



General Certificate of Secondary Education
2024

Centre Number

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Candidate Number

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Statistics

Unit 1 (With Calculator)

Higher Tier

[GST12]



GST12

TUESDAY 11 JUNE, AFTERNOON

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing can be completed using an HB pencil.

Any working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and protractor.

The formula sheet is on page 2.

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24GST1201

HIGHER TIER FORMULA SHEET

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

Spearman's Rank Correlation Coefficient

$$r_s = 1 - \left(\frac{6 \sum d^2}{n(n^2 - 1)}\right)$$





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(Questions start overleaf)

[Turn over

14282



24GST1203

Answer **all** questions

- 1 The manager of a cricket team records the scores achieved by one of the batsmen in 20 matches during the season.

The results are shown below.

23	18	35	48	30
40	52	24	55	38
12	32	29	7	19
21	26	43	37	24

- (a) In the space below, draw a stem and leaf diagram to illustrate this data.

[3]



(b) (i) Find the median score.

Answer _____ [1]

(ii) Work out the interquartile range of the scores.

Answer _____ [2]

The manager made a mistake recording one of the scores.

He replaces the score 52 with the score 42

(c) What effect will this replacement have on:

(i) the median of the scores;

Tick the correct box.

Decrease Increase No change [1]

(ii) the mean of the scores;

Tick the correct box.

Decrease Increase No change [1]

(iii) the range of the scores?

Tick the correct box.

Decrease Increase No change [1]

[Turn over



- 2 Kiera wants to investigate the opinions of library members about plans to create a study area in the library.

She considers whether to do a sample survey or a census to gather opinions.

- (a) Explain why a census may be better than a sample survey for gathering opinions.

[2]

One of the questions Kiera plans to ask is shown below.

What do you think of the plan to create a study area in the library?

Circle one of the following responses:

Strongly agree Agree Unsure Disagree

- (b) Give one reason why the response section is not suitable.

[1]



Kiera decides to take a stratified random sample for her survey.

- (c) Give one advantage of a stratified random sample compared to a simple random sample.

[1]

The 1345 members of the library are organised into age groups as follows:

Age (years)	Under 25	25–60	Over 60
Number of members	340	560	445

Kiera selects 80 members for her stratified random sample.

- (d) Work out how many members aged over 60 years will be selected for the sample.

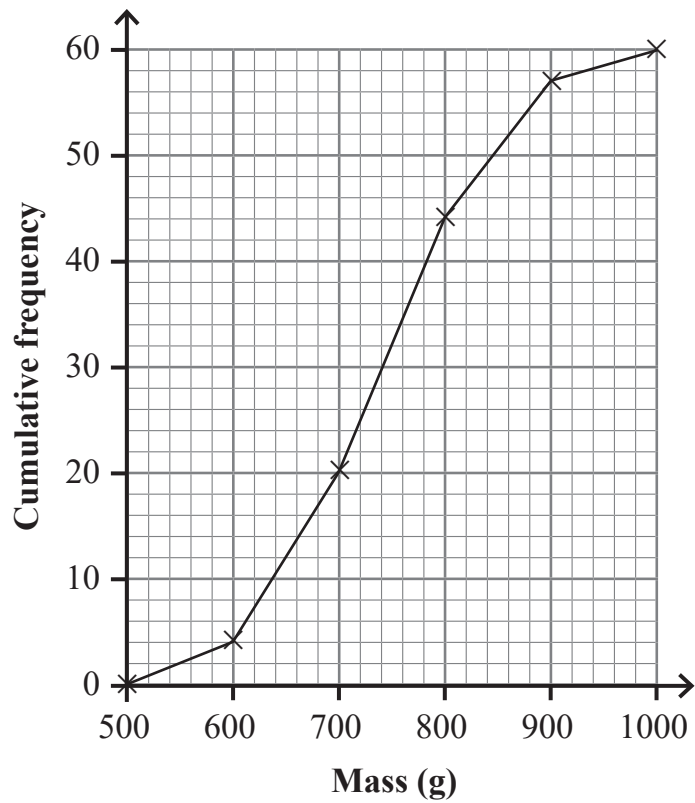
Answer _____ [2]

[Turn over



3 Tom recorded the masses, in grams (g), of all the cabbages for sale at his stall.

His results are shown on the cumulative frequency diagram below.



(a) How many cabbages are for sale at Tom's stall?

