

Free-Standing Mathematics Qualification
June 2006
Intermediate Level



USING ALGEBRA, FUNCTIONS AND GRAPHS 6988/2PM
Unit 8

PRELIMINARY MATERIAL

DATA SHEET

To be issued to candidates between Wednesday 3 May 2006 and Wednesday 10 May 2006

REMINDER TO CANDIDATES

**YOU MUST NOT BRING THIS DATA SHEET
WITH YOU WHEN YOU SIT THE EXAMINATION.
A CLEAN COPY WILL BE MADE AVAILABLE.**

Halley's Comet

One Astronomical Unit is equal to 1.496×10^{11} metres.

When Halley's Comet is at its maximum distance from the Earth, it is 35 Astronomical Units away.

Light travels at 2.998×10^8 metres per second.

Greenhouse heaters

A company designs and makes greenhouse heaters.

The cost, £ P , of making n greenhouse heaters is given by the formula $P = c + dn$, where c and d are constants.

The cost of making 1000 greenhouse heaters is £24 000.

Wind chill

When the weather is cold, strong winds make it feel even colder. This is known as the wind-chill factor.

An approximate formula for calculating the effective temperature, e ° Celsius, from the actual temperature, a ° Celsius, when the wind speed is w km per hour is

$$e = (1.1 + 0.02w)a - (3 + 0.6w)$$

For example, if the wind speed is 10 km per hour, the simplified formula will be

$$e = 1.3a - 9$$

Rockets

Rockets can be made to reach different maximum vertical heights.

At a firework display, a rocket is fired vertically upwards.

Its vertical height, h metres, is given by the equation $h = 20t - 5t^2$, where t is the time in seconds after firing.

The solutions of $at^2 + bt + c = 0$, where $a \neq 0$, are given by $t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Trays

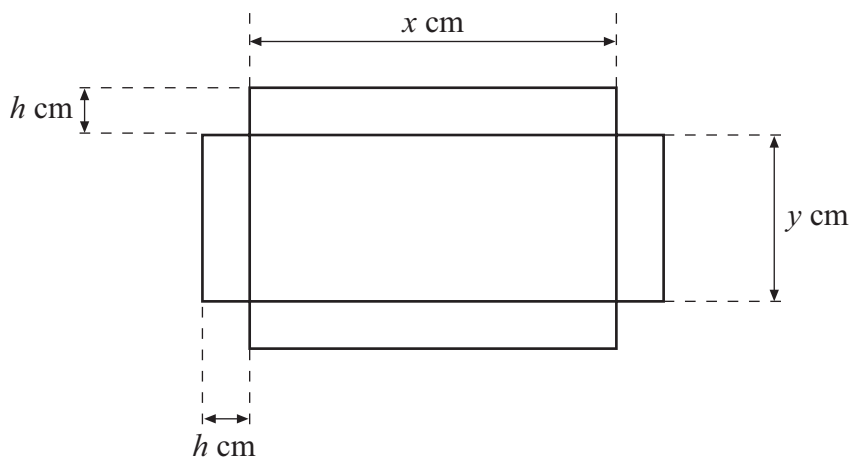
A student makes a tray, in the shape of a cuboid, from thin sheet metal.

The volume of a cuboid = width $\times$ length $\times$ height.

The net of the tray is shown in the diagram below.

The base of the tray is a rectangle x cm long and y cm wide.

The tray is h cm deep.



END OF DATA SHEET

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