Surname								
Other Names								
Candidate Signature								
Centre Number			Candidate Number	er				
Examiner Comments						Tota	al Mari	ks
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MATHEMATICS

AS PAPER 2

CM

Bronze Set B (Edexcel Version)

Time allowed: 1 hour and 15 minutes

Instructions to candidates:

- In the boxes above, write your centre number, candidate number, your surname, other names and signature.
- Answer ALL of the questions.
- You must write your answer for each question in the spaces provided.
- You may use a calculator.

Information to candidates:

- Full marks may only be obtained for answers to ALL of the questions.
- The marks for individual questions and parts of the questions are shown in round brackets.
- There are 9 questions in this question paper. The total mark for this paper is 60.

Advice to candidates:

- You should ensure your answers to parts of the question are clearly labelled.
- You should show sufficient working to make your workings clear to the Examiner.
- Answers without working may not gain full credit.







Section A: Statistics

Some of the disks are empty. The probability of picking an empty disk from	om the bag is 0.1.						
Alex picks 30 disks from the bag.							
(a) Find the probability that none of the disks are empty.	(2						
(b) Find the probability that at most 2 disks are empty.	(3						



Question 1 continued	
	TOTAL 5 MARKS





2	A factory produces 10000 lightbulbs each day. In the previous year, the factory did an investigation and found that every 1 in 80 lightbulbs are faulty. A customer thinks this is incorrect and that proportion of faulty lightbulbs is higher. The factory investigates this claim	m.
	On a particular day, the factory takes a small random sample of 1% of the lightbulbs they produced and find that 3 are faulty.	
	(a) Explain why a census would be an inappropriate data selection process for the factory.	(1)
	(b) Using a 5% level of significance, investigate the customer's claim.	
	State your hypotheses clearly.	(5)



Question 2 continued	
TOTAL 6 MARKS	





3 A new online quizzing website is created.

The times taken, *t* minutes, for individuals to complete one of the quizzes is recorded. The data is summarised in the following grouped frequency table.

Time (t minutes)	Number of individuals
0 – 5	23
5 – 10	12
10 – 20	42

(a) Use interpolation to find an estimate for the median of these data.	(3)
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The mid-point of each class was represented by x and its corresponding frequency by f giving

$$\sum fx = 777.5 \qquad \sum fx^2 = 10268.75$$

(b) Calculate an estimate for the mean and standard deviation of these data.Show your working clearly.(3)

To compensate for the unresponsiveness of the website, the times are converted into seconds and then 20 seconds is subtracted from each time.

(c) Calculate an estimate for the mean and standard deviation of the converted times.

Give your answers in seconds. (3)

Question 3 continued	
	TOTAL 9 MARKS





4 Nikita is investigating the relationship between daily mean temperature, T °C, and rainfall, r mm, for different regions around the world over a 10 year period.

She takes a random sample of 10 days from 2015 for Leeming from the large data set. She obtained the following data.

T	17.6	12.5	17.1	14.4	14.5	18.4	19.7	16.6	16.2	17.2
r	2.6	1.6	1.8	10	2.6	4.6	15.2	1.8	10.4	2.0

Nikita drew the scatter graph in Figure 1 for *T* and *r* and calculated the quartiles.

	Q_1	Q_2	Q_3
T	14.5	16.9	17.8
r	1.8	2.6	10.1

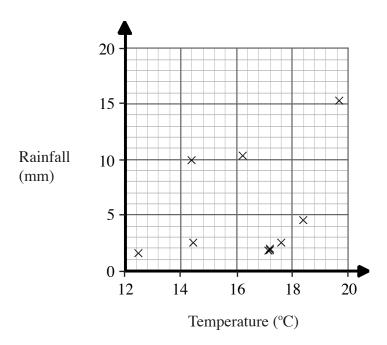


Figure 1

A data point is considered an outlier if it more than 1.5 times the interquartile range above the upper quartile or less than 1.5 times the interquartile range below the lower quartile.

(a) Determine whether the data has any outliers according to this measure. (2)

Mark is familiar with the large data set and believes Nikita's sample is unlikely to be random.

- (b) Using your knowledge of the large data set, give a reason to justify Mark's belief. (1)
- (c) Interpret Figure 1 in relation to Nikita's investigation. (1)



Mark uses all the data from Leeming in 2015 to calculate the equation of the regression line for r on T. He calculates the equation of the regression line to be

$$r = 2.767 - 0.0424T$$

(d) Explain the meaning of the figure –0.0424 in the regression line. (1)

Figure 2 below shows a scatter graph drawn for T and r using all the data from Leeming in 2015.

