

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](#):



- 3) Over 600 000 people recorded the number and species of different birds seen in their gardens during a one-hour period in January 2011.

The table shows the average number of birds of ten different species seen in the counties of Cornwall and Somerset.

Species	Average number of birds seen in one-hour period	
	Cornwall	Somerset
Starling	6.1	5.2
House Sparrow	5.2	4.4
Chaffinch	4.5	3.0
Blackbird	3.7	3.3
Blue Tit	3.0	3.0
Robin	1.8	1.5
Dunnock	1.5	1.3
Jackdaw	1.2	0.9
Magpie	1.0	0.7
Greenfinch	0.9	0.7

- 1) The volume, X millilitres, of energy drink in a bottle can be modelled by a normal random variable with mean 507.5 and standard deviation 4.0.

- (a) Find:
- (i) $P(X < 515)$;
 - (ii) $P(500 < X < 515)$;
 - (iii) $P(X \neq 507.5)$. (5 marks)
- (b) Determine the value of x such that $P(X < x) = 0.96$. (3 marks)

- 2) Molly had a tax-free allowance of £10 600 and earned £4629 per month.
- (a) Calculate Molly's taxable income. [3 marks]
- (b) Calculate the total amount of income tax which Molly paid in the year. [5 marks]

- (a) Find:
- (a) (i) the mean of the ten averages for Cornwall;
 - (a) (ii) the mean of the ten averages for Somerset.
 - (b) Plot a scatter diagram of the data. The first four points have been done for you.
 - (c) Draw a line of best fit through the mean point. (2 marks)

- (d) The average number of goldfinches seen in **Somerset** was 1.7.
- Using your scatter diagram, estimate the average number of goldfinches seen in **Cornwall**.

- 4) An amount is increased by 20%
40% of the new amount is 288
Work out the original amount.

- 5) A council wants to restrict the amount of waste that households are producing. It is considering giving each household a slimline 87 litre waste bin.

Assume that a typical household produces, on average, 80 litres of waste each week and that its volume of waste follows a normal distribution with a standard deviation of 5 litres.

- (b) Calculate the probability that the amount of waste will be more than the capacity of the slimline bin. *(3 marks)*
- (c) Calculate the expected number of weeks in one 52 week year when the slimline bin will not be large enough to take the waste. *(2 marks)*
- (d) How large would the bin have to be in order to be large enough to take the waste 95% of the time? *(4 marks)*

6)

Average life expectancy			
European countries		African countries	
Country	Age	Country	Age
Belarus	71	Angola	39
France	81	Egypt	73
Germany	80	Kenya	59
Italy	82	Niger	53
Latvia	73	Nigeria	48
Moldova	71	South Africa	49
Poland	76	Tanzania	53
Russia	66	Togo	63
Spain	81	Tunisia	75
Sweden	81	Uganda	53
United Kingdom	80	Zimbabwe	50

- (a) Show the data on an ordered back-to-back stem and leaf diagram.
- (b) Use one measure of location and one measure of spread to compare average life expectancy in these European and African countries.

Comment on your results.

- 7) When buying a camera costing £520, Ben considers two different lenders.

- (a) The first lender requires Ben to pay a single lump sum of £720 at the end of three years.

Calculate the APR charged by this lender.

Give the value of the APR as a percentage.

[4 marks]

- (b) The second lender states that it charges an APR of 9% and requires three equal repayments: one repayment at the end of the first year; the second repayment at the end of the second year; and the final, third, repayment at the end of the third year.

Calculate the amount of each repayment.

