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

Homework 9A

Godalming College

You have one week to complete this. What you hand in should be your best work, and you must attempt every question.

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 data below show the end-of-day total portfolio value, in pounds, of Bill's penny share portfolio during a nine-day trading period in May 2010.

Date	Portfolio value, £
4 May	31 449
5 May	30 586
6 May	29 254
7 May	33 351
10 May	30 829
11 May	28 775
12 May	33 470
13 May	32 966
14 May	33 405

(a) Calculate the mean and the standard deviation of Bill's nine daily portfolio values. *(3 marks)*

(b) Over the same period, Oliver has a portfolio of FTSE 100 shares with a mean value of £252 520 and standard deviation of £5175.

Compare Bill's and Oliver's daily portfolio values. *(2 marks)*

2) A rubber seal is fitted to the bottom of a flood barrier. When no pressure is applied, the depth of the seal is 15 cm. When pressure is applied, a watertight seal is created between the flood barrier and the ground.

The table shows the pressure, x kilopascals (kPa), applied to the seal and the resultant depth, y centimetres, of the seal.

x	25	50	75	100	125	150	175	200	250	300
y	14.7	13.4	12.8	11.9	11.0	10.3	9.7	9.0	7.5	6.7

(a) (i) State the value that you would **expect** for a in the equation of the least squares regression line, $y = a + bx$.

[1 mark]

(ii) Calculate the equation of the least squares regression line, $y = a + bx$.

[4 marks]

(iii) Interpret, in context, your value for b.

[2 marks]

(b) Calculate an estimate of the depth of the seal when it is subjected to a pressure of 225 kPa.

[2 marks]

(c) (i) Give a statistical reason as to why your equation is unlikely to give a realistic estimate of the depth of the seal if it were to be subjected to a pressure of 400 kPa.

(ii) Give a reason based on the context of this question as to why your equation will not give a realistic estimate of the depth of the seal if it were to be subjected to a pressure of 525 kPa.

[3 marks]

3) In 2012, the cost of a ticket from Ipswich to Lowestoft was £11.69.
In January 2013, the cost of this ticket increased by 4.4%.

What was the cost of this ticket after the increase?

[3 marks]

4) Mark invests £3000 for three years in an easy-access savings account. This account has an AER of 1.45%, which does not include a bonus. The interest is paid at the end of each year.

How much interest will this investment gain, assuming that the interest rate stays the same during this period?

[3 marks]

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5) During 2008–2010, the number of different apps available for the Apple iPhone and the number of downloads of these apps increased substantially.

The table below shows some data for these apps.

Date	Number of apps available (in thousands)	Number of downloads made (in millions)
July 2008	0.8	10
September 2008	3	100
April 2009	35	1000
July 2009	65	1500
September 2009	85	2000
January 2010	100	3000

Find:

(a) (i) the mean of the number of apps available;

(2 marks)

(a) (ii) the mean of the number of downloads made.

(1 mark)

(b) Plot a scatter diagram of the data.

(c) Draw a line of best fit through the mean point.

(2 marks)

(d) Explain why you cannot use your line of best fit to estimate accurately the number of downloads made when there are 300 000 apps available.

6) (a) Prem is planning his 21st birthday, it will be from 8pm to midnight at the local village hall. He wants to invite 100 friends, and he will provide the drinks. How many drinks should he provide?

(b) How much money do you estimate this will cost?

(c) How might changing one of your assumptions affect your answer to part (b)?

7) There are 142 732 households in Northumberland as a whole.
The table shows the percentages of different types of household in each area of Northumberland and in Northumberland as a whole.

	Detached house or bungalow (%)	Semi-detached house or bungalow (%)	Terrace (%)	Flat (%)	Caravan or other temporary structure (%)
Alnwick	30.62	32.20	27.41	9.62	0.15
Berwick-upon-Tweed	24.80	34.47	28.97	11.50	0.27
Blyth Valley	15.12	44.69	26.99	13.11	0.03
Castle Morpeth	38.10	32.80	21.98	7.01	0.10
Tynedale	33.49	31.28	26.52	8.44	0.27
Wansbeck	14.65	33.69	39.90	11.62	0.13
Northumberland as a whole	24.58	35.85	28.93	10.49	0.14

(a) Explain why the percentages for Berwick-upon-Tweed do not sum to 100. *(1 mark)*

