansion joints. These are gaps between the different parts of the bridge. On hot, sunny days these gaps are narrower than on cold winter days. Use your understanding of the kinetic theory to explain why this is so.

Question 2

(3 marks)

Answer **TRUE** or **FALSE** to each of the following.

You place a mercury thermometer and an alcohol thermometer into the same beaker of warm liquid at the same time. When the mercury and alcohol bars reach steady points:

the mercury has the same temperature as the warm liquid. _____

the alcohol has the same temperature as the mercury. _____

the mercury and alcohol have both absorbed the same amount of heat from the warm liquid.

Question 3

(3 marks)

Each day, when Victoria gets home from work, she climbs the stairs to her second-floor apartment. On some days she walks up the stairs and on other days she runs up them.

Victoria's potential energy, kinetic energy and power output may change as she climbs the stairs. Assuming that Victoria's mass remains constant, and that she is halfway up the stairs:

her potential energy is (circle the correct response)

less for walking
than for running

the same for walking
and running

greater for walking
than running

her kinetic energy is (circle the correct response)

less for walking
than for running

the same for walking
and running

greater for walking
than running

her power output is (circle the correct response)

less for walking
than for running

the same for walking
and running

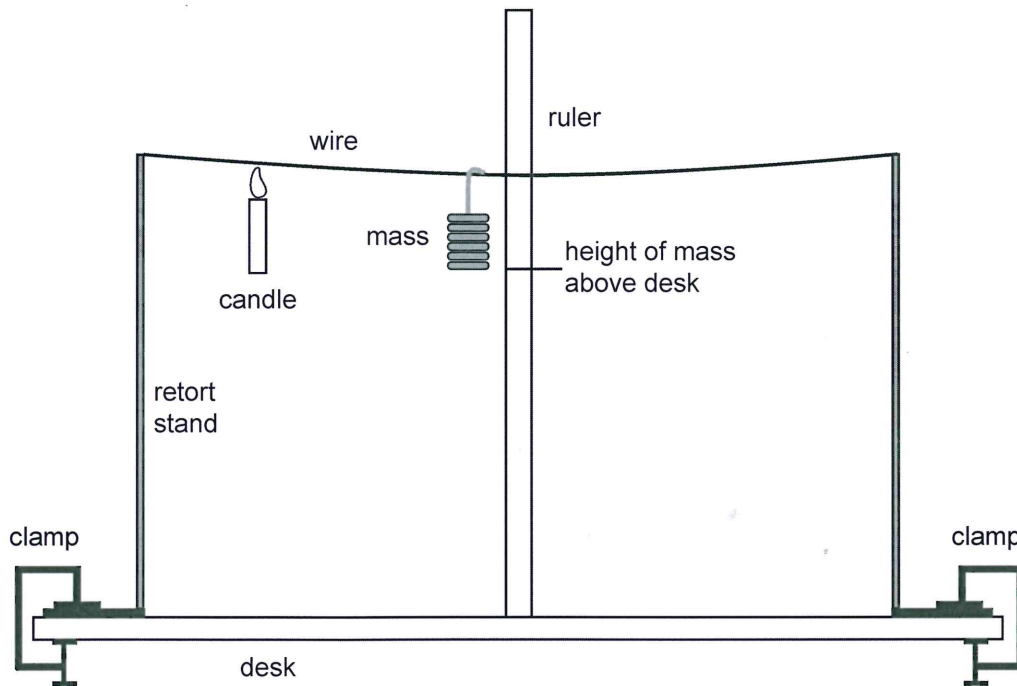
greater for walking
than running

Question 4

(4 marks)

Some students clamped two retort stands onto a desk. They tied a metal wire tightly between the tops of the retort stands and then hung a mass from the wire as shown in the diagram. After they had measured the height of the mass above the desk, they heated the wire evenly with a candle for about three minutes and measured the height of the mass above the desk again. This time, the height was less than it had been before.

Using your understanding of the kinetic theory explain why the mass moved closer to the desk as the wire was heated.



Question 5

(4 marks)

Before the 19th century scientists believed that how hot or cold an object felt was a result of how much 'heat' it contained. This 'heat' was thought to be a result of a weightless liquid called 'caloric' that flowed between objects. Heat and temperature were considered to be the same. Today, scientists have a much deeper understanding of the concepts of heat and temperature.

As a result of your studies of heat and temperature this year, state whether the following statements are True or False.

Statement		True or False
A	Heat is best described as how hot an object is.	
B	Temperature is a measure of the total kinetic energy that an object contains.	
C	Objects can both gain and lose heat but usually the net heat transfer is from hotter objects to cooler objects.	
D	When a metal cube is heated without melting the kinetic energy of its particles increases.	

