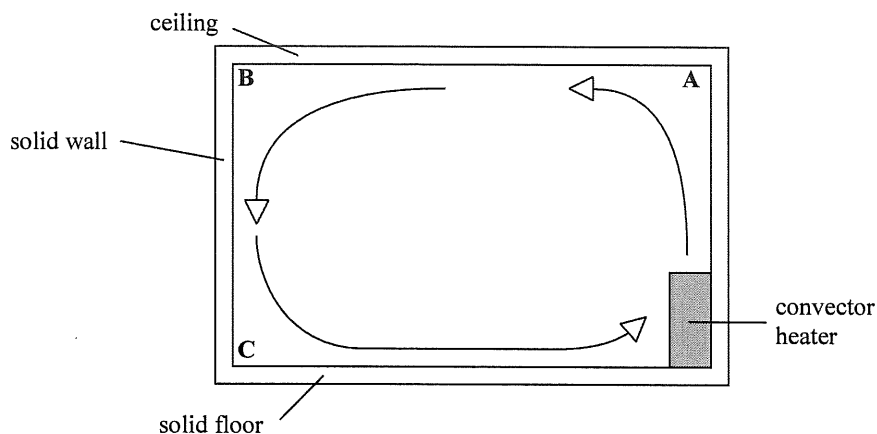


A

5.



- (a) The room shown is heated by a convector heater. The arrows show the direction of movement of the air within the room.
Is the highest temperature at A or B or C?

.....
(1)

- (b) The room has a floor area of 20 m^2 . The height of the room is 3 m and it contains air of mass 72 kg.
Calculate the density, in kilograms per cubic metre, of the air in the room.

.....
.....
..... Density = kg/m^3
(3)

- (c) The density of air changes with temperature.
Is the density of air lowest at A or B or C?

.....
(1)

- (d) Some heat energy within the room is transferred through the solid floor.
Name the energy transfer process taking place.

.....
(1)

(Total 6 marks)

Leave blank

Q5



N 2 1 1 6 1 A 0 7 2 4

7

Turn over

8

- 4 (a) Four identical metal plates, at the same temperature, are laid side by side on the ground. The rays from the Sun fall on the plates.

For
Examiner's
Use

One plate has a matt black surface.

One plate has a shiny black surface.

One plate has a matt silver surface.

One plate has a shiny silver surface.

State which plate has the fastest-rising temperature when the sunlight first falls on the plates.

..... [1]

- (b) The apparatus shown in Fig. 4.1 is known as Leslie's Differential Air Thermometer.

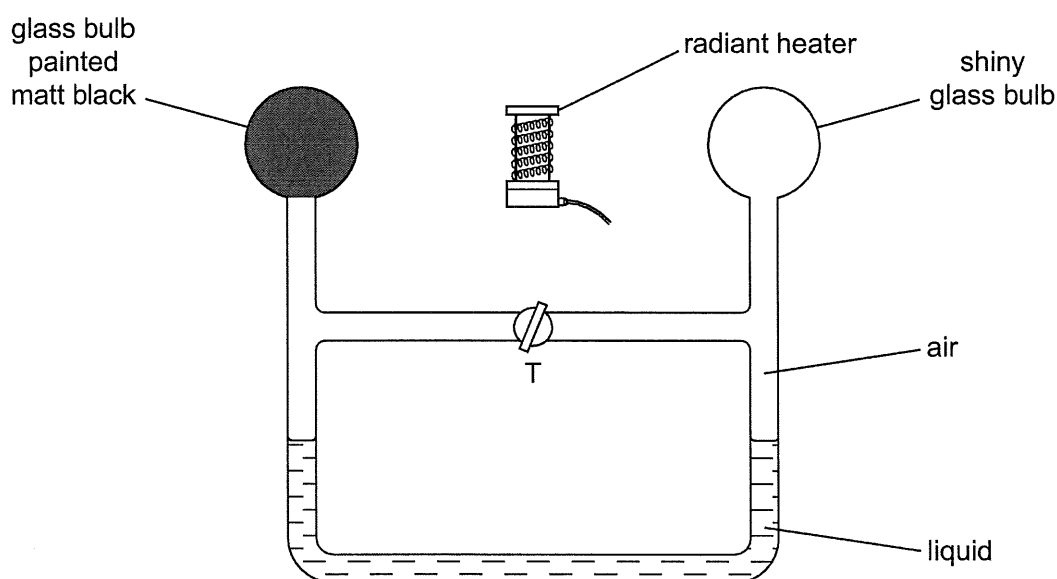


Fig. 4.1

The heater is switched off. Tap T is opened so that the air on the two sides of T has the same pressure. Tap T is then closed.

