Temperature

Question Paper

Level	O Level
Subject	Physics
Exam Board	Cambridge International Examinations
Unit	Energy & Thermal Physics
Topic	Temperature
Booklet	Question Paper

Time Allowed: **32 minutes**

Score: **/27**

Percentage: **/100**

Grade Boundaries:

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1 Why is there a constriction in a clinical thermometer?

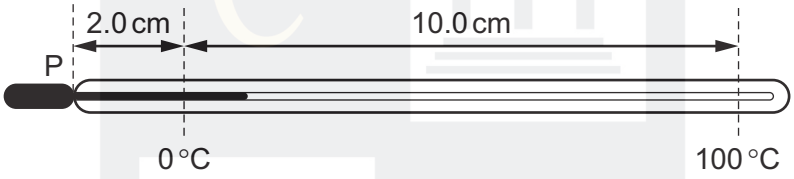
A to give the thermometer a smaller temperature range

B to make the thermometer more sensitive

C to prevent the mercury breaking the bulb when it expands

D to stop the mercury from going back to the bulb

2 In a liquid-in-glass thermometer, the liquid column is 2.0 cm long at 0 °C and it expands 10.0 cm when heated to 100 °C.



Measuring from P, how long is the liquid column at 30 °C?

A 2.3 cm **B** 3.0 cm **C** 5.0 cm **D** 7.0 cm

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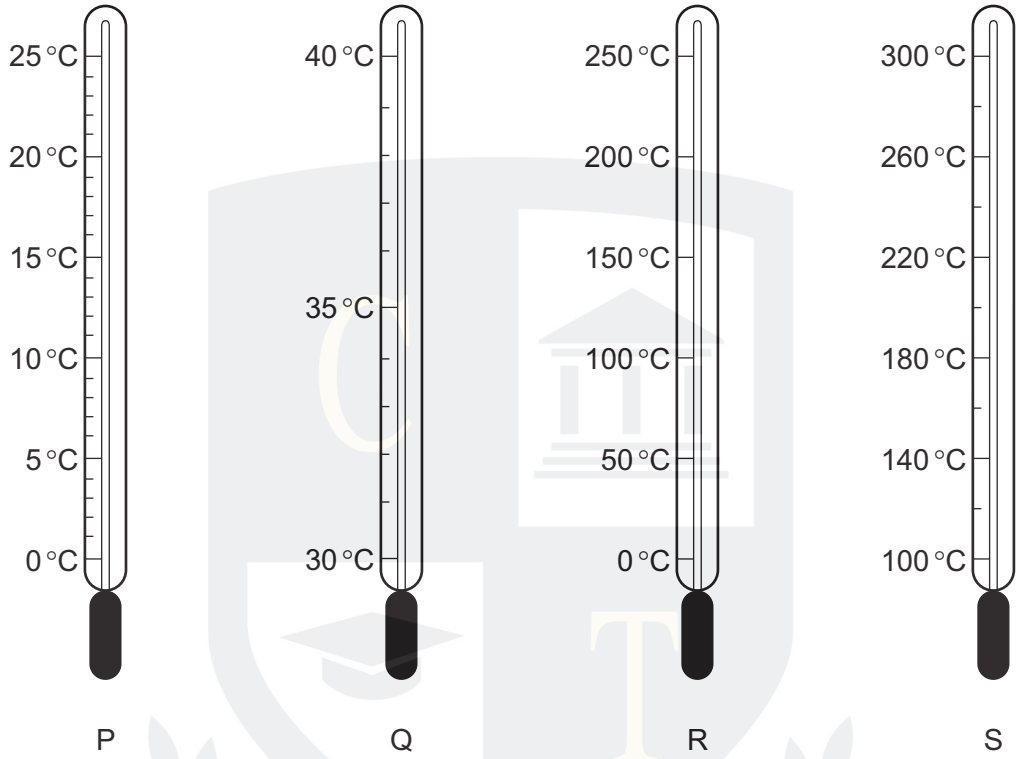
3 The diagrams represent four thermometers.



