

## APPENDIX 2



### AB1001: Techniques in Science

#### UNITS AND MEASUREMENT

The booklet that accompanies this work sheet covers the SI and Non -SI units that you are likely to meet in science. This work sheet is designed to give you experience working in various units and converting between them. There is a mixture of very easy through to not very hard calculations that you are likely to use on the course. The "maths" involved is nothing more complicated than simple "sums" and proportions. Those of you that have studied maths and the sciences to GCSE or GCE O-level will find little to trouble you and should finish well within the time. Those who feel less secure with calculations may take a little longer but there is plenty of time for you to reach the pass mark. You may use the booklet and you will not be penalised for asking the staff for help if you get stuck.

You are to attempt ALL the problems on the work sheet and have them marked BEFORE you leave the session. There are a total of 80 marks attainable and to pass this session you must get AT LEAST 56 correct.

The first FIVE questions are designed to test your general mathematical ability and are to be performed **WITHOUT A CALCULATOR**. The questions are similar to those used on foundation level science modules of the Open University. These are specifically designed for students with very little formal mathematical background.

1) Solve the following equations (6 marks)

a)  $2 \times (-5) =$  .....

b)  $(-3) \times (-2) =$  .....

c)  $\frac{4}{(-2)} =$  .....

d)  $\frac{(-8)}{(-4)} =$  .....

e)  $10 - (-5) =$  .....

f)  $(-10) - (-5) =$  .....

2) Express the following numbers in scientific notation (4 marks)

a) 24328 .....

b) 3000000 .....

c) 0.000003 .....

d) 1.0 .....

3) Express the following scientific notations in ordinary numerical form (5 marks)

a)  $5.5 \times 10^4$  .....

b)  $5.5 \times 10^{-4}$  .....

c)  $10^3$  .....

d)  $1E^{+3}$  .....

e)  $1E-2$  .....

4) Solve the following problems and express your answers in scientific notation (3 marks)

a)  $(2 \times 10^5) \times (4 \times 10^{-3}) =$  .....

b)  $\frac{(4 \times 10^6)}{(2 \times 10^{-3})} =$  .....

c)  $\frac{0.005 \times (2 \times 10^6)}{50} =$  .....

5) Given that  $\log_{10}$  of 2 = 0.301 and that  $\log_{10}$  of 8 = 0.903 what are the values of the following? (3 marks)

a)  $\log_{10}$  of 16 = .....

b)  $\log_{10}$  of 4 = .....

c)  $\log_{10}$  of  $\frac{1}{4}$  = .....

- 6) Complete the following table using items from the list provided.(7 marks)

Prefix	Symbol	Multiple
centi	c	$10^{-2}$
deci		
femto		$10^{-15}$
kilo		
mega		
micro		
milli		
nano		
pico	p	

$10^6$ ,  $10^3$ ,  $10^{-1}$ ,  $10^{-3}$ ,  $10^{-6}$ ,  $10^{-9}$ ,  $10^{-12}$ , f, n, m,  $\mu$ , d, k, M.

- 7) Express the following in grams (8 marks)

1.0 tonne ..... 1.0 mg .....

1.0  $\mu$  g ..... 0.5 mg .....

1.0 g ..... 0.5 kg .....

1.0 kg ..... 0.5 tonne .....

- 8) The image of a bacterial cell observed with an electron microscope is 90  $\mu$ m in length. If the magnification of the electron microscope is  $6 \times 10^4$ , what is the length of the original bacterial cell? (One correct answer)

a .....540  $\mu$ m

d ..... 1.5  $\mu$ m

b .....6.6  $\mu$ m

e ..... 540  $\mu$ m

c .....1.5  $\mu$ m

- 9) The relative molecular mass (RMM) of  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  is 246.5. How many grams of  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  will there be in 450 ml of a 1 molar solution? (One correct answer)

a .....123.25

d ..... 110.93

b .....0.12325

f ..... 120.50

c 0.01109 g 0.1205