Answer _____ [1]



(b) From the cumulative frequency diagram, find:

(i) the median;

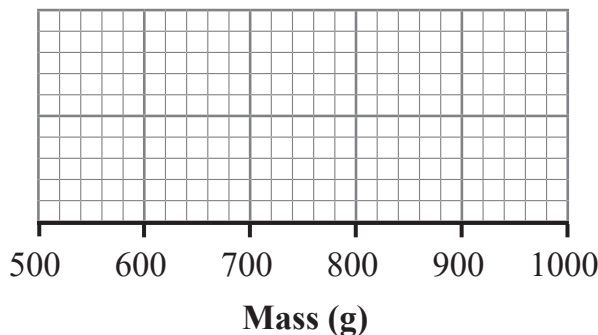
Answer _____ g [1]

(ii) the interquartile range.

Answer _____ g [2]

The lightest cabbage was 520 g and the range of the masses of the cabbages was 450 g.

(c) Use this information to draw a box plot on the grid below for the data in the cumulative frequency diagram.



[4]

Tom suggests that a normal distribution may be a suitable model for the masses of the cabbages at his stall.

(d) Comment on Tom's suggestion.

[2]

[Turn over



- 4 The table below shows the annual cost of a TV streaming service between 2018 and 2023

Taking 2018 as the base year, some of the index numbers have been calculated.

Year	2018	2019	2020	2021	2022	2023
Annual cost	£53	£56		£54	£55	
Index number		105.7	96.2		103.8	113.2

The annual cost of the streaming service for each year was obtained from the internet.

- (a) Circle two words from the list below which describe this data.

Secondary Categorical Quantitative Primary

[2]

- (b) (i) Did the cost of the streaming service increase or decrease between 2018 and 2020?

Tick the correct box.

Increase Decrease

[1]

- (ii) Explain how this is shown in the table above.

[1]



(c) Find the annual cost of the streaming service for 2023

Answer £ _____ [3]

(d) Calculate the index number for 2021

Answer _____ [3]

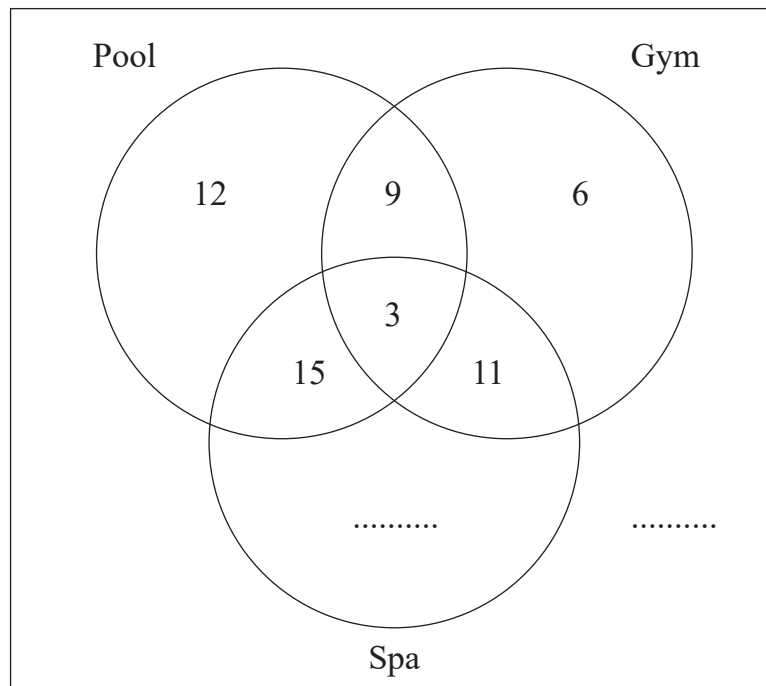


5 Stacey investigated the leisure facilities offered by various hotels.

She looked at 65 hotels and recorded how many had a pool, a gym or a spa.

She found that 32 of the hotels had a spa.

(a) Use the information provided to complete the Venn diagram below.



[2]



One of the hotels is chosen at random.

(b) Work out the probability that this hotel has:

(i) a spa and a gym but not a pool;

Answer _____ [2]

(ii) only one of the three leisure facilities.

Answer _____ [2]

One of the hotels with a pool is chosen at random.

(c) Work out the probability that this hotel has a gym.

