Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

MATHEMATICS

AS PAPER 2

CM

Bronze Set A (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.

1 0 3 3 1 2 2 1 8 0 0 0 4

Section A: Statistics

1 Two variables x and y are linked by the relationship $y = 12x - 6$.

The mean of the variable y is 10.

The standard deviation of the variable x is 2.34.

(a) Find the mean of the variable x. **(2)**

(b) Find the standard deviation of the variable y. **(2)**

Question 1 continued

TOTAL 4 MARKS

2 Alex is collecting information about weather patterns in different regions around the world.

He uses the large data set to collect some of this information.

He gains information about weather in the UK by looking at the data for Leuchars in 2015.

As part of his investigation, Alex calculates the average daily mean temperature for each month in Leuchars. His calculations are shown in the table below to one decimal place. The data are not in month order.

Month	*A*	*B*	*C*	*D*	*E*	*F*
Average daily mean temperature (°C)	18.0	13.8	14.0	17.3	16.3	19.1

Month *B* had the lowest daily mean temperature.

(a) Using your knowledge of the large data set, suggest, giving a reason, the month corresponding to *B*. **(1)**

(b) Suggest why giving Alex's calculations to one decimal place in the table is suitable. **(1)**

To gather information on cloud cover in the UK, he takes a simple random sample of 38 data points from Leuchars in 2015 and calculates the mean.

(c) Describe how Alex can use simple random sampling to obtain a sample of 38 data points from the large data set. **(2)**

The data collected by Alex is summarised in the table below.

Cloud cover	0	1	2	3	4	5	6	7	8
Frequency	2	0	3	1	5	8	5	4	10

(d) Calculate the mean of Alex's data. **(1)**

(e) Calculate the standard deviation of these data and state the units. **(2)**

(f) State **one** limitation of how Alex has used the large data set for his study. **(1)**

(g) Explain why Alex should not only use the large data set for the purpose of his study. **(1)**

Question 2 continued

TOTAL 9 MARKS

3 In a communications centre, it is suggested that in 3% of calls, customers are accidentally disconnected from the call. A manager holds a team meeting in an attempt to reduce the number of customers that are accidentally disconnected from calls. The manager thinks her meeting was effective and there will be reduction in the number of disconnected calls. After the meeting, the manager monitors 200 calls and finds that 4 calls are disconnected accidentally.

Using a 10% level of significance, test the manager's claim. State your hypotheses clearly. **(5)**

Question 3 continued

TOTAL 5 MARKS

4 The amount of money, M pounds, raised by individuals in a fundraising competition is recorded. The recorded data is summarised in a grouped frequency table and then represented on a histogram.

(a) Justify the use of a histogram to represent these data. **(1)**

(b) Write down the underlying feature associated with each of the bars of a histogram. **(1)**

One of the classes in the grouped frequency table is $100 \leq M < 120$ and its associated frequency is 40. The bar representing this class on the histogram has a height of 4 cm and width of 2 cm. Another class in the grouped frequency table is $50 \leq M < 80$ and its associated frequency is 80.

(c) Find the width and height of the bar representing the class $50 \leq M < 80$. **(3)**

The mean amount of money raised per individual was £102.

Given that the total area under the histogram is 52 cm^2,

(d) estimate the total amount of money fundraised by all the people in the competition. **(3)**

Question 4 continued

Question 4 continued

Question 4 continued

TOTAL 8 MARKS

5 The random variable X has the probability distribution

$$P(X = x) = \begin{cases} \dfrac{x^2 + 1}{k} & x = -1,\ 0,\ 1,\ 2 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant.

The random variable $Y = 2X - 1$.

Find $P(-3 < Y \leq 2)$. **(4)**

Question 5 continued

TOTAL 4 MARKS

TOTAL FOR SECTION A IS 30 MARKS

Section B: Mechanics

Unless otherwise indicated, whenever a numerical value of g is required, take $g = 9.8$ m s^{-2} and give your answer to either 2 significant figures or 3 significant figures.

