

YEAR 2 | MODULE 5 | PACK 01

Temperature, matter and internal energy

Official past-paper questions

2017-2023 | OCR A H556 | 5.1.1; 5.1.2

20 marks | 6 question entries

One practice session

Use: attempt the session after learning its content. Try without notes; record any help used. Mark the session, identify the reason for lost marks, then revisit those questions after a few days.

Format: all MCQs appear first with their complete answer boxes. Written extracts retain the original paper's answer space. Only the subparts named in the source reference are assigned.

Reserved: all 2024 and 2025 papers are excluded. These files contain official examination questions only; no sample, specimen or practice papers.

Name: _____

First attempt: _____ Score: _____ / 20

[Official data, formulae and relationships booklet](#)

Question index

TP identifiers are stable across the question packs and mark schemes; Q numbers refer to this pack.

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Q01 | TP05

1 mark

June 2019 | H556/01 | Q9

- 9 A solid molecular substance is supplied with energy and it starts to melt.

Which of the following pairs of quantities remains the same as the substance melts?

- A Kinetic energy of molecules and internal energy of molecules.
- B Potential energy of molecules and internal energy of molecules.
- C Kinetic energy of molecules and temperature of substance.
- D Potential energy of molecules and temperature of substance.

Your answer

[1]

Q02 | TP12

1 mark

June 2023 | H556/01 | Q9

- 9 During cold weather salt is spread on roads causing ice to melt without changing its temperature.

Which statement correctly describes the energy of the water particles during this process?

- A Potential and kinetic energies increase
- B No energy changes occur
- C Only kinetic energy increases
- D Only potential energy increases

Your answer

[1]

Q03 | TP18A

2 marks

June 2017 | H556/01 | Q17(a)

- 17 A group of students are conducting an experiment in the laboratory to determine the value of absolute zero by heating a fixed mass of gas. The volume of the gas is kept constant. Fig. 17.1 shows the arrangement used by the students.

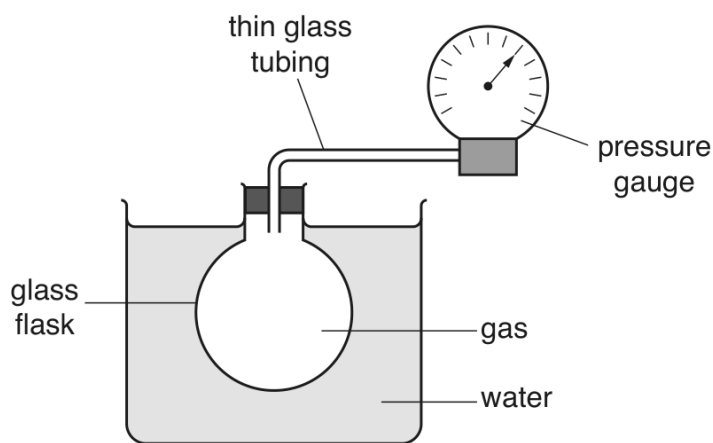


Fig. 17.1

The gas is heated using a water bath. The temperature θ of the water is increased from 5°C to 70°C . The temperature of the water bath is assumed to be the same as the temperature of the gas. The pressure p of the gas is measured using a pressure gauge.

- (a) Describe and explain how the students may have made accurate measurements of the temperature θ .

.....

.....

..... [2]

Only (a) is assigned. The original apparatus and temperature description are retained.

Q04 | TP20

5 marks

June 2017 | H556/01 | Q22

22 (a) Define the *internal energy* of a substance.

..... [1]

(b) A block of paraffin wax is melting at a constant temperature of 52°C . Use the behaviour of paraffin molecules to describe and explain the changes to the internal energy of the molecules of the paraffin wax as it melts.

[4]

Q05 | TP24AC

5 marks

June 2019 | H556/01 | Q21(a), (c)

- 21 A substance can exist as a crystalline solid, a liquid or a gas.
A solid sample of the substance is placed in a sealed container and heated at a constant rate until it changes into a gas.

Fig. 21 shows the variation with time t of the temperature θ for the substance.