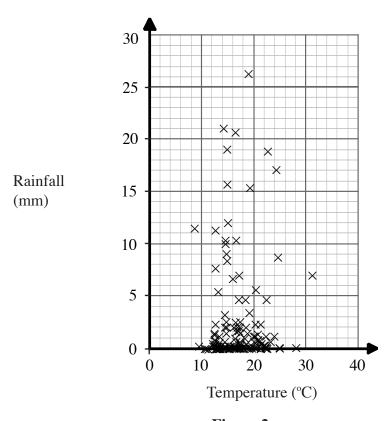


Figure 2

- (e) Use Figure 2 to comment on the suitability of Mark's regression line for these data. (1)
- (f) (i) Explain how Figure 2 is inconsistent with Figure 1 in relation to Nikita's investigation. (1)
 - (ii) Suggest how Nikita can improve her data collection method to avoid these inconsistencies. (1)
- (g) Outline two limitations of the large data set for the purposes of Nikita's investigation. (2)



Question 4 continued



Question 4 continued
TOTAL 10 MARKS
TOTAL FOR SECTION A IS 30 MARKS





Section B: Mechanics	
Unless otherwise indicated, whenever a numerical value of g is required, take $g = 9.8 \text{ m s}^{-2}$ and give your answer to either 2 significant figures or 3 significant figures.	
5 [In this question, i and j are unit vectors due east and due north respectively.]	
A particle P moves with constant velocity $6\mathbf{i} - 9\mathbf{j}$.	
(a) Find the speed of the particle P .	(1)
(b) Find the direction of the motion of the particle <i>P</i> . Give your answer as a bearing.	(2)
The particle Q moves parallel to P with velocity $-\mathbf{i} + k\mathbf{j}$, where k is a constant.	
(c) Write down the value of <i>k</i> .	(1)

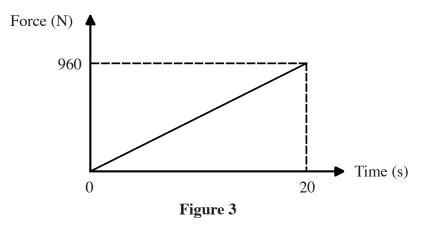


Question 5 continued
TOTAL 4 MARKS





6 A car, of mass 800 kg, accelerates for 20 seconds along a straight road. Figure 3 below shows how the resultant force acting on the car varies with time as it accelerates.



(a) Show that the acceleration, $a \text{ m s}^{-2}$, of the car at time t seconds can be given by $a = \frac{3}{50}t$ for $0 \le t \le 20$.

The initial velocity of the car is 8 m s⁻¹.

(1) (1)	1 4 41 4 4 1 1 4	ance travelled by the	' 41 00 1	• 1	-
(n) (a	illate the total dist	ance travelled by the <i>i</i>	car in the All second	period	-
(U) Can	onaic inc total dist	ance havened by the	cai ili uic 20 second	DCITOU.	\sim 1

Question 6 continued	
	TOTAL 7 MARKS





7		n a
rough horizontal surface. At time $t = 0$, the block passes the point A with speed 2 m/s and at time $t = 4$ s, the block passes the point B with speed 7 m/s. The block accelerates uniformly.		
	(a) Calculate the magnitude of the acceleration of the block.	(1)
	The magnitude of the frictional force acting on the block is μR N, where μ is a constant and is the magnitude of the normal reaction force between the block and the surface.	d R
	(b) Determine the value of the constant μ .	(5)



Question 7 continued	
	TOTAL 6 MARKS





8

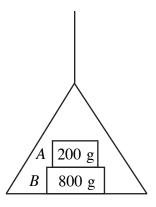


Figure 4

A light lift is attached to a vertical light inextensible string. The lift carries the masses A and B. The mass of A is 200 g and the mass of B is 800 g. Mass A rests on top of mass B as shown in Figure 4 above. The lift is raised vertically at 3 m s⁻².

/	 a) Find the tension 	1	
	al Hind the tencion	in the ctring	(7)
١.	17 FIHA HIC ICHSION	i ili ulic su ilip.	(4)

- (b) Calculate the magnitude of the force exerted on A by B. (3)
- (c) Write down the magnitude of the force exerted on B by A. (1)
- (d) Explain how you have used the fact that lift is light in your calculations. (1)



Question 8 continued	
	TOTAL 7 MARKS





9	9 A ball is projected vertically upwards from the ground with a speed of <i>u</i> m/s. The point <i>P</i> is 10 m above the ground. The ball is modelled as a particle that moves freely under the influence of gravity.		
	Given that the ball passes through the point P ,		
	(a) find the range of values of u .	(2)	
	Given that $u = 20$,		
	(b) find the length of time for which the ball is 12 m above the ground.	(4)	



Question 9 continued	
TOTAL 6 M	IARKS
TOTAL FOR SECTION B IS	S 30 MARKS
TOTAL FOR PAPER IS	6 60 MARKS
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