- (i) The heater is switched on. On Fig. 4.1, mark clearly where the two liquid levels might be a short time later. [1]

- (ii) Explain your answer to (b)(i).

.....

 [2]

[Total: 4]

4

A solar panel is mounted on the roof of a house. Fig. 4.1 shows a section through part of the solar panel.

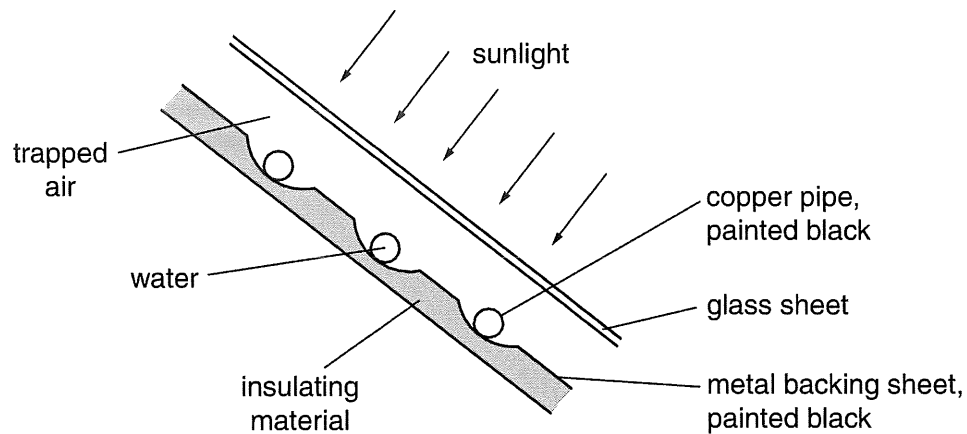


Fig. 4.1

A pump makes water circulate through the copper pipes. The water is heated by passing through the solar panel.

(a) Suggest why

(i) the pipes are made of copper,

.....
 [1]

(ii) the pipes and the metal backing sheet are painted black,

.....
 [1]

(iii) an insulating material is attached to the metal backing sheet,

.....
 [1]

(iv) the presence of the glass sheet increases the energy collected by the water.

.....
 [1]

- (b) During one day, 250 kg of water is pumped through the solar panel. The temperature of this water rises from 16 °C to 38 °C.

The water absorbs 25% of the energy falling on the solar panel, and the specific heat capacity of water is 4200 J/(kg °C).

Calculate the energy falling on the solar panel during that day.

energy = [4]

[Total: 8]

1

Leave blank

1. A student is asked to investigate the properties of three different cups. The cups are all of the same size and shape but made from different materials. These cups keep drinks hot for as long as possible.

She has the following apparatus.



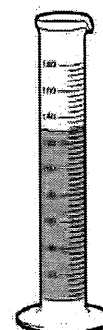
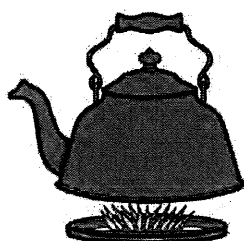
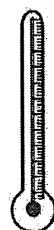
thin
metal



thin
plastic



thick
plastic



- (a) Describe how the student would use the apparatus to determine which cup keeps the liquid hottest.

.....

.....

.....

.....

.....

.....

.....

.....



Leave
blank

.....
.....
.....
.....
.....
.....

(8)

- (b) List two things that she should keep constant when comparing cups in this investigation.

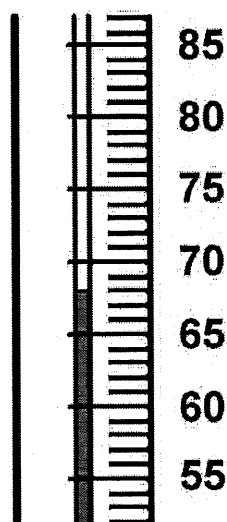
1

2

(2)

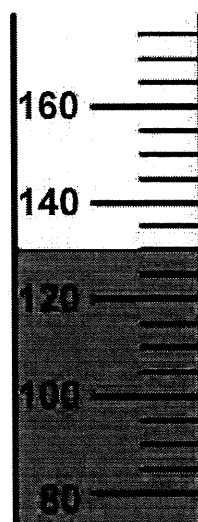
- (c) During the investigation she takes readings from the measuring cylinder and the thermometer.

