core:maths
A NEW QUALIFICATION FOR WORK, STUDY & LIFE

Homework 5

Godalming College

You have one week to complete this. What you hand in should be your best work, and you must attempt every question (the only exception being if there are optional topics which don't apply to you).

If you are stuck then please either consult notes or textbooks, attend a workshop, or ask your teacher.

You may need to refer to the formula book, found here:

or financial information, found here:

1) The Bank of Scotland's Instant Access Savings Account advertises an annual effective rate (AER) of 5%.

(a) Find the sum of money you would have to invest to give a value of £5000 after 10 years in this account, assuming that the AER remains fixed at 5% over the entire period. *(2 marks)*

(b) If interest is compounded monthly in this account calculate the nominal interest rate. *(4 marks)*

2) The table below shows the hourly share price, in pence, of Woolworths on 8 October 2008.

Time	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
Share price, *p*	3.0	2.7	2.8	2.8	2.9	3.1	3.2	3.1	3.1

(a) Use the data from the table to calculate the mean and the standard deviation of Woolworths' hourly share prices. *(3 marks)*

(b) The mean and the standard deviation of the hourly share prices for Pendragon on the same day are 6.04p and 0.126p respectively.

Compare the hourly share prices of Woolworths and Pendragon for 8 October 2008. *(3 marks)*

3) When buying a camera costing £750, Asif is offered two different repayment methods.

Method A: paying back a single lump sum of £1000 at the end of 2 years;
Method B: paying back £450 after 1 year and a further £450 after another year.

(a) Calculate the APR for repayment method A. *(4 marks)*

(b) Repayment method B advertises an APR of 13.1 %.

Show calculations to confirm that this is a good approximation. *(4 marks)*

4) Jose decides to pay off his credit card debt.

He will not use his card to buy anything.

He will pay £300 to the credit card company each month.

The credit card company charges him 2.9% interest each month on his outstanding debt.

His current debt is £3800.

His outstanding debt, £A_n, at the end of the nth month is given by the recurrence relation:

$$A_n = 1.029A_{n-1} - 300, \quad \text{where} \quad A_0 = 3800$$

(a) Explain the significance of the coefficient 1.029 in the recurrence relation. **[1 mark]**

(b) Use the recurrence relation, $A_n = 1.029A_{n-1} - 300$, complete the table on the sheet giving the outstanding debt on Jose's account at the end of each of the first six months.

Give your answers correct to the nearest penny. **[3 marks]**

(c) After six months, the credit card company increases the interest rate charged on Jose's account to 3.1% monthly. Jose increases the amount he repays to £400 per month.

Write down a recurrence relation to give the amount of money, £A_n, in Jose's account after these changes. **[2 marks]**

Homework 5

5) A pan contains 9 litres of jam, to the nearest litre.
Jars hold 0.15 litres each, to 2 decimal places.

Work out the **greatest** number of jars that could possibly be filled with the jam.
You **must** show your working.

[3 marks]

6) When buying a bass guitar costing £450, Freida considers two different lenders.

(a) The first lender requires Freida to pay a single lump sum of £550 at the end of two years.

Calculate the APR charged by this lender. *(3 marks)*

(b) The second lender states that it charges an APR of 20% and requires two equal repayments, the first repayment at the end of the first year and the second repayment at the end of the second year.

Calculate the amount of each repayment. *(3 marks)*

7) A teaching agency employs 400 tutors.
Each tutor teaches one of three subjects: English, Maths or Science.
The number of tutors of each subject is shown in the table.

Subject	Number of tutors
English	200
Maths	185
Science	15

The manager wishes to survey a sample of tutors.
She decides to sample 50 of the 400 tutors.

(a) Give a reason why a random sampling method might **not** be appropriate in this case.

[1 mark]

(b) The assistant manager suggests selecting a sample of 50, stratified by subject.

How many Maths tutors would there be in this sample?

[3 marks]

8) Estimate how long in hours the average person in the UK spends sat on the toilet in their lifetime

Homework 5 – Answer sheet

4)

n	A_n
0	3800
1	3610.20
2	
3	
4	
5	
6	