[4 marks]

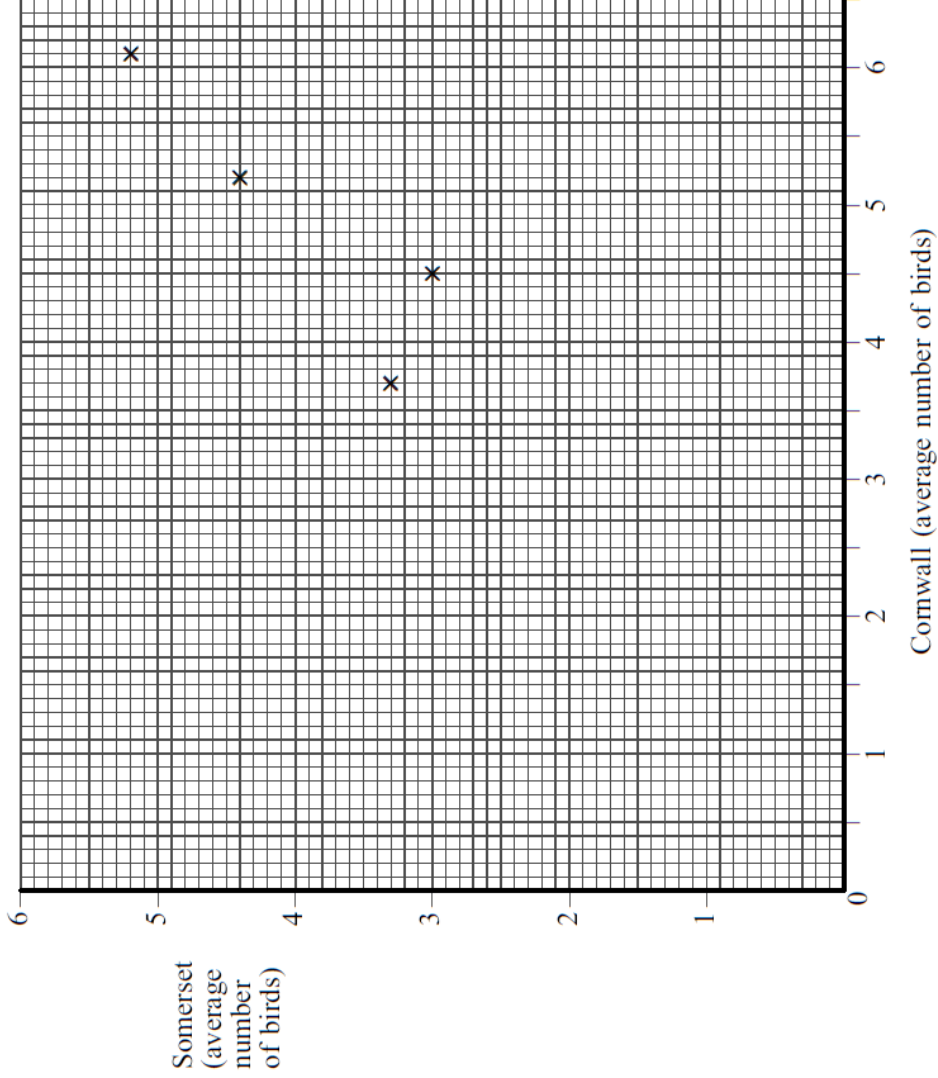
8)

An experiment was undertaken to collect information on the burning of a specific type of wood as a source of energy. At given fixed levels of the wood's moisture content, x per cent, its corresponding calorific value, y MWh/tonne, on burning was determined. The results are shown in the table.

x	5	10	15	20	25	30	35	40	45	50	55	60	65
y	5.2	4.7	4.3	4.0	3.2	2.8	2.5	2.2	1.8	1.5	1.3	1.0	0.6

- (a) Explain why calorific value is the response variable. *(1 mark)*
- (b) Calculate the equation of the least squares regression line of y on x , giving your answer in the form $y = a + bx$. *(5 marks)*
- (c) Interpret, in context, your values for a and b . *(3 marks)*
- (d) Use your equation to estimate the wood's calorific value when it has a moisture content of 27 per cent. *(2 marks)*

- 3) (b) Plot a scatter diagram of the data.
The first four points have been done for you.



(2 marks)

6)

Average life expectancy

European countries	African countries
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(5 marks)