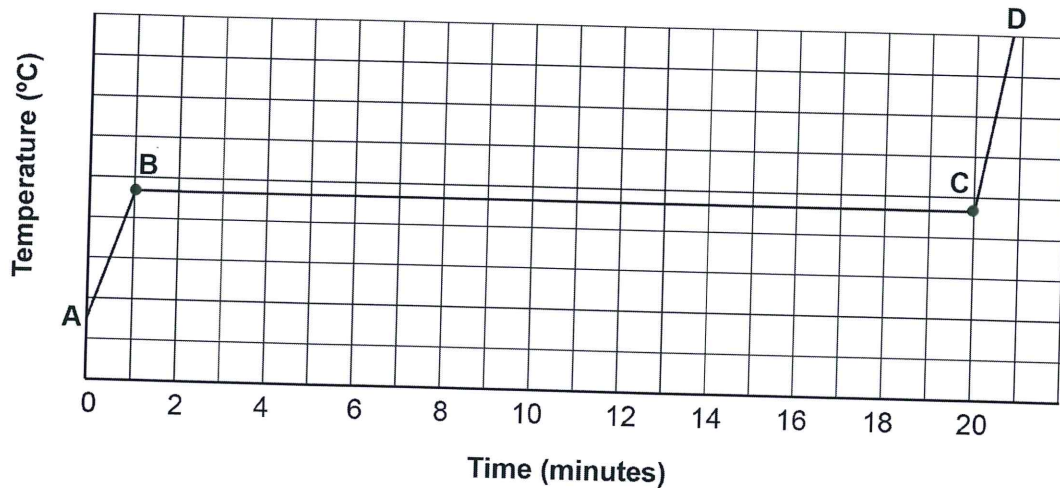
Chapter 1.2. Question 6

WACE Q

page 3

(5 marks)

The following graph shows the temperature change when 1.00 kg of water is heated in an insulated container by a 2.00 kW heater. The temperature change has not been recorded.



Using the information contained in the graph,

- (a) determine the time interval, in seconds, between B and C; and (2 marks)
- (b) use this time value to calculate the amount of energy supplied by the 2.0 kW heater in the time interval between B and C. Express your answer with appropriate units. (3 marks)

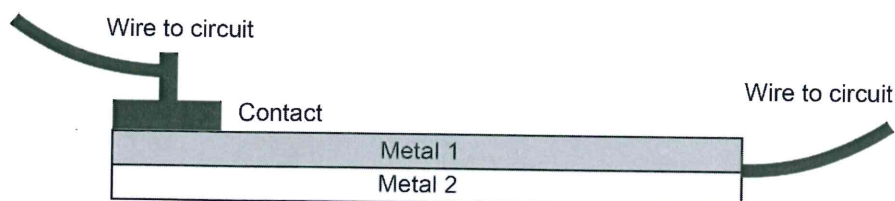
Chapter 1.2 WACE Q

Question 7

page 4

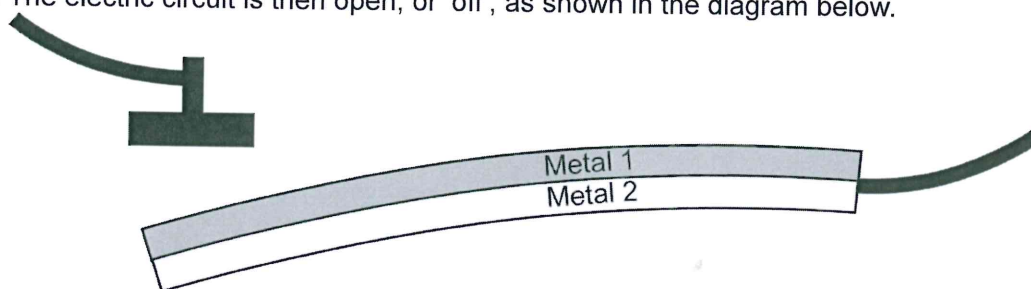
(4 marks)

A common type of switch used for regulating temperature is a bimetallic strip. A bimetallic strip is made of two different types of metal. The bimetallic strip is set so that when a certain temperature is reached, a contact is made and the circuit is closed or 'on' as shown in the diagram below.



Bimetallic strip in the 'on' position

Both metals experience the same change in temperature in an oven. When the temperature is too high, the contact is broken because the different properties of the metals make the strip bend. The electric circuit is then open, or 'off', as shown in the diagram below.



Bimetallic strip in the 'off' position

Complete the following table by using the diagram(s) and your understanding of the concepts of thermal expansion and contraction to choose the best answer. Tick the appropriate column to indicate your answer to each question.

Question	Metal 1	Metal 2	Neither
Which metal expands more when heated?			
Which metal has particles with greater average kinetic energy when in the 'off' position?			
Which metal's particles have the least change in their average distance apart when cooled?			
Which metal's particles have the least change in their average distance apart when heated?			