

Name:

Class:



An ice cube of unknown mass has a temperature of $-15.0\text{ }^{\circ}\text{C}$.

- i. Write down the equation linking energy, mass, specific heat capacity, and temperature change.

$$E = m \times c \times \Delta\theta \quad \text{or}$$

change in thermal energy = mass $\times$ specific heat capacity $\times$ temperature change

- ii. Write down the equation linking energy, mass, and specific latent heat.

$$E = mL \quad \text{or} \quad \text{Thermal energy for a change of state} = \text{mass} \times \text{specific latent heat}$$

- iii. The total thermal energy needed to raise the temperature of this ice cube to $0.0\text{ }^{\circ}\text{C}$ and completely melt it is 5848 J. Using the constants below, calculate the mass of the ice cube. Specific heat capacity of ice = $2100\text{ J/kg }^{\circ}\text{C}$

Specific latent heat of fusion of ice = $334\,000\text{ J/kg}$

$$\Delta\theta = 15\text{ }^{\circ}\text{C}$$

$$5848 = m(365500)$$

$$\text{Energy to heat} = m \times 2100 \times 15$$

$$\text{Energy to melt} = m \times 334000$$

$$5848 = m(31500 + 334000)$$

$$m = \frac{5848}{365500}$$

$$\text{Mass} = 0.016\text{ (kg)}$$

A mass of 20 kg is held stationary by a rope passing over a frictionless pulley.

What is the tension (T) in the rope?

$$\text{Weight} = \text{mass} \times \text{gravity}$$

$$\text{Weight} = 20 \times 9.81$$

$$T = 196.2\text{ N}$$

Three ammeters X, Y and Z show the current in different parts of the circuit.

What are the readings at Y and Z?

$$Y = 4\text{ A} \quad Z = 4\text{ A}$$

The diagrams show four solid blocks with their dimensions and masses.

Which block has the greatest density?