Which thermometer has the greatest sensitivity and which thermometer has the greatest range?

	greatest sensitivity	greatest range
A	P	R
B	P	S
C	Q	R
D	Q	S

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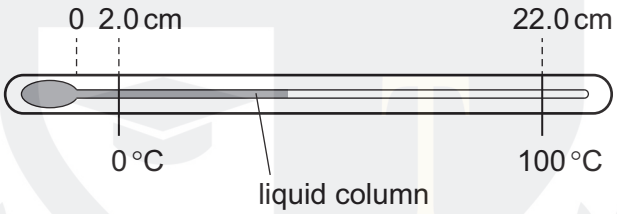
4 Which type of thermometer is used for measuring temperatures above 1000 °C and which type is used for measuring temperatures that change rapidly?

	measures temperatures above 1000 °C	measures temperatures that change rapidly
A	liquid-in-glass	liquid-in-glass
B	liquid-in-glass	thermocouple
C	thermocouple	liquid-in-glass
D	thermocouple	thermocouple

5 The diagram shows a liquid-in-glass thermometer.



At 0 °C, the length of the liquid column is 2.0 cm. At 100 °C, the length of the liquid column is 22.0 cm.

What is the length of the liquid column at 40 °C?

A 6.0 cm **B** 8.0 cm **C** 8.8 cm **D** 10.0 cm

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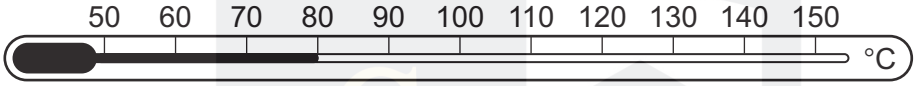
6 A thermometer is used to measure a temperature of 80 °C.

Which thermometer is the most sensitive?

A

B



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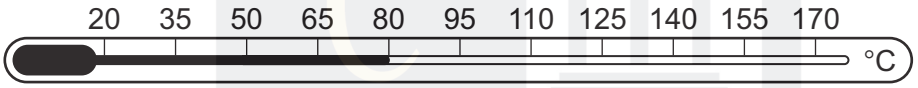

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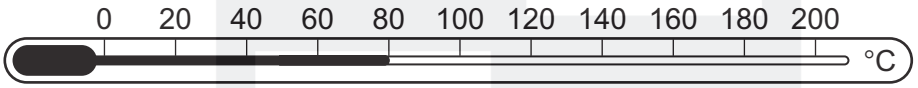
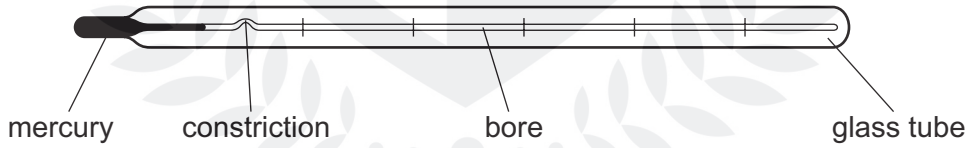


7 The diagram shows a clinical thermometer.



Which factor affects the sensitivity of the thermometer?

A the constriction

B the diameter of the bore

C the length of the glass tube

D the thickness of the glass tube

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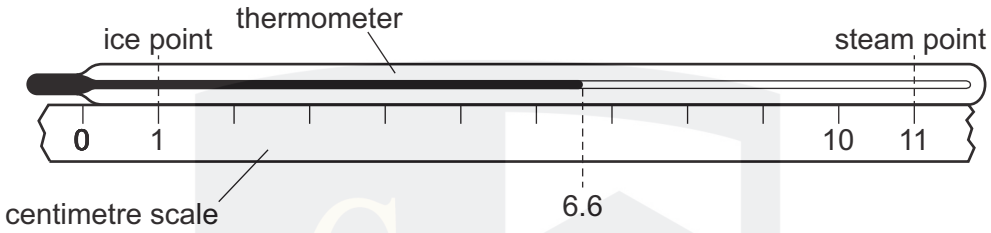
8 A centimetre scale is fixed next to an unmarked mercury-in-glass thermometer.

