

O Level Pure Physics MCQs

Thermal Properties of Matter Test 3.0

Q1

Which quantity gives the *thermal capacity* of a solid object?

- A the energy lost by radiation from the object in 1.0 s
- B the energy needed to melt the object
- C the energy needed to raise the temperature of the object by 1.0 °C
- D the total amount of thermal energy in the object

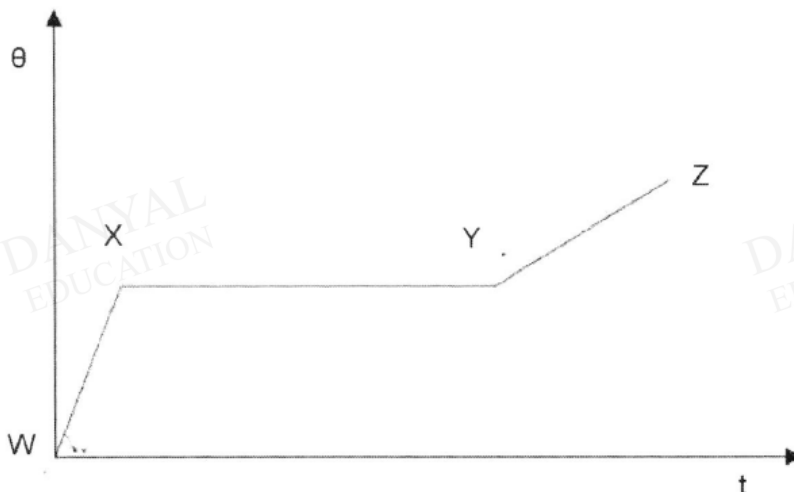
Q2

Which of the following correctly shows the changes, if any, in the potential energy and in the kinetic energy of the molecules of a solid as it melts?

	Potential Energy	Chemical Energy
A	decrease	increase
B	increase	stay the same
C	stay the same	decrease
D	stay the same	stay the same

Q3

A substance is heated at a constant rate. The sketch graph shows the variation with time t of the temperature θ of the substance.

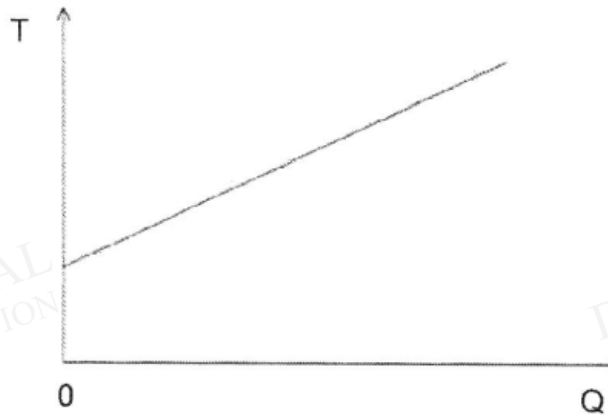


In which region or regions of the graph must there be more than one state of the substance present?

- A WX and YZ
- B WX only
- C WX, XY and YZ
- D XY only

Q4

The specific heat capacity c of a solid block of mass m is determined by heating the block and measuring its temperature. The graph below shows the variation of the temperature T of the block with the thermal energy Q transferred to the block.



What does the gradient of the line represent?

- A $\frac{c}{m}$
- B $\frac{m}{c}$
- C mc
- D $\frac{1}{mc}$

Q5

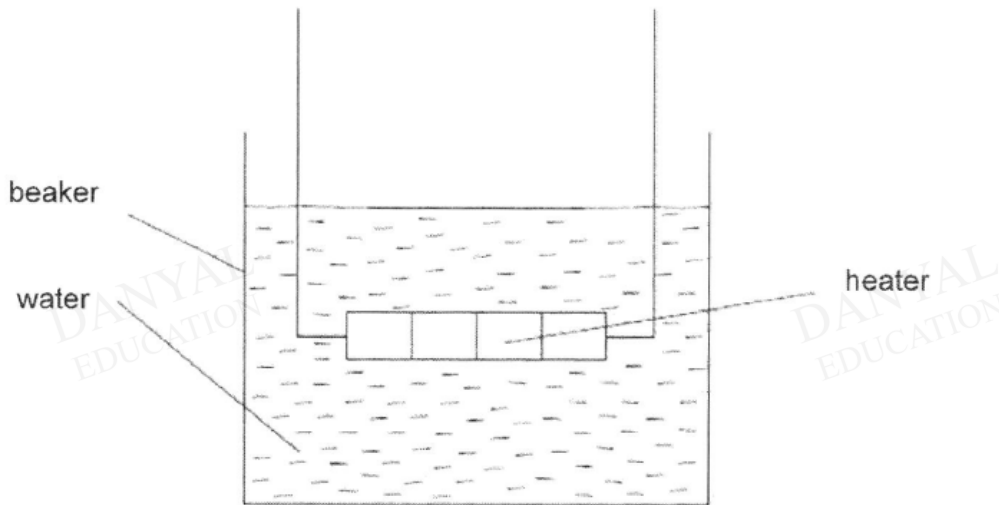
Blowing across the surface of a bowl of hot soup will cause the soup to cool faster.

