

Free-Standing Mathematics Qualification  
June 2008  
Intermediate Level



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

**PRELIMINARY MATERIAL**

**DATA SHEET**

**To be issued to candidates between Tuesday 29 April 2008  
and Tuesday 6 May 2008**

**REMINDER TO CANDIDATES**

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

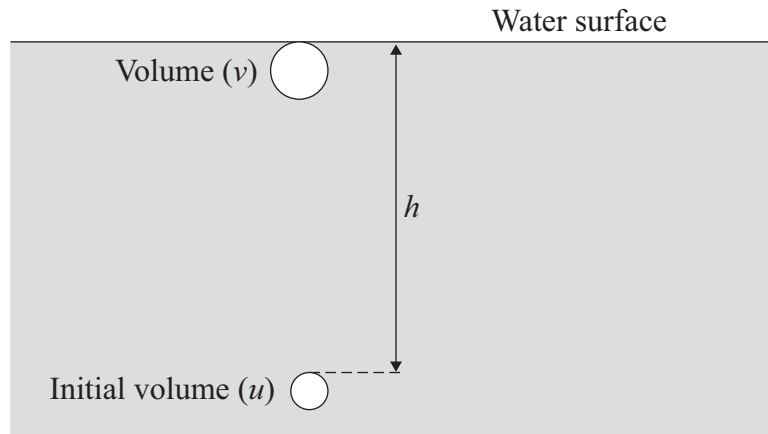
**Volcanoes**

A news report read as follows:

‘Activity resumed at Mount Etna in Italy on 15th July 2006. A fracture opened at the base of the South-East crater accompanied by lava flows. The following day there were eruptions at the cone, with lava ejected into the air. The lava is flowing towards the village of Valle del Bova.’

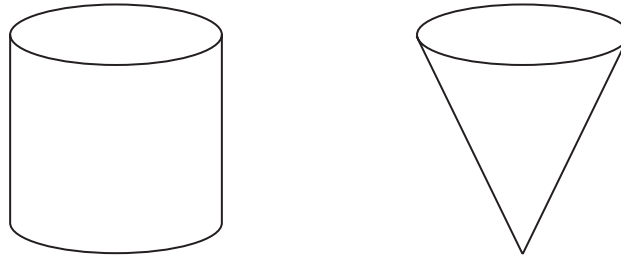
**Air bubbles**

When an air bubble travels upwards through water, its volume increases.



The formula for finding the initial volume,  $u \text{ cm}^3$ , of an air bubble from its volume,  $v \text{ cm}^3$ , at the water surface when it has risen  $h$  metres is

$$u = \frac{10.3v}{h + 10.3}$$

**Ice cream containers**

An ice cream manufacturer sells ice cream in two types of container. One container is in the shape of a cylinder, the other is a cone.

Area of a circle =  $\pi r^2$ , where  $r$  is the radius of the circle.

Curved surface area of a cylinder =  $2\pi rh$ , where  $r$  is the radius of the circular base and  $h$  is the height of the cylinder.

Curved surface area of a cone =  $\pi rl$ , where  $r$  is the radius of the circular base and  $l$  is the slant height.

The total surface area of a closed cone is the curved surface area plus the area of the circular lid.

The total surface area of a closed cylinder is the curved surface area plus the area of the two circular ends.

