

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](#):



2) Liz keeps three different breeds of duck on her farm.



Bali duck



Muscovy duck

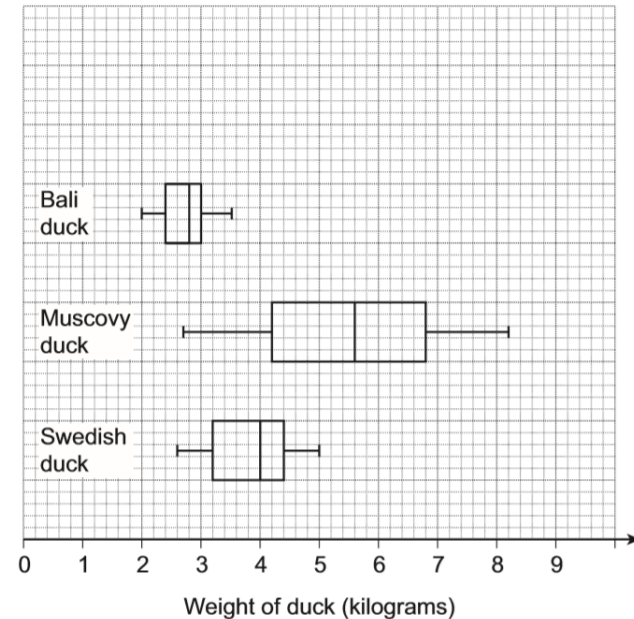


Swedish duck

(a) Liz has 40 Bali ducks.

Explain how she can select a random sample of three of them.

(b) The box plots show information about the weights of Liz's ducks.



(b) (i) One of Liz's ducks weighs 5.2 kg.

Which breed of duck is it?

(b) (ii) Liz has 60 Swedish ducks.

Estimate the number of Swedish ducks with a weight greater than 4.4 kilograms.

1) The cumulative frequency diagram shows information about the finishing times of 100 runners in a race in 2015

The fastest runner finished in 26 minutes.
The slowest runner finished in 54 minutes.

(a) Use this information and the cumulative frequency diagram to draw a box-and-whisker plot for these runners.

[3 marks]

(b) The table shows information about the finishing times of the runners in the same race in 2014

Fastest time	27 minutes
Lower quartile	32 minutes
Median	39 minutes
Upper quartile	45 minutes
Slowest time	54 minutes

Eli says,

"Times were faster on average and more consistent in 2014 than in 2015"

Comment on Eli's statement.

You **must** support your comments with working.

[4 marks]

- 3) An investigation was made of the effect of the distance apart that parsnip seeds were sown on the number of seeds that germinated. Equal numbers of parsnip seeds were sown in trays. The seeds in each tray were either touching each other or placed 2 cm apart. The numbers of seeds in each tray that had germinated after 10 days were recorded and are shown below.

Number of seeds that had germinated after 10 days											
Seeds touching each other						Seeds placed 2 cm apart					
8	9	9	5	5	11	14	16	16	12	15	16
13	9	12	11	8	10	10	12	13	16	12	10
7	9	9	9	8	6	15	11	15	14	13	13
12	9	11	7	8	12	11	15	14	8	13	14
10	9	9	11	6	8	19	11	12	17	9	17

- (a) For the seeds touching each other, calculate:

- (i) the mean number of seeds per tray that germinated after 10 days; (1 mark)
- (ii) the standard deviation of the number of seeds per tray that germinated after 10 days. (2 marks)

- (b) For the seeds that were placed 2 cm apart, the mean and standard deviation of the number of seeds that germinated after 10 days are 13.43 and 2.54 respectively.

Compare the numbers of seeds that germinated in these two experiments. (2 marks)

- 4) (a) A study by the AA, in 2011, found that the average cost of fully comprehensive insurance for a driver aged between 17 and 22 years old had increased by 58% since 2010.
The average cost in 2011 was £2251.

Calculate what the average cost was in 2010.

- (b) Nikita says that she pays about £830 per year for her car insurance.
This amount is correct to the nearest ten pounds.

What is the minimum possible cost to Nikita for the year's car insurance?

- 5) Dmitry earned £397 per week.

Calculate the amount which Dmitry paid per week in National Insurance contributions.

[4 marks]

- 6) (a) The time, in seconds, that each of 100 people wait to be connected to a telephone help-line is recorded.
The shortest time was 34.6 seconds and the longest time was 86.3 seconds.
- (b) Javed decides to use this appropriate frequency distribution for the 100 values.

Time, x (seconds)	Frequency
$30 < x \leq 40$	4
$40 < x \leq 50$	7
$50 < x \leq 60$	11
$60 < x \leq 70$	34
$70 < x \leq 80$	32
$80 < x \leq 90$	12

Use a graphical method to estimate the median of the distribution.