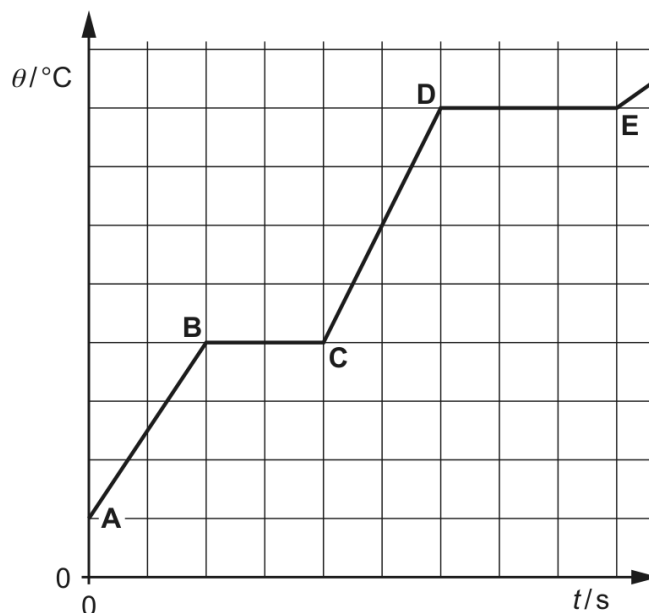


Fig. 21

- (a) Use the kinetic theory of matter to describe the solid phase (section **AB**) and the liquid phase (section **CD**) in terms of the motion and arrangement of the molecules of the substance.

Section **AB**:

.....

.....

.....

.....

.....

Section **CD**:

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.....

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.....

.....

[4]

Only (a) and (c) are assigned. Keep the original heating-curve context.

Q05 | TP24AC - continued

5 marks

June 2019 | H556/01 | Q21(a), (c)

(c) State what is meant by the **internal energy** of the substance.

.....

.....

..... [1]

Only (a) and (c) are assigned. Keep the original heating-curve context.

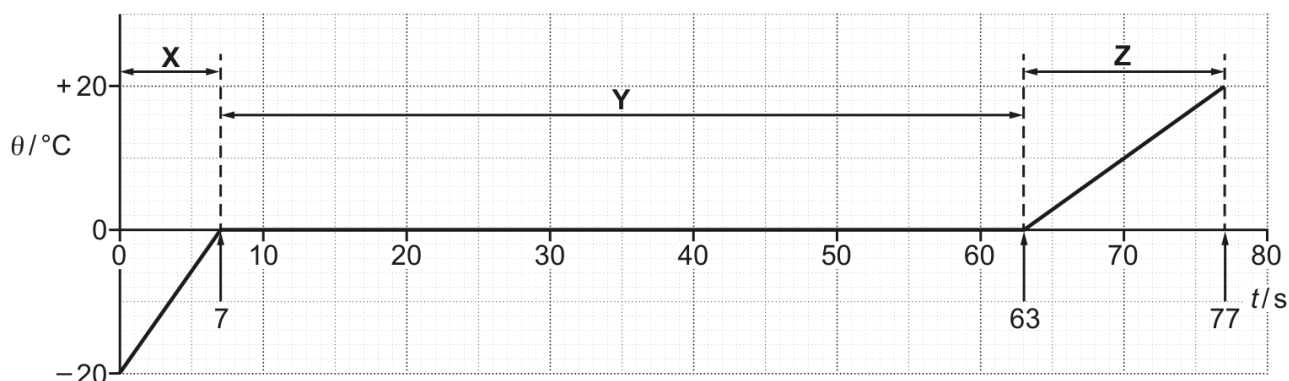
Q06 | TP30B

6 marks

November 2021 | H556/01 | Q18(b)

- 18** A 150 W heater is used to heat 25 g of ice in a sealed and well-insulated container. The initial temperature of the ice is -20°C .

The graph shows the variation of temperature θ with time t as the ice is heated.



There are three distinct regions of the graph, **X**, **Y** and **Z**.

- (b) (i)** Describe the motions of the molecules in region **X** and in region **Z**.

.....

.....

.....

..... [2]

- (ii)** The internal energy of the ice increases from $t = 0$ to $t = 77$ s.
Complete the table below using the following key for the physical quantities:

- K = kinetic energy of molecules
- P = potential energy of molecules.

Region	Physical quantity, or quantities, that increases as time increases	Physical quantity, or quantities, that remain constant as time increases
X		
Y		
Z		

[3]

- (iii)** State the temperature of the ice at which its molecules have zero kinetic energy.

..... [1]

Only (b)(i)-(iii) are assigned; the original heating graph is retained.