Answer _____ [2]

[Turn over

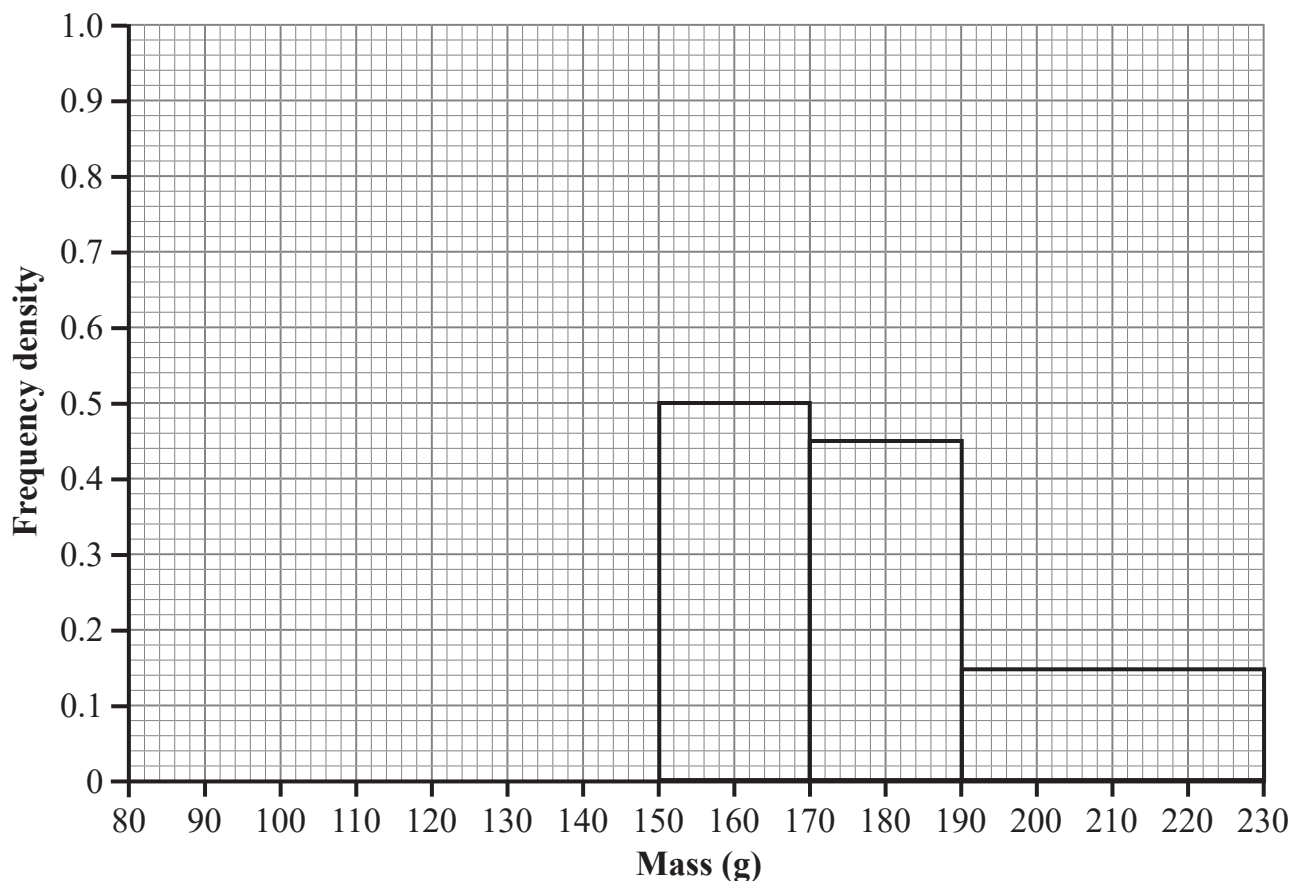


6 The masses, in grams (g), of a sample of oranges in a supermarket were recorded.

The results are shown in the partially completed frequency table and partially completed histogram.

Mass (g)	Frequency		
$80 < x \leq 120$	4		
$120 < x \leq 140$	12		
$140 < x \leq 150$	9		
$150 < x \leq 170$			
$170 < x \leq 190$	9		
$190 < x \leq 230$	6		

(a) Complete the frequency table above and the histogram below.



[4]



Hugh says the supermarket does not have any oranges which have a mass of more than 230 g.

(b) Explain, with a reason, whether or not you think Hugh is correct.

[2]

[Turn over



7 Hope believes that ticket prices to cinemas are related to the number of visitors to the cinemas.

(a) (i) Which of the following should Hope use as her hypothesis?

Tick the correct box.

Cinemas with more visitors charge more for entry tickets.

Do cinemas with more visitors charge more for entry tickets?

[1]

(ii) Give a reason for your choice.

_____ [1]

To investigate her hypothesis, Hope gathers data about the total visitors in one week for eight cinemas and the average ticket price for each cinema.

Her results are presented in the table below.

Cinema	A	B	C	D	E	F	G	H
Total visitors in one week	110	323	770	64	501	447	882	269
Average ticket price (£)	5.75	4.75	8.00	6.80	3.20	7.40	6.15	5.45



(b) (i) Calculate Spearman's rank correlation coefficient for the data in the table opposite.

You may use the blank rows in the table.