6 At time $t = 0$, a particle passes the point A with velocity -4 m s^{-1}. The particle accelerates uniformly for 4 seconds until it is moving with a velocity 2 m s^{-1}. The particle then accelerates at a different uniform rate for 2 more seconds until it reaches a speed V m s^{-1}. The particle maintains this speed for 4 seconds until it passes through the point B.

(a) Sketch a velocity-time graph for the motion of the particle between A and B. **(2)**

(b) Calculate the acceleration of the particle in the first 4 seconds of its motion. **(1)**

(c) Find the time at which the particle is at rest. **(2)**

Given that the total **displacement** of the particle between A and B is 13 m,

(d) find the value of V. **(3)**

Question 6 continued

TOTAL 8 MARKS

7 The particle P moves in a straight line on the x-axis.

At time t s, the velocity of the particle is v m s^{-1}, where

$$v = at^2 + b, \quad t \geq 0$$

and $a > 0$ and $b > 0$.

The initial velocity of the particle is 4 m s^{-2}.

The distance travelled by the particle in the third second of its motion is 61 m.

(a) Find the values of a and b. **(4)**

Given that at $t = 4$ s, the magnitude of the instantaneous force acting on P is 10 N,

(b) find the mass of the particle. **(2)**

Question 7 continued

TOTAL 6 MARKS

8 *[In this question,* **i** *and* **j** *are unit vectors directed due east and due north respectively.]*

Starting from the point O at time $t = 0$, the boat B_1 moves with a constant velocity vector $(4\mathbf{i} - 6\mathbf{j})$ m s^{-1}.

(a) Find the speed of the boat B_1. **(1)**

(b) Find the bearing of the boat's path. **(2)**

The displacement, **s** m, from the point O of another boat B_2 at time t seconds is given by

$$\mathbf{s} = 2\mathbf{i} + (3 - 4t)\mathbf{j}$$

(c) Write down an expression for the displacement of B_1 from O at time t. **(1)**

(d) Show that the two boats do not meet. **(3)**

Question 8 continued

TOTAL 7 MARKS

9

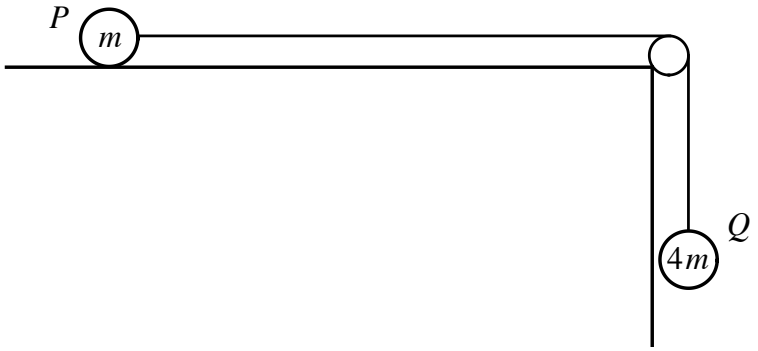

Figure 1

The particle P lies at rest on a rough horizontal table and is connected to one end of a light inextensible string. The light inextensible string passes over a small smooth pulley that is fixed to edge of the table. The other end of the string is attached to the particle Q, which hangs freely, as shown in Figure 1 above.

The mass of P is m kg and the mass of Q is $4m$ kg.

The magnitude of the frictional force between P and the table is modelled as μR N, where μ is a constant and R is the magnitude of the normal contact force between P and the table.

The system is released from rest.

The magnitude of the acceleration of P is $0.7g$ m s^{-2}, where g is the acceleration due to gravity.

(a) Explain why the acceleration of Q is also $0.7g$ m s^{-2}. **(1)**

(b) Find the tension in the string. **(2)**

(c) Using the model, find the value of μ. **(3)**

(d) Calculate the magnitude and direction of the resultant force exerted by the string on the pulley. **(3)**

Question 9 continued

Question 9 continued

Question 9 continued

TOTAL 9 MARKS

TOTAL FOR SECTION B IS 30 MARKS

TOTAL FOR PAPER IS 60 MARKS