**Containers**

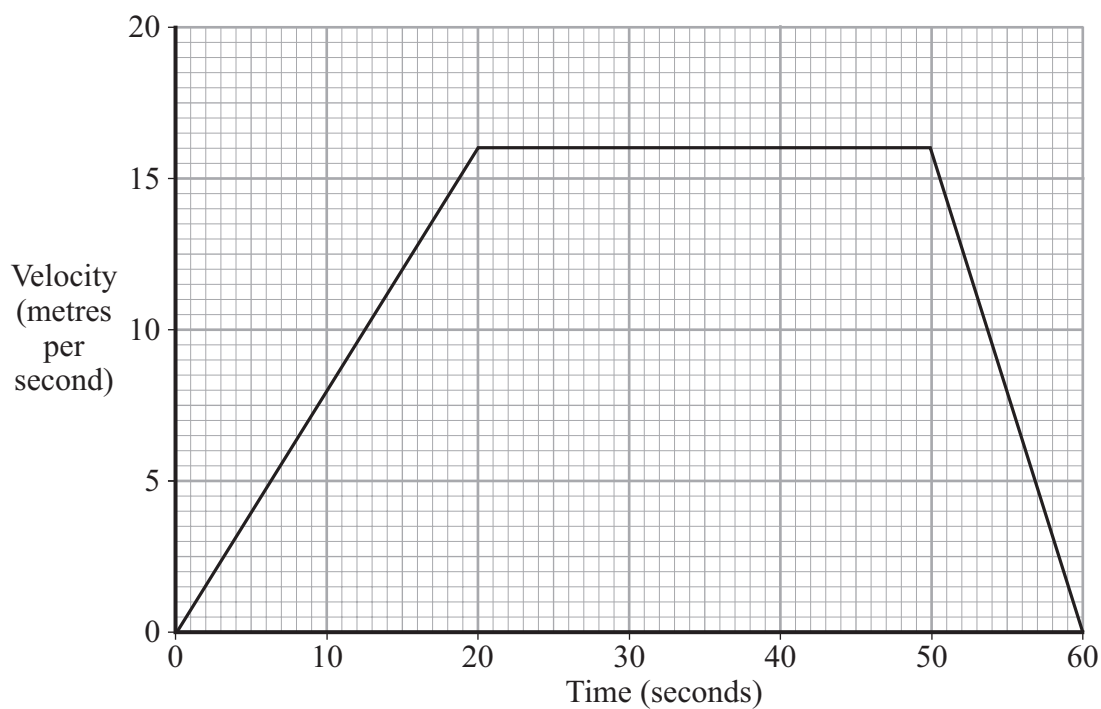
Each of  $n$  small containers holds  $x$  litres of liquid.  
The total volume of the liquid is 500 litres.

**Turn over**

**Turn over ►**

**Bus journey**

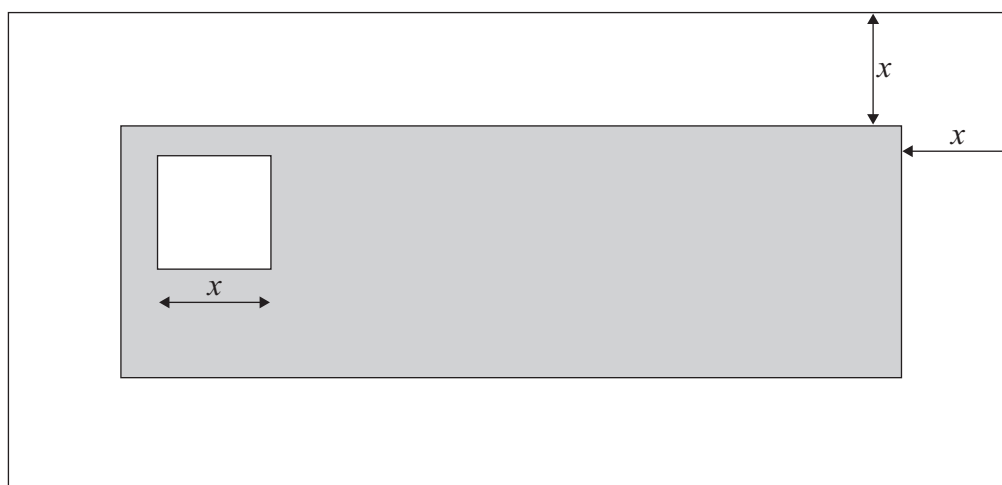
The diagram shows the velocity–time graph of a bus on a journey between two bus stops.

**Postcard**

A border of uniform width is drawn inside a rectangular postcard.

A small square is drawn, as shown on the diagram below.

The width of the border,  $x$  cm, is the same as the side of the square.



**END OF DATA SHEET**