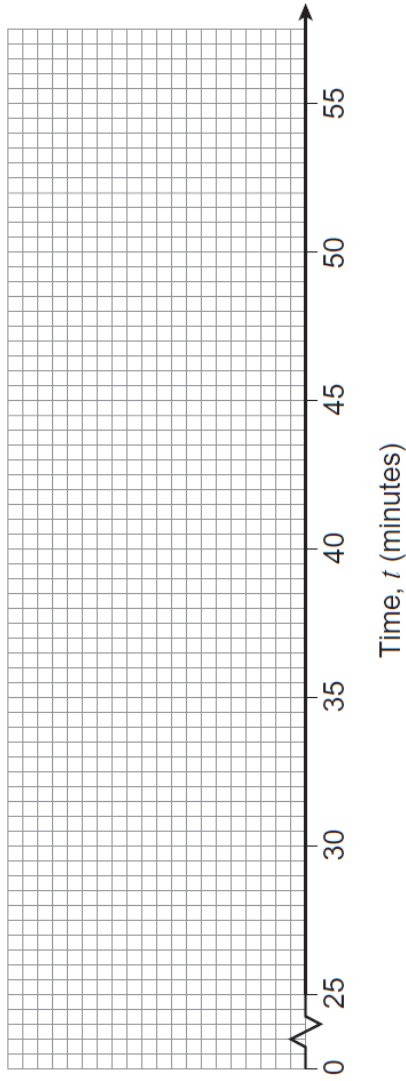
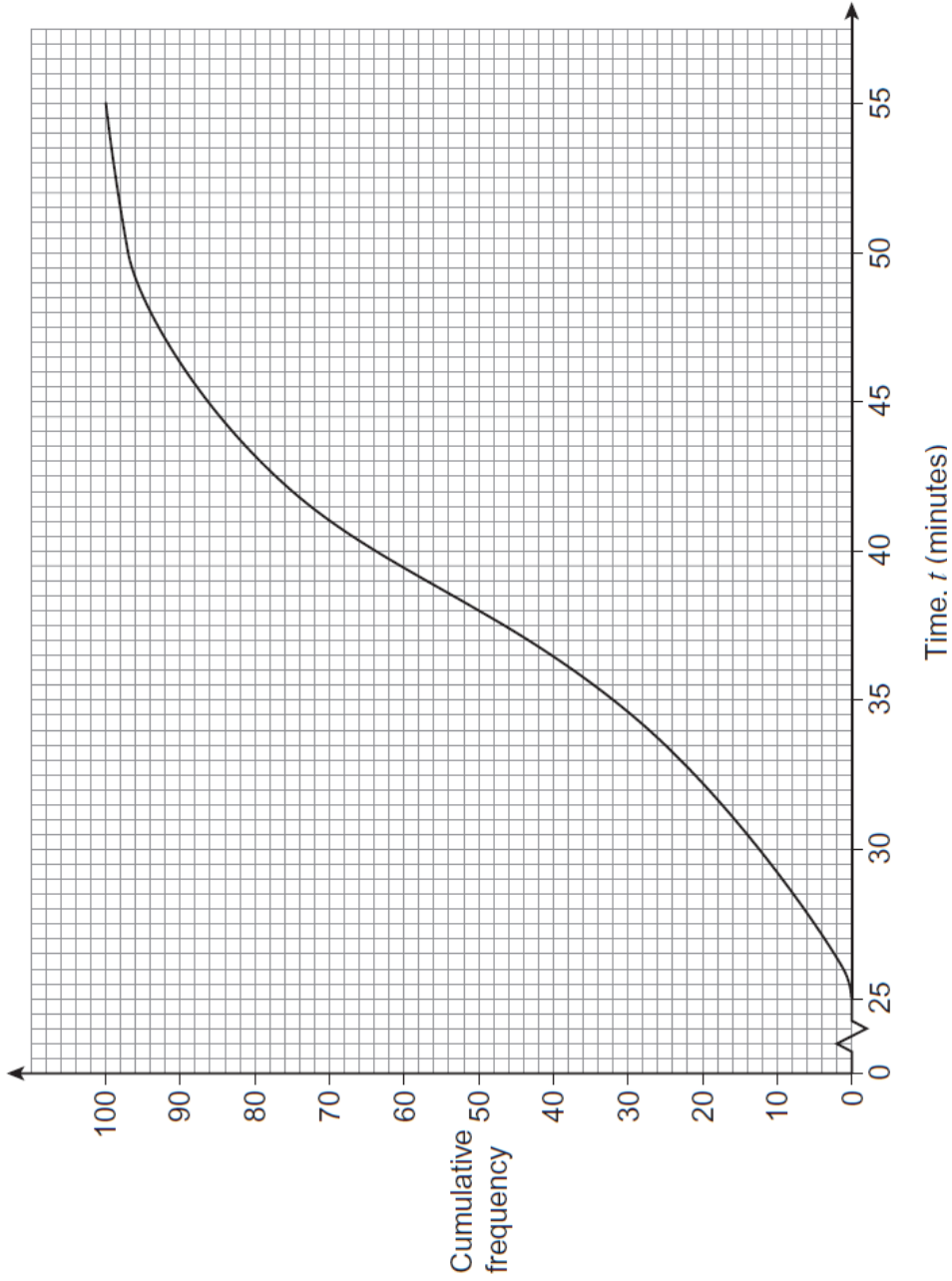
7) Harry has just taken out a mortgage for £120 000. He has agreed to repay £920 per month for the life of the mortgage. The mortgage has an interest rate of 0.6% per month which is fixed for the first four years.