Record her readings.



thermometer

..... °C



measuring cylinder

..... ml
(2)



Leave
blank

- (d) The student makes the following notes during the investigation with the three cups.

PLASTIC

32.46 °C after about half a minute

List four criticisms of her recording of data and experimental method.

- 1
- 2
- 3
- 4

(4)

Q1

(Total 16 marks)

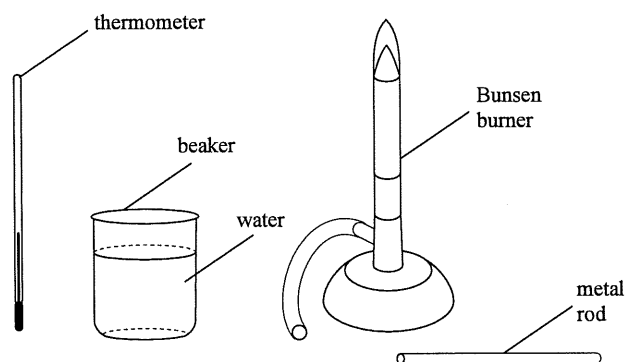




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blank

3. You are to investigate which is the hottest part of a Bunsen flame by heating a metal rod and then placing the rod into water.

(a) Describe how you would use the apparatus below to determine the hottest part of the flame.



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)



Leave
blank

- (b) List **four** things that you should keep constant when comparing the temperature of different parts of the flame.

- 1
- 2
- 3
- 4

(4)

- (c) Name an extra piece of apparatus that would make the investigation

- (i) more reliable

.....

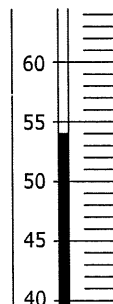
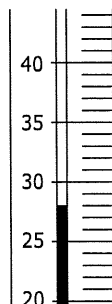
(1)

- (ii) safer

.....

(1)

- (d) During the investigation the following thermometer readings were observed. Record each reading and calculate the temperature difference.



.....

Temperature difference = °C

(2)

(Total 12 marks)

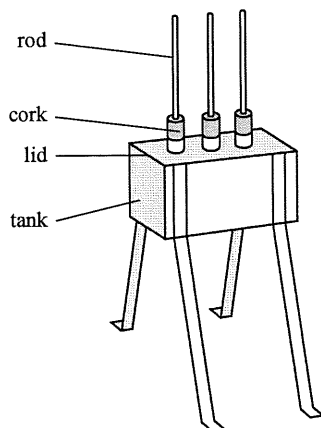
Q3



5

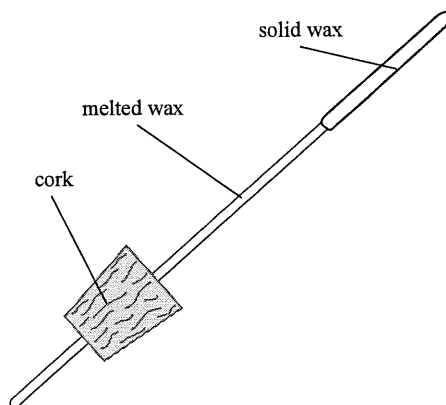
Leave blank

1. A student knows that some metals are better heat conductors than others. He investigates rods made of aluminium, brass, copper, iron, lead and zinc. The diagram shows the equipment which he uses to test three of the rods.



He fits the rods into corks and puts the corks into holes in the lid.
He covers each rod above its cork with wax which is solid at room temperature.
The student pours hot water into the tank and puts the lid on.
After 20 seconds, he measures the length of the melted wax on each rod.

- (a) Measure the length of melted wax above the cork in the following diagram.



Length = mm
(1)



Leave
blank

(b) Name the equipment the student needs to measure the time of 20 seconds.

.....
(1)

(c) (i) The rods are all the same length.

Give **two** other features of the rods and their arrangement which should be the same to make a fair comparison.

Feature 1

.....

Feature 2

.....

(2)

(ii) The student repeats the investigation for the other three rods.

Give **two** other features of this second investigation which should be the same as those in the first to make a fair comparison of all six metals.

Do **not** list any feature already referred to in (c)(i).

Feature 1

.....

Feature 2

.....

(2)



Leave
blank

- (d) The student's friend says that it is more reliable to take several readings rather than just one.

This is correct because any anomalous (or unexpected) readings are then easier to identify.

- (i) State how you can recognise an anomalous reading.

