Free-Standing Mathematics Qualification
June 2007
Advanced Level

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

MODELLING WITH CALCULUS **6992/2PM**
**Unit 12**

PRELIMINARY MATERIAL

DATA SHEET

To be issued to candidates between Thursday 3 May and Thursday 10 May 2007

REMINDER TO CANDIDATES

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

6992/2PM

Shares

The value, £V, of Primary Pathfinder shares during the first ten months of the year 2006 is shown on the graph below, where t is the time in months after 1 January 2006.
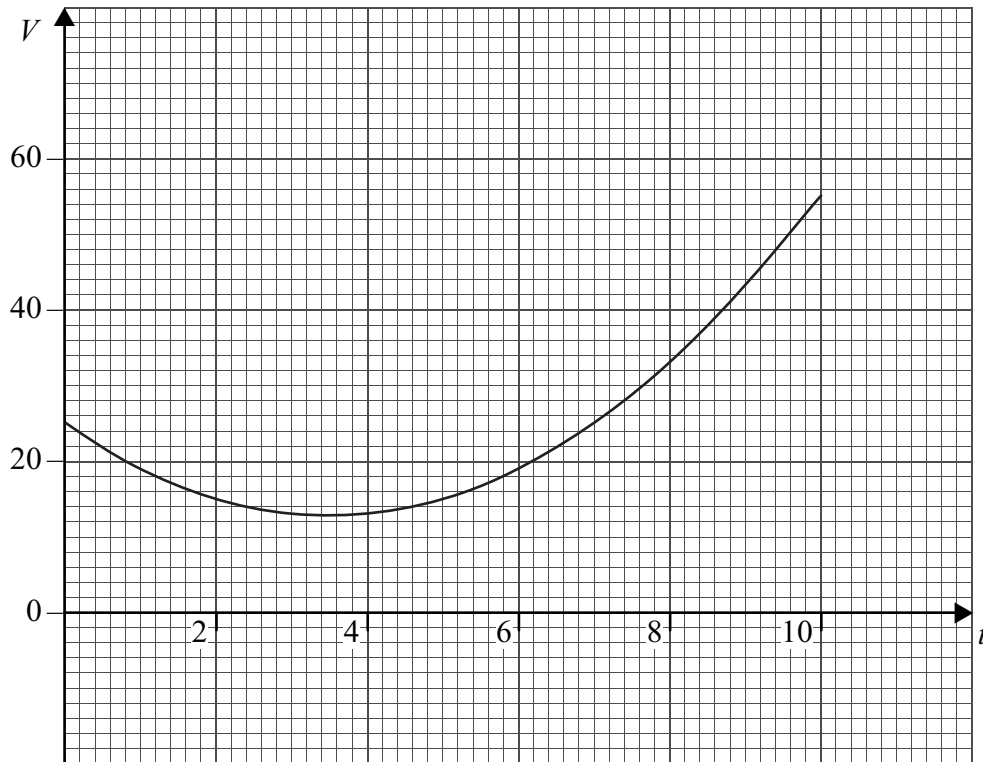
Table mat

Anne Marie is making wooden table mats in the shape of a fish. The plan of a mat is shown below.

The origin O is taken on the mouth of the fish and the line OP is a line of symmetry.
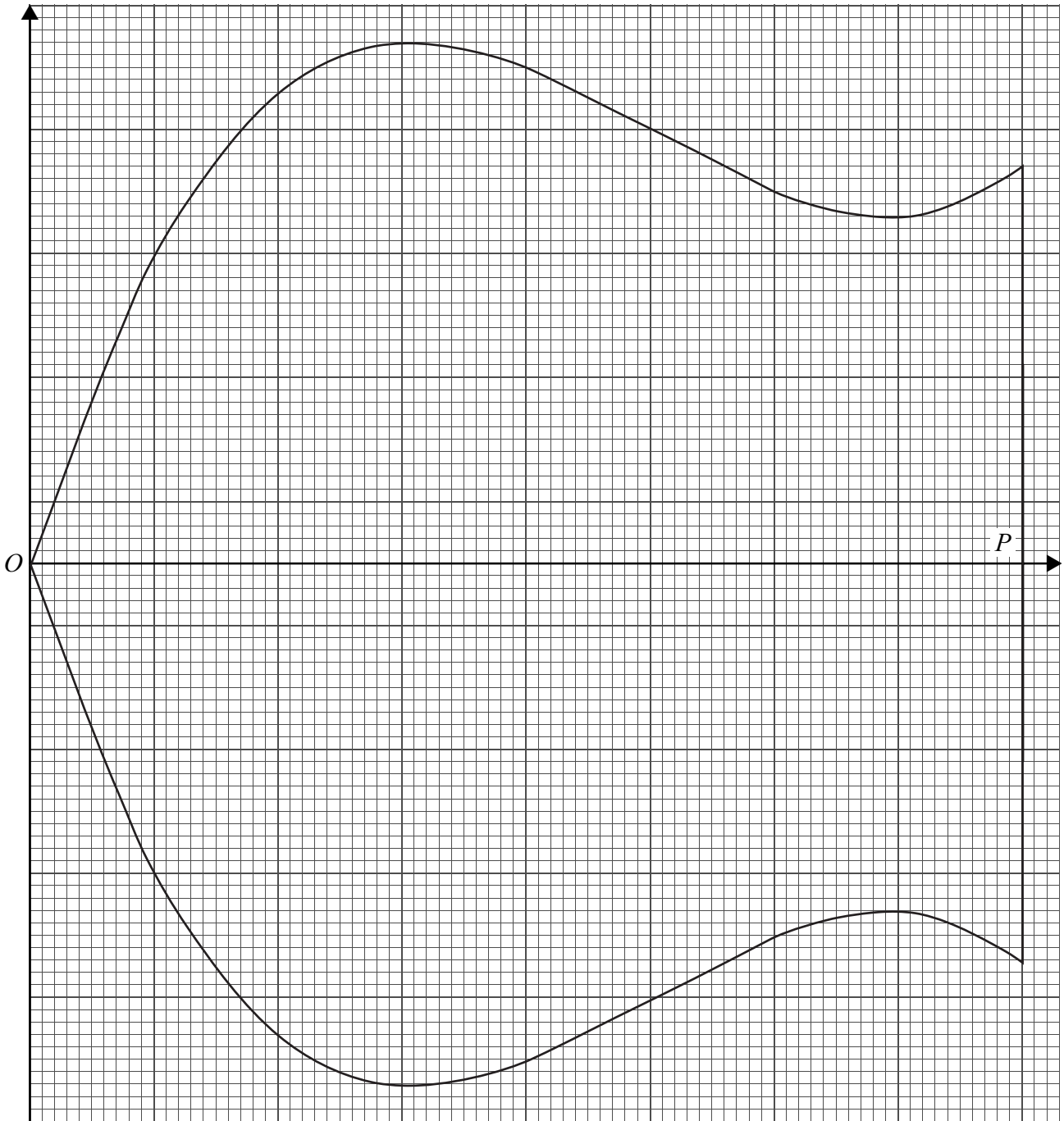
Elastic string