Harry would like to find out how much of the initial value of the mortgage he will pay off in the first six months of the mortgage period. To do this, he uses a recurrence relation to calculate the amount of his outstanding mortgage.

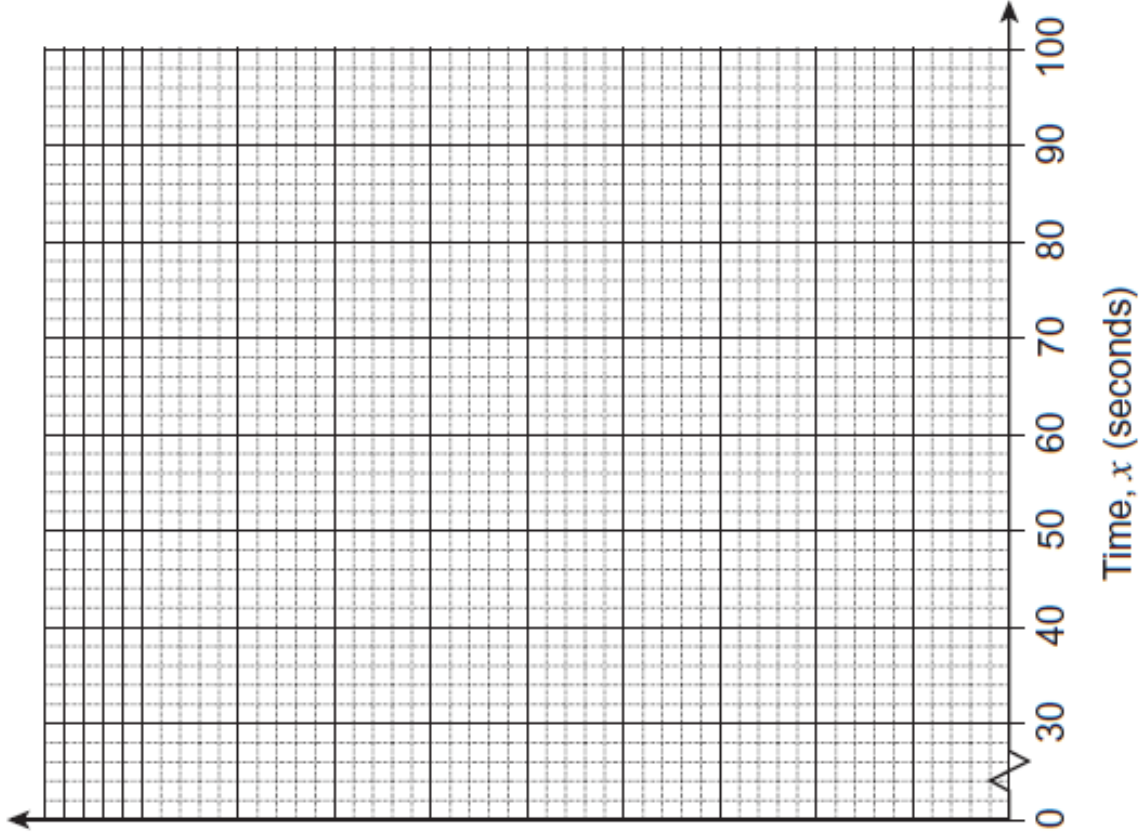
The amount of the mortgage at the end of the n th month, A_n , is given by $A_n = 1.006 A_{n-1} - 920$ where the amount at the start is A_0 which is £120 000.

- (a) Explain the significance of the coefficient 1.006 in the recurrence relation. (2 marks)
- (b) Use the recurrence relation $A_n = 1.006 A_{n-1} - 920$ to complete the table opposite to give the amount of the mortgage debt outstanding at the end of each of the first six months.
You should give your values correct to the nearest penny. (4 marks)
- (c) Hence find the amount Harry will have paid off his mortgage in the first six months. (2 marks)

1)



6)



7)

n	A_n
0	£120 000
1	
2	
3	
4	
5	
6	