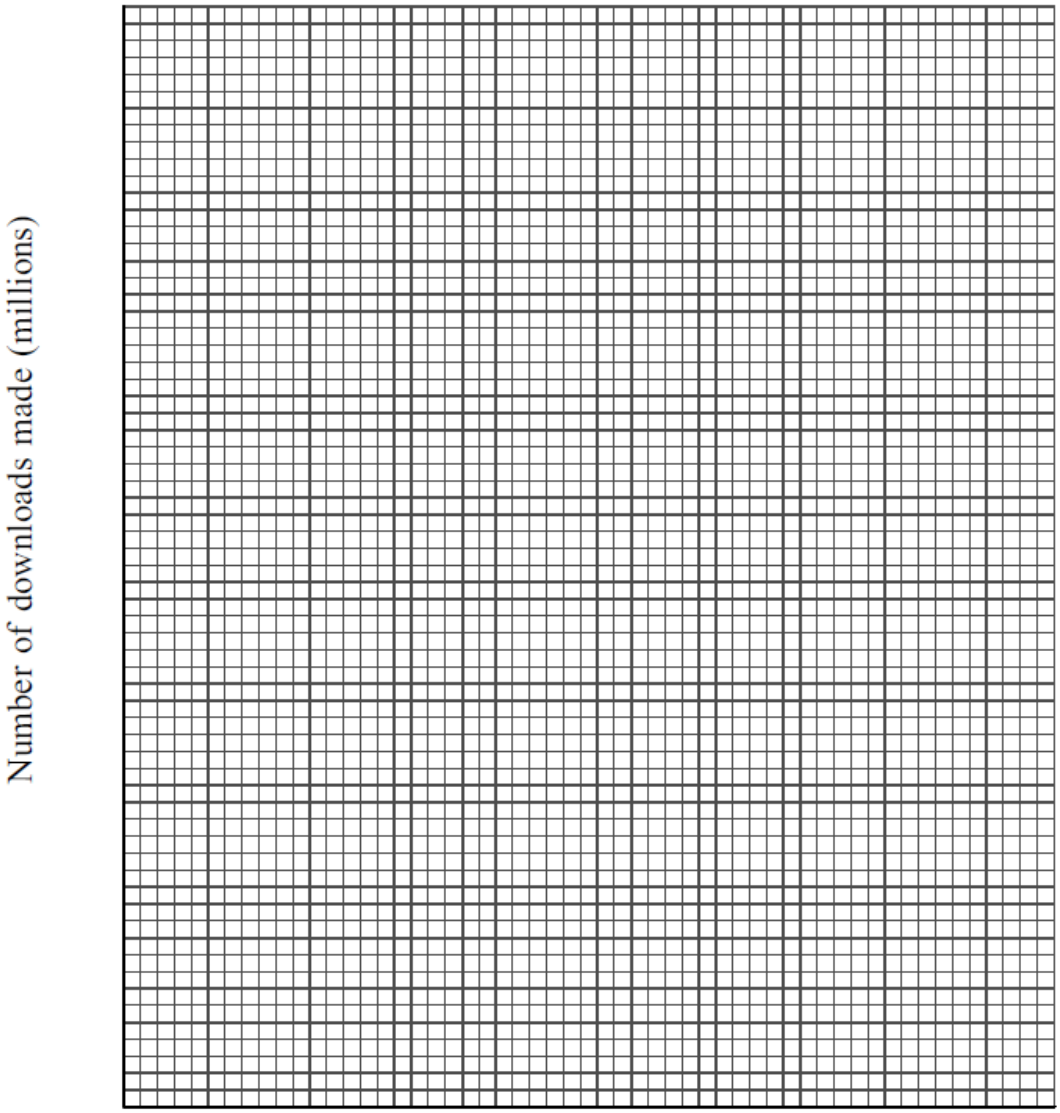
(b) Calculate the number of 'detached houses or bungalows' in Northumberland as a whole. *(2 marks)*

(c) There were 2990 flats in Wansbeck. Calculate how many households there are in Wansbeck. *(3 marks)*

(d) Castle Morpeth has the greatest percentage of 'detached houses or bungalows'. Does this necessarily mean that Castle Morpeth has the greatest number of 'detached houses or bungalows' when compared with the other areas of Northumberland? Give a reason for your answer. *(2 marks)*

Homework 9A – Answer sheet

5)



(3 marks)