Oxford Cambridge and RSA

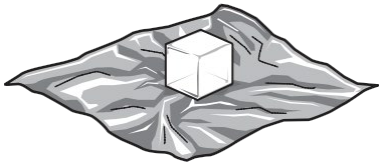
GCSE Physics B (Twenty First Century Science)

J259/03 Depth in physics (Higher Tier)

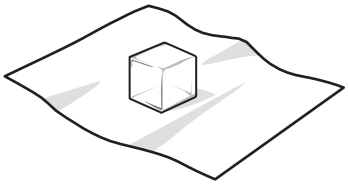
Question Set 14

1 Amir investigates melting ice.

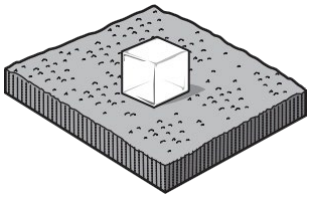
He puts ice cubes on different materials. He then measures the time taken for each ice cube to completely melt.



Metal foil



Paper



Carpet

Amir's results are shown in the table.

Material	Time (min)
Metal foil	86
Paper	105
Carpet	162

(a) Calculate the thermal energy needed to melt 20 g of ice.

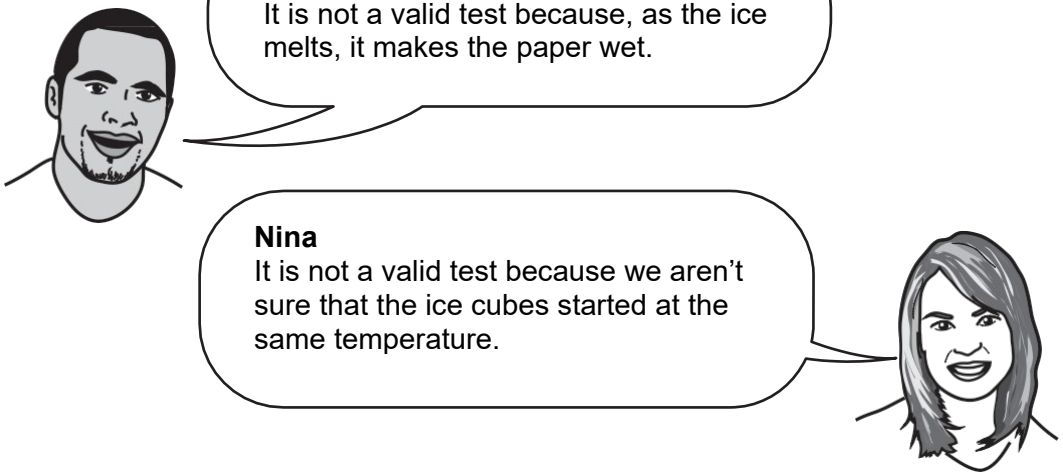
The specific latent heat of melting for ice is 334 000 J / kg.

Thermal energy = ...J **[3]**

(b) Explain why the ice cubes take different times to melt on different materials.

[2]

(c) Amir discusses the experiment with Nina, another student.



(i) Suggest improvements to the experiment to solve each of these problems.

[2]

(ii) Amir wants to speed up the experiment so it can be repeated more quickly.

Suggest **one** way he can change the experiment so that the ice melts more quickly, without making the experiment invalid.

[1]

Total Marks for Question Set 14: 8

Resource Materials

Equations in Physics

change in internal energy = mass × specific heat capacity × change in temperature

energy to cause a change in state = mass × specific latent heat

for gases: pressure × volume = constant
(for a given mass of gas and at a constant temperature)

$(\text{final speed})^2 - (\text{initial speed})^2 = 2 \times \text{acceleration} \times \text{distance}$

energy stored in a stretched spring = ½ × spring constant × $(\text{extension})^2$

potential difference across primary coil × current in primary coil =
potential difference across secondary coil × current in secondary coil

Higher tier only –

pressure due to a column of liquid = height of column × density of liquid × g

force = magnetic flux density × current × length of conductor

potential difference across primary coil ÷ potential difference across secondary coil = number of turns in primary coil ÷ number of turns in secondary coil

change in momentum = resultant force × time for which it acts