The ice point and the steam point are marked.



What is the temperature shown on the thermometer?

A 44 °C **B** 56 °C **C** 60 °C **D** 66 °C

9 A liquid-in-glass thermometer contains mercury.

Which physical property of the mercury varies with temperature, enabling the thermometer to operate?

A mass

B melting point

C resistance

D volume

10 The temperature shown by a mercury-in-glass thermometer increases.

Which of the following is constant?

A the density of the mercury

B the internal energy of the mercury

C the mass of the mercury

D the volume of the mercury

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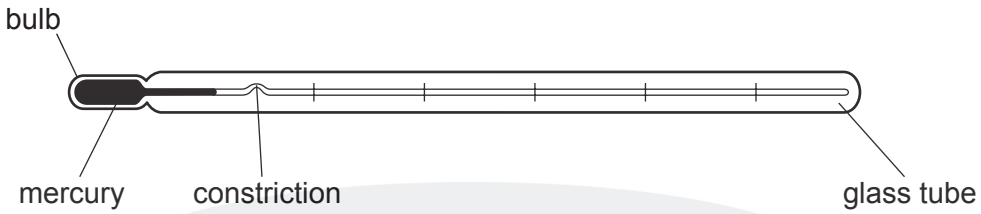
11 The diagram shows a clinical thermometer.



Which factor affects the sensitivity of the thermometer?

A the constriction

B the length of the glass tube

C the thickness of the glass in the wall of the bulb

D the volume of mercury in the thermometer

12 The length of mercury in the bore of a thermometer is 5.0 cm at 0 °C and 11.0 cm at 60 °C.

What is the length in the bore when the temperature is –10 °C?

A 1.0 cm **B** 4.0 cm **C** 6.0 cm **D** 10.0 cm

13 Many gas appliances such as ovens and heaters use a small flame to ignite the main burner.

To make sure that the small flame is burning, a temperature-measuring device is inserted into the flame.

What is the most suitable device to use?

A a clinical thermometer

B a mercury manometer

C a thermocouple thermometer

D a water manometer

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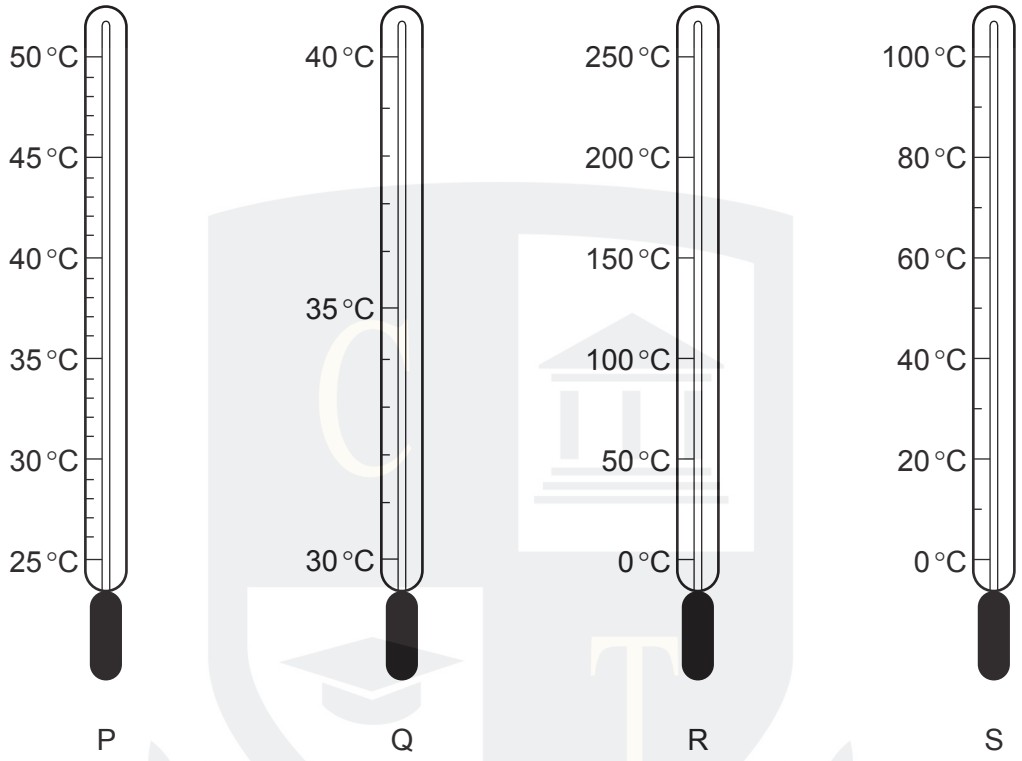
14 The diagram shows four thermometers.