.....
.....

(1)

- (ii) State what you should do with an anomalous reading.

.....
.....

(1)



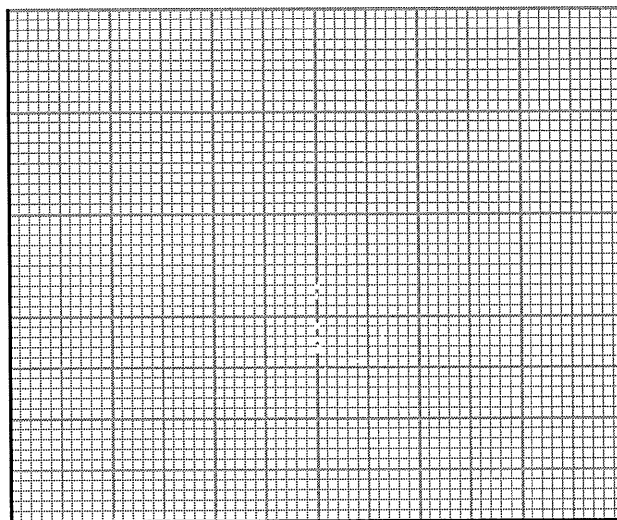
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(e) In a similar investigation a student collects the following data.

Metal	Length of melted wax in mm
aluminium	62
brass	28
copper	96
iron	25
lead	22
zinc	35

The teacher says that the student's data should be drawn as a bar chart (histogram).

(i) Use the student's data to draw a bar chart.



(3)



(ii) Explain why a line graph is wrong for the student's data.

.....

.....

.....

.....

(1)

(Total 12 marks)

Leave
blank

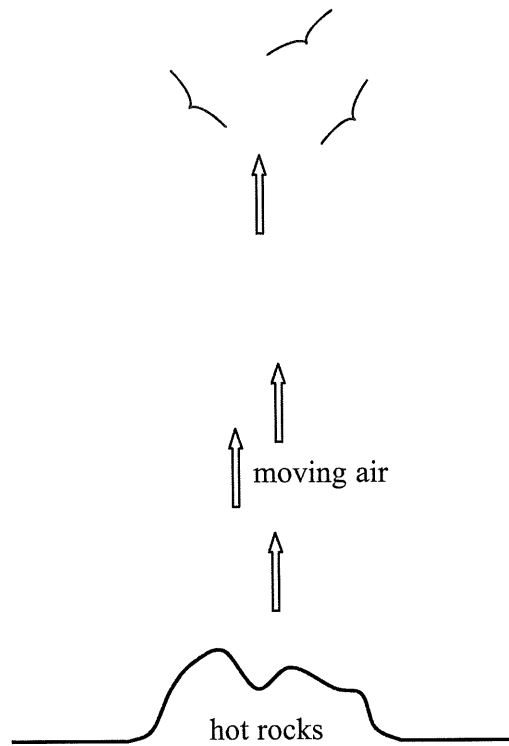
Q1



6

4 On sunny days, birds can use a column of moving air to help them rise.

The diagram shows one of these air columns rising from hot rocks.



Describe how the process of convection causes this air movement.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 4 = 3 marks)



4. (a) Electrical 1
Heat / thermal 1
Light 1
- (b) 3000(J) (2 marks)
 $E = P \times t$ (1 mark) Or $E = 100 \times 30$ (1 mark) 2
- (c) 5% (of output) (1 mark)
(is) light (1 mark) Or 150 J (1 mark)
Either '5% light' or '95% heat'
scores 2 marks 2

Total 7 marks

5. (a) A 1
- (b) 1.2 (kg / m³) (3 marks) 3
density = $\frac{\text{mass}}{\text{volume}}$ (1 mark) or $V = A \times h$
- (density) = $\frac{72}{60}$ (1 mark)
- (c) A No ecf 1
- (d) Conduction 1

Total 6 marks

6. (a) 10 minutes (2 marks) 2
20 minutes is two half lives
(1 mark)
- (b) Half-life is too short / decays
too quickly 1
- (c) • Rocks OR soil Any two
• Trees OR plants
• Air
• Cosmic rays
• Buildings
• People OR animals
• Sun 2