Which of the following statements is the correct explanation?

- A Moving air is a better conductor of heat than still air.
- B Convection currents cannot be set up without blowing.
- C Blowing across the surface of the soup increases the rate of evaporation, hence more thermal energy will be lost from the soup.
- D Blowing across the surface of the soup increases the surface area of the soup, hence more thermal energy will be lost through radiation.

Q6

As part of an experiment to determine the latent heat of vaporisation of water, a student boils some water in a beaker using an electric heater as shown below.



The student notes two sources of error.

Error 1: thermal energy is lost from the sides of the beaker

Error 2: as the water is boiling, water splashes out of the beaker

Which of the following gives the correct effects of these two errors on the calculated value for the specific latent heat?

	Error 1	Error 2
A	increase	decrease
B	increase	stay the same
C	decrease	increase
D	decrease	stay the same

Q7

An ice machine removes heat at a rate of 3000 W.

The specific heat capacity of water is $4.2 \times 10^3 \text{ J / kg } ^\circ\text{C}$ and the specific latent heat of fusion of ice is $3.4 \times 10^5 \text{ J / kg}$.

What is the time needed to freeze 2.5 kg of water at $30 \text{ }^\circ\text{C}$?

A 280 s

B 300 s

C 390 s

D 8600 s

Q8

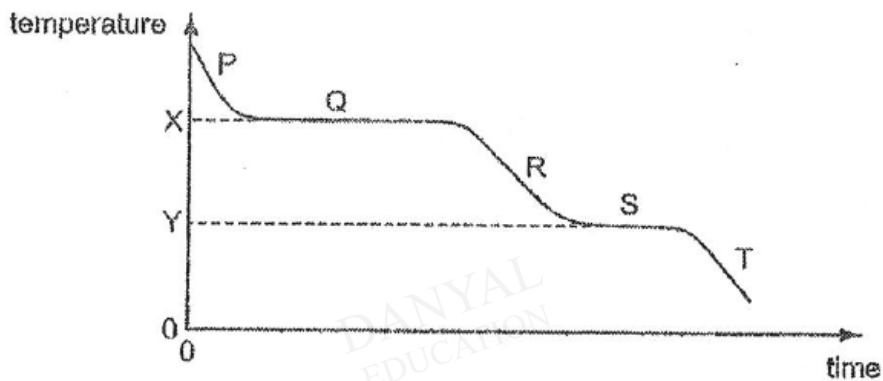
The bulb of a thermometer is wrapped in a tube of cotton fabric. The fabric is dipped into a cup containing water at room temperature and left for some time. The thermometer wrapped in wet fabric is then removed from the cup and evaporation takes place.

What happens to the thermometer reading?

- A It falls.
- B It remains unchanged.
- C It rises.
- D It rises and then falls.

Q9

A gas in a container is at high temperature and loses thermal energy to its surroundings. The graph shows how its temperature varies with time.



Which feature of the graph indicates that the specific latent of vaporisation of the substance is greater than its specific latent heat of fusion?

- A The gradient of the graph at P is greater than the gradient of the gradient at R.
- B The gradient of the graph at T is greater than the gradient of the gradient at R.
- C The length of the line Q is greater than the length of the line S.
- D The value of X is greater than the value of Y.

Q10

An electric kettle contains 500 g of water at 15 °C. The heating element of the kettle is rated at 2.2 kW and the specific heat capacity of water is 4200 J/kg °C.

Assuming there is no heat loss, calculate the minimum time it takes to raise the temperature of the water to 100 °C.

- A 22 s
- B 81 s
- C 95 s
- D 81 000 s

Answers

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Q1 C

Q2 B

Q3 D

Q4 D

Q5 C

Q6 A

Q7 C

Q8 A

Q9 C

Q10 B

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