

Centre Number						Candidate Number				
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Candidate Signature										

For Examiner's Use Total Task 2



General Certificate of Education  
Advanced Subsidiary Examination  
June 2013

## Biology

## BIO3X/PM2

### Unit 3X AS Externally Marked Practical Assignment Task Sheet 2

To be completed before the EMPA Written Test.

For submission by 15 May 2013

**For this paper you must have:**

- a ruler with millimetre measurements
- a calculator.

## Task 2

### Introduction

Cells absorb substances across their cell surface membranes. In Task 2, you will make model cells by cutting cubes of agar of different sizes out of a block of agar stained with cresol red. You will investigate the effect of different surface area to volume ratios on the time it takes cubes of different sizes to turn completely from red to orange.

### Materials

You are provided with:

- a block of agar stained with cresol red dye
- scalpel
- 100 cm<sup>3</sup> beaker
- dilute hydrochloric acid
- white tile
- timer
- ruler with millimetre measurements
- forceps.

You may ask your teacher for any other apparatus you require.

### Method

**Read these instructions carefully before you start your investigation.**

1. Place the agar block on the white tile.
2. Making sure that the scalpel blade is vertical, cut any curved edges off the agar to form a rectangular block.
3. From this block, cut five cubes with the following dimensions:

Cube 1 - 13 mm × 13 mm × 13 mm

Cube 2 - 10 mm × 10 mm × 10 mm

Cube 3 - 7 mm × 7 mm × 7 mm

Cube 4 - 5 mm × 5 mm × 5 mm

Cube 5 - 3 mm × 3 mm × 3 mm

4. Stand the beaker on the white tile. Pour dilute hydrochloric acid into the beaker until it is half full.
5. Drop all the cubes into the beaker at the same time and start the timer. Make sure that the cubes do **not** touch each other.
6. Time in seconds how long it takes each cube to change colour completely from red to orange and record your results.

**You must decide for yourself:**

- when each cube has changed colour completely.

**Presenting your data**

- 6 Record the results of your investigation in an appropriate table in the space below.  
Hand in this sheet at the end of each practical session. (3 marks)
- 7 You will be awarded up to 2 marks for the quality of your practical work. (2 marks)

**Turn over for the next question**

**Turn over ►**

- 8** The table shows the surface area to volume ratio for each cube. To make it easier for you to plot your graph, the surface area to volume ratios have been shown as decimals. For example, the ratio 1 : 2.16 is expressed as 0.46.

Size / mm	Surface area to volume ratio
$13 \times 13 \times 13$	0.46
$10 \times 10 \times 10$	0.60
$7 \times 7 \times 7$	0.86
$5 \times 5 \times 5$	1.20
$3 \times 3 \times 3$	2.00

- 8 (a)** Explain how the surface area to volume ratios were calculated.

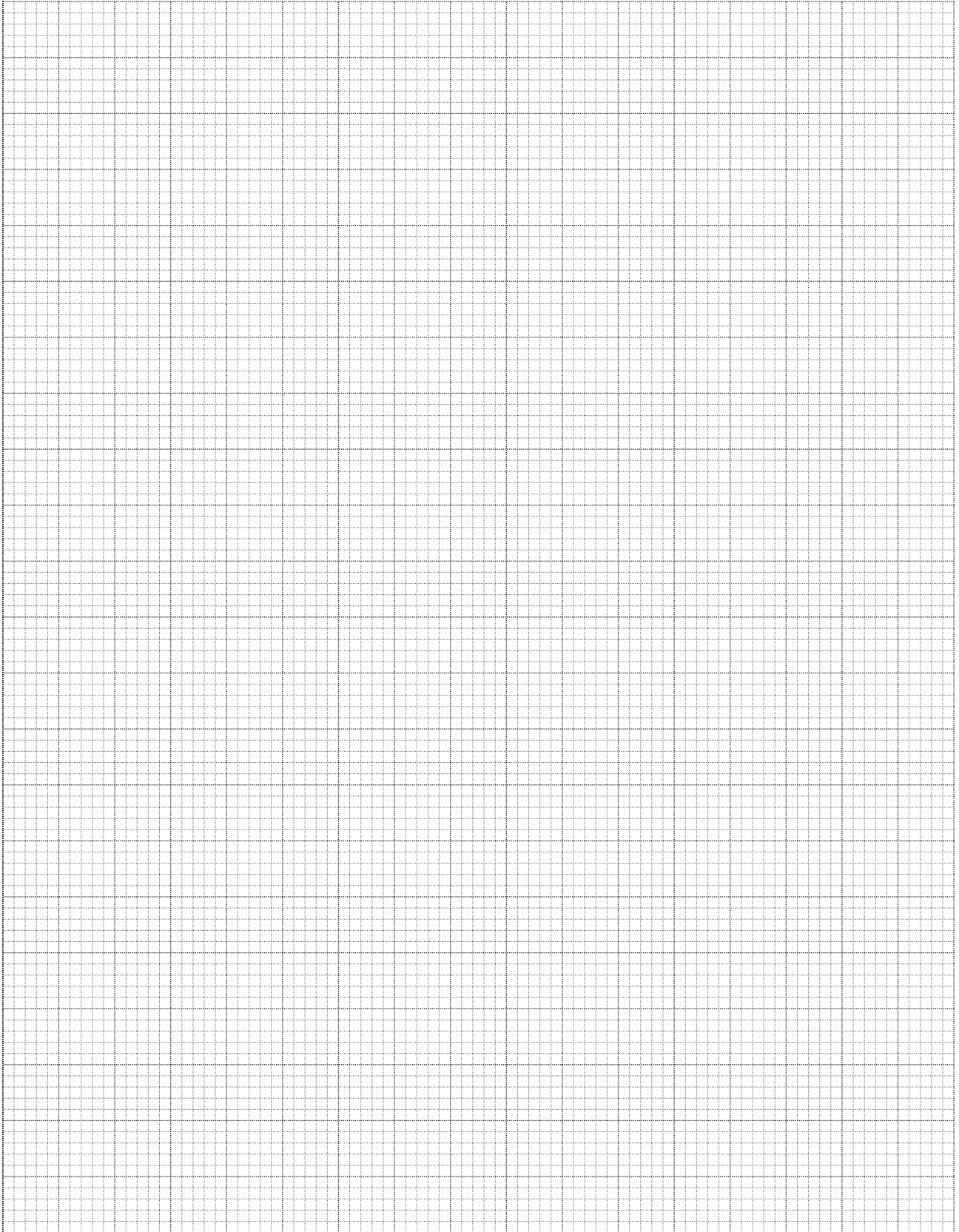
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(1 mark)

- 8 (b)** Use the graph paper to plot an appropriate graph using the surface area to volume ratios in the table opposite and your own data. (5 marks)



**END OF TASK 2**

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