Which thermometer has the greatest sensitivity and which thermometer has the greatest range?

	greatest sensitivity	greatest range
A	P	R
B	P	S
C	Q	R
D	Q	S

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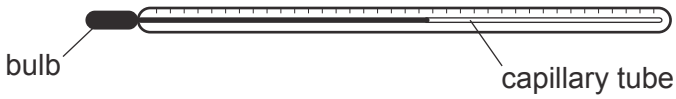
15 A liquid-in-glass thermometer consists of a bulb containing a liquid which expands into a very thin capillary tube.



The liquid in the thermometer is replaced by the same volume of a different liquid that expands more for the same temperature rise.

The new thermometer will have

A greater sensitivity and a greater range.

B greater sensitivity but a smaller range.

C the same sensitivity and the same range.

D the same sensitivity but a greater range.

16 A certain liquid is used in a liquid-in-glass thermometer. It does not expand uniformly with temperature.

What effect will this have on the scale of the thermometer?

A It will be non-linear.

B It will have a small range.

C The markings will be close together.

D The markings will be far apart.

17 What makes a clinical thermometer suitable for measuring small changes in body temperature?

A The amount of mercury in the bulb is small.

B The bore of the capillary tube is narrow.

C The capillary tube is long.

D The glass bulb has a thin wall.

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18 What makes a liquid-in-glass thermometer sensitive to a small change of temperature?

A a bulb with a thin glass wall

B a shiny liquid in its bore

C a stem with a thick glass wall

D a very narrow bore

19 To calibrate a thermometer, without using another thermometer, fixed points are required.

Which statement is correct?

A Any temperatures can be used as fixed points.

B Both a lower fixed point and an upper fixed point are required.

C Only a lower fixed point is required.

D Only an upper fixed point is required.

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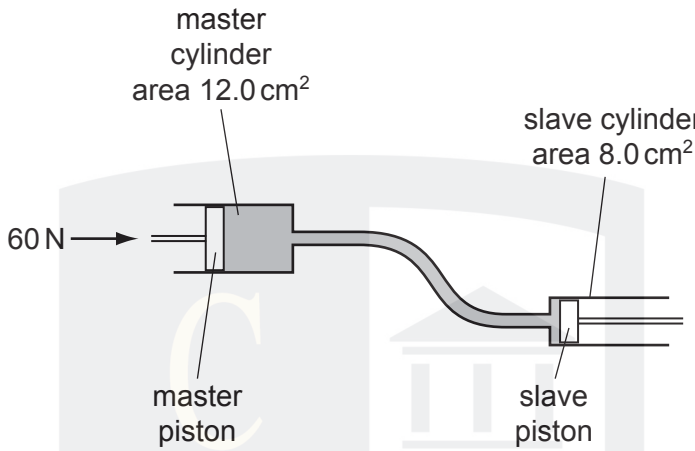
20 The diagram shows the principle of an hydraulic system.