Manuel is doing an experiment with an elastic string. The string has an unstretched length of 20 cm. Manuel fastens one end of the string to a fixed point and hangs a weight on the other end of the string. When the weight is at rest and is hanging in equilibrium, the string is extended by 4 cm.

Manuel notes the movement of the weight when he pulls it down a further 2 cm and releases it. The distance of the weight below the equilibrium position is y cm at time t seconds after it is released.

The graph below shows y against t.
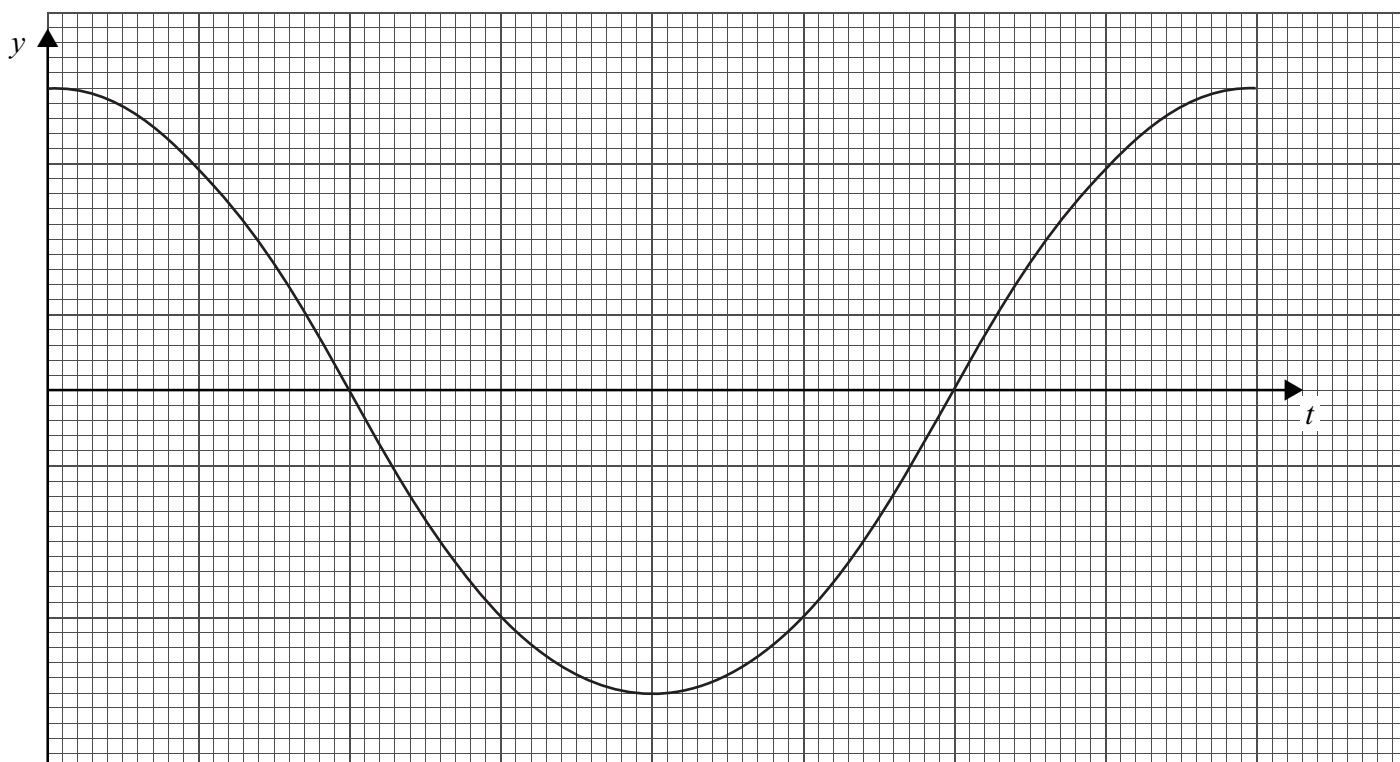
Bacteria

Chloe is carrying out an experiment into the growth of bacteria.

The mass, m grams, of a colony of bacteria increases with time, t days.

The rate of change of the mass is directly proportional to the mass at that time.

This can be expressed by the differential equation

$$\frac{dm}{dt} = \lambda m, \quad \text{where } \lambda \text{ is a positive constant.}$$

END OF DATA SHEET