Total 5 marks

7. (a) Continuously 1
- (b) ON 1
Zero 1
OFF 1

Total 4 marks

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – May/June 2010	0625	31

- 3) 4 (a) matt black B1
- (b) (i) L down and R up, equal amounts (by eye) B1
- (ii) on black side or on left (more) energy / heat absorbed OR greater temp rise OR heats up quicker B1
- on black side or on left greater expansion of air / greater pressure of air B1 [4]
- 5 (a) energy / heat required to change state / phase / any example of change of state / phase M1
- with no change in temperature / at a specified temperature A1
- OR energy to break bonds between molecules / atoms M1
- with no change in K.E. A1
- (b) any time or range of time between 1.6 (min) and 14.0 (min) inclusive [no UP] B1
- (c) turns substance to gas / vapour OR causes evaporation OR escape from liquid C1
- energy to break bonds/separate molecules/overcome intermolecular forces A1
- Ignore move faster / PE increases
- (d) (i) $Pt / 2 \times 4 / 2000 \times 4 / 2 \times 240 / 2000 \times 240 / 8 / 8000 / 480 / 480000$ C1
480 000 J OR 480 kJ A1
- (ii) $(\theta =) 43 (^{\circ}\text{C})$ seen anywhere C1
 $Q = mc\theta$ OR $480000 = m \times 1760 \times 43$ in any form ecf. from (i) C1
6.34 kg or 6.3 kg ecf. A1 [10]
- 6 (a) (i) same / unchanged / nothing B1
- (ii) reduced / slows down B1
- (iii) reduced B1
- (b) $v = f\lambda$ in any form or in words [not numbers] B1
OR $f = 1/T$ in any form or in words [not numbers] C1
 $0.12 = f \times 0.08$ OR $T = 0.08 / 0.12$
1.5 Hz / cycles per sec / c.p.s. / per s
[only 2 marks if B1 mark above not scored] A1

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2010	0625	32

- 3 (a) (i) 120 Ncm OR 1.2 Nm B1
- (ii) 60 Ncm OR 0.6 Nm B1
- (iii) idea of CW moments = ACW moments C1
 $60 + 20F = 120$ OR $0.6 + 0.2F = 1.2$ e.c.f. C1
3.0 N OR 3 N e.c.f. A1
- (b) $1.2 \times 20 = 2.0 \times d$ OR $1.2 \times 0.2 = 2.0 \times d$ C1
 $(d =) 12$ OR 0.12 C1
18 c.a.o. OR special case (30 – his 12) correctly evaluated B1 A1

[Total: 8]

4

- (a) (i) good conductor (of heat) B1
(ignore electricity)
- (ii) black is good absorber/bad reflector B1
(ignore emitter)
- (iii) reduce heat lost/conducted away (from pipes/sheet) B1
NOT prevents heat loss o.w.t.t.e.
- (iv) air heated OR glass reduces/prevents convection
OR greenhouse effect OR reference to far and near I.R.
OR glass prevents warm air being blown away OR traps air B1
Ignore traps heat
- (b) $38 - 16$ OR 22 C1
 $mc\theta$ OR $250 \times 4200 \times \text{his } 22$ C1
 2.31×10^7 (J) e.c.f from previous line C1
 9.24×10^7 J OR e.c.f from previous line $\times 4$ correctly evaluated A1
No unit penalty if J seen anywhere in (b) clearly applied to an energy

[Total: 8]

- 5 (a) racing car + 1 correct reason M1
2nd correct reason A1
correct reasons:
• wider (car)
• lower (centre of mass/gravity) NOT wider tyre/surfaces o.w.t.t.e.
- (b) larger/wider tyres/area (of contact) ignore base area B1
- (c) F/A OR $9600/0.012$ OR $9600/0.048$ OR $9600/(4 \times 0.012)$
OR 800,000 C1
 2×10^5 Pa OR 200 000 Pa (accept N/m^2) c.a.o. A1

[Total: 5]