The cross-sectional area of the master cylinder is 12.0 cm^2 and the cross-sectional area of the slave cylinder is 8.0 cm^2. The force applied to the master piston is 60 N, producing a pressure of 5.0 N/cm^2.

Which line in the table is correct?

	pressure at slave cylinder / N/cm^2	force at slave cylinder / N
A	3.3	40
B	3.3	90
C	5.0	40
D	5.0	90

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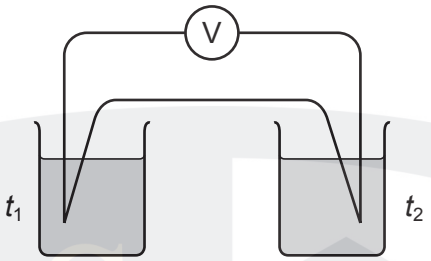
21 A thermocouple thermometer uses a voltmeter to measure the e.m.f. generated between two junctions. The junctions are at temperatures t_1 and t_2. To calibrate the thermometer, fixed points are needed.



What are the values of t_1 and t_2 when the thermometer is calibrated at the steam point?

	t_1	t_2
A	0 °C	0 °C
B	0 °C	100 °C
C	25 °C	0 °C
D	25 °C	125 °C

22 Which instrument is most suitable for measuring a rapidly changing temperature?

A alcohol-in-glass thermometer

B clinical thermometer

C mercury-in-glass thermometer

D thermocouple

23 Which thermometer is the best for measuring rapidly-changing temperatures?

A a clinical thermometer

B a liquid-in-glass thermometer

C a thermocouple

D all thermometers are equally good

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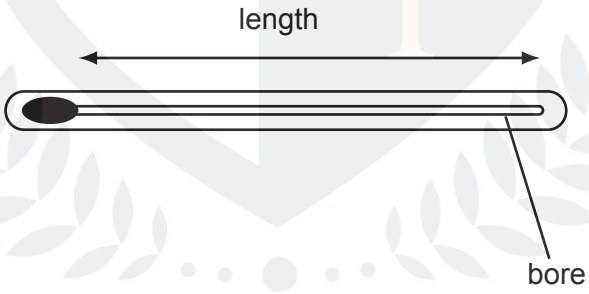
24 The sensitivity of a liquid-in-glass thermometer depends on the volume of liquid used and the diameter of the bore of the thermometer.

Which changes will produce the greatest increase in sensitivity?

	volume of liquid	bore diameter
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

25 Four mercury-in-glass thermometers are made with different dimensions.



Which will have the greatest sensitivity?

A 10 cm long and bore 0.75 mm wide

B 15 cm long and bore 0.50 mm wide

C 25 cm long and bore 0.10 mm wide

D 30 cm long and bore 0.25 mm wide

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26 A new liquid is tested to decide whether it is suitable for use in a liquid-in-glass thermometer.

It is found that the liquid does not expand uniformly with temperature.

What will be the effect of this on the scale of the thermometer?

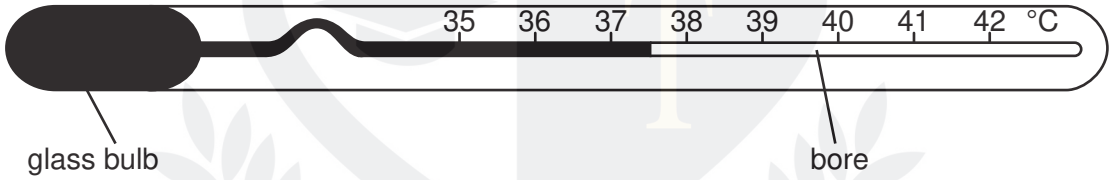
A It has a short range.

B It is not linear.

C The markings are too close together.

D The markings are too far apart.

27 A clinical thermometer is designed to respond quickly to a change in temperature and to have a high sensitivity.



Which design features should the clinical thermometer have?

	bulb	bore
A	thick glass	narrow
B	thick glass	wide
C	thin glass	narrow
D	thin glass	wide

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