OCR
Oxford Cambridge and RSA

GCSE Physics B (Twenty First Century Science)

J259/01 Breadth in Physics (Foundation Tier)

Question Set 23

1 Ali uses a hot water bottle to keep warm.

(a) He uses a kettle to heat 1.1 kg of water from 20 °C to 90 °C. Ali then pours the hot water into the hot water bottle.

The specific heat capacity of water is 4200 J / kg / °C.

Calculate the change in internal energy in heating the water.

Use the equation:
change in internal energy = mass × specific heat capacity × change in temperature

Give your answer to **2** significant figures.

$E = mc\Delta T = 1.1 \times 4200 \times (90-20)$
$= 32340\,J$
$= 320{,}000\,J$ (2 s.f.)

Change in internal energy = ... 320,000 ..... J **[3]**

(b) The kettle transfers energy electrically.

The resistance of the kettle is 20 Ω.

The electric current in the kettle is 11 A.

Calculate the power of the kettle.

$P = I^2R = 11^2 \times 20 = 2420\,W$

Power = ... 2420 ..... W **[3]**

(c) Ali decides to use a heat pack instead of a hot water bottle.

A heat pack is a bag containing seeds, such as rice or wheat. It is heated in a microwave oven.

heat pack

Ali has two heat packs, one containing rice, and one containing wheat. He wants to investigate which heat pack will stay warm for longer.

(i) Suggest **two** pieces of measuring apparatus he will need to use in his investigation. **[2]**

Thermometer, stopwatch

(ii) Suggest **one** control variable for Ali's investigation. **[1]**

Mass of heatpack.

Total Marks for Question Set 23: 9