Paper 3

1. (a) Any eight points which must include the two marked *.
- Put water in kettle
 - *Heat water (priority mark)
 - Boil water
 - Use measuring cylinder
 - Water into cup
 - Check no water left in measuring cylinder
 - Put thermometer in cup of water
 - Note(initial) temperature of water
 - Start stopwatch
 - Note temperature at a later time (or note temperature after a certain time)
 - Stir (before taking readings)
 - *Repeat for other cups (priority mark)
 - A valid conclusion comment
- 8
- (b) Any two (1 mark each)
- amount/volume of water (in cup) {accept mass/weight of water (in cup)}
 - initial/start temperature
 - external/room temperature
 - surface on which the cup stands (as it cools)
 - position of cup
- 2
- (c) 68 (°C) (1 mark) Units not essential for these marks
130 (ml) (1 mark)
- 2
- (d) Any four (1 mark each)
- Which plastic - thick or thin
 - Thermometer cannot measure/ be read to this accuracy
 - Time is too vague/ not specified well enough
 - Starting temperature too low
 - No tabulation of data
 - Does it refer to a temperature or a temperature fall
- 4
- Total 16 marks**
2. (a) (i) Eight
- 1
- (ii) Either 0.160 (s) (2 marks)
Or (time =) 0.020×8
(1 mark) ecf from (i)
- 2
- (b) Dots evenly spaced Or words to that effect
- 1
- (c) In the range 103 - 105 (mm)
- 1
- (d) (i) Substitution of values from (a)(ii) and (c) For example
104 mm / 0.16 s
- Correct calculation = 650
Significant figures 2 significant figures
Appropriate unit mm/s
- 4

Question Number	Question		
2	(d)		
	Acceptable Answers	Reject	Mark
	(i) James (1) (ii) wavelength decreases with increase in change of direction (1) dop (iii) yes or no (1) reason (1) dop Notes (ii) varies inversely		(4)

Total 13 marks

Question Number	Question		
3	(a)		
	Acceptable Answers	Reject	Mark
	place rod in flame (1) place rod in water (1) note highest temperature of water / rise in temperature/ compare temperature readings (1) repeat for another part of flame (1)		(4)

Question Number	Question		
3	(b)		
	Acceptable Answers	Reject	Mark
	ANY FOUR amount of water in beaker (1) (initial) temperature of water (1) time of rod in flame (1) size of flame (1) same (metal) rod (1) Notes award if any seen in (a)		(4)

(E) cont.

Question Number	Question		
3	(c)		
	Acceptable Answers	Reject	Mark
	(i) lagging, stirrer, stopwatch, measuring cylinder (1)		
	(ii) gloves, pliers, tongs (1)		(2)

Question Number	Question		
3	(d)		
	Acceptable Answers	Reject	Mark
	54 - 28 (1) = 26 (1)		(2)

Total 12 marks

Question Number	Question		
4	(a)		
	Acceptable Answers	Reject	Mark
	(i) <i>correct connection of :</i> power supply to form any complete circuit (1) ammeter in series (1) variable resistor in series (1) both rods connected (1) <i>using correct symbols</i>		
	(ii) arrows from + of power supply (1) arrows consistent throughout in circuit containing both rods (1) Notes ecf from first mark		
	(iii) attract because currents in same direction (1) or not attract because currents in opposite directions		(7)

2

Question Number	Acceptable Answers	Extra Information	Mark
1(a)	44-45 (mm)		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(b)	stopwatch /stop clock / chronometer /timer		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(c)(i)	same length of rod in the water/air same thickness/radius/diameter / width	allow 'cork in the same position (on rod)' dna features that should be constant e.g. same water temperature, time, wax	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
1(c)(ii)	<i>ANY TWO</i> <ul style="list-style-type: none"> • same (starting) temperature of the (hot) water • same room temperature • same volume/mass of (hot) <u>water</u> (in the tank) • same time (20 s) • same type of wax (same melting point) 	allow any feature(s) not already given credit allow 'tank filled to the same level' dna allow 'same amount of wax'	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
1(d)(i)	does not fit the pattern (of the other results)	allow 'is not similar to the other results'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(d)(ii)	ignore it/do not use it to calculate the average	allow 'repeat (that part of) the experiment'	
			(1)

(F) cont.

Question Number	Acceptable Answers	Extra Information	Mark
1(e)(i)	axes both labelled with unit		1
	all data correctly transposed from the table	allow vertical axis not starting from zero	1
	all columns the same width (up to and including 20 mm wide)		1
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
1(e)(ii)	<p><i>ANY ONE</i></p> <ul style="list-style-type: none"> • for a line graph both variables should be continuous • the names (of the metals are not continuous they) are categoric • only one quantity has a value/number • the points on the line (between data points) are meaningless • the slope (of the line(s)) is meaningless 		
			(1)

6

Question number	Answer	Accept	Reject	Marks
4	Any three of: the air is warmed / heated (by the hot rocks); air expands / molecules move apart; air becomes less dense; <u>hot</u> air rises; cooler air (from sides) displaces warm air; (at height) air cools / contracts / becomes more dense; cooled air falls; process is repeated;	Correct points in any order Same ideas expressed in different words Same ideas expressed in <u>labelled</u> additions to the diagram "It" for air		3
			Total	3