Round your answer to three decimal places.

Answer _____ [4]

(ii) What conclusion could Hope reach about her hypothesis?

[2]

[Turn over



- 8 The table below shows the average cost of the ingredients for making a batch of scones between 2019 and 2023

	2019	2020	2021	2022	2023
Average cost (£)	24	31	35	40	43
Chain base index number	100	129.2		114.3	107.5

- (a) Calculate the missing chain base index number for 2021

Answer _____ [2]

- (b) Explain the meaning of the chain base index number for 2022

[3]

- (c) Calculate the geometric mean for the five chain base index numbers from 2019 to 2023

Answer _____ [2]



(d) Give an interpretation of your answer to part (c).

[2]

Carl makes a batch of scones using flour, butter and sugar.

The amount he spent on each ingredient in 2022 and 2023 is shown in the table below.

	2022	2023	Weighting
Flour	200p	232p	50
Butter	270p	297p	37.5
Sugar	16p	18p	12.5

(e) Using 2022 as the base year, calculate the weighted index number for 2023

Answer _____ [4]

[Turn over



- 9 A factory has two machines, Machine A and Machine B, which are used to fill 65 kg bags of fertiliser.

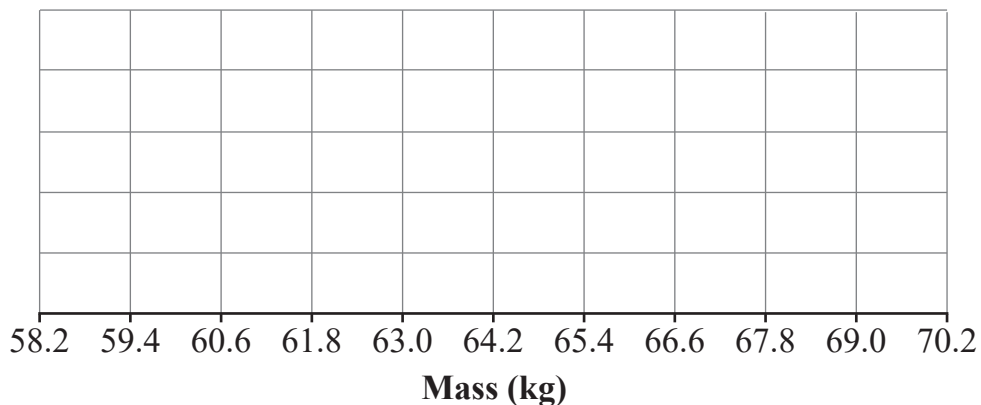
Over a period of time it is found that the masses of the bags filled by Machine A are normally distributed with mean 64.2 kg and standard deviation of 1.2 kg.

- (a) Work out the boundaries within which 68% of the masses from Machine A lie between.

Lower boundary _____ kg [1]

Upper boundary _____ kg [1]

- (b) On the grid below, sketch the distribution of the masses of the bags of fertiliser from Machine A.



A bag of fertiliser weighs 60.8 kg.

- (c) Use a suitable calculation below to decide whether or not the mass of this bag is an outlier for Machine A.

[4]



The masses (x), in kilograms, of 10 bags of fertiliser from Machine B are recorded.

The results are summarised as follows:

$$\sum x = 651 \qquad \sum x^2 = 42382.7$$

(d) (i) Calculate the mean of these masses.

Answer _____ kg [1]

(ii) Calculate the standard deviation of these masses.

Answer _____ kg [3]

(e) Use the information provided and your answers to parts (d)(i) and (d)(ii) to compare the reliability of Machine A and Machine B.

[5]

[Turn over



10 56% of all customers who enter an optician's shop are male.

(a) Calculate the probability that the next two customers are female.

[2]

Five customers enter the shop during one hour.

(b) Jonny decides to use the binomial distribution to model the number of male customers who enter the shop during this hour.

(i) Explain why the binomial distribution could be a suitable model to use.

[2]

(ii) For this model, write down the number of trials, n , and the probability of a success, p .

$n =$ _____ [1]

$p =$ _____ [1]



- (c) Calculate the probability there will be at least four male customers during one hour.

You may use $(p + q)^5 = p^5 + 5p^4q + 10p^3q^2 + 10p^2q^3 + 5pq^4 + q^5$

Answer _____ [3]

- (d) Work out the most likely number of male customers during one hour.

You may use $(p + q)^5 = p^5 + 5p^4q + 10p^3q^2 + 10p^2q^3 + 5pq^4 + q^5$

Answer _____ [4]

THIS IS THE END OF THE QUESTION PAPER



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For Examiner's use only	
Question Number	Marks
1	
2	
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10	

Total Marks	
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Examiner Number

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