

Write your name here

Surname

Other names

**Pearson Edexcel**  
**Level 3 GCE**

Centre Number

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Candidate Number

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# Mathematics

**Advanced Subsidiary**

**Paper 2: Statistics and Mechanics**

Sample Assessment Material for first teaching September 2017

**Time: 1 hour 15 minutes**

Paper Reference

**8MA0/02**

**You must have:**

Mathematical Formulae and Statistical Tables, calculator

Total Marks

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**Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for algebraic manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

## Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- There are **two** sections in this question paper. Answer **all** the questions in Section A and **all** the questions in Section B.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

## Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 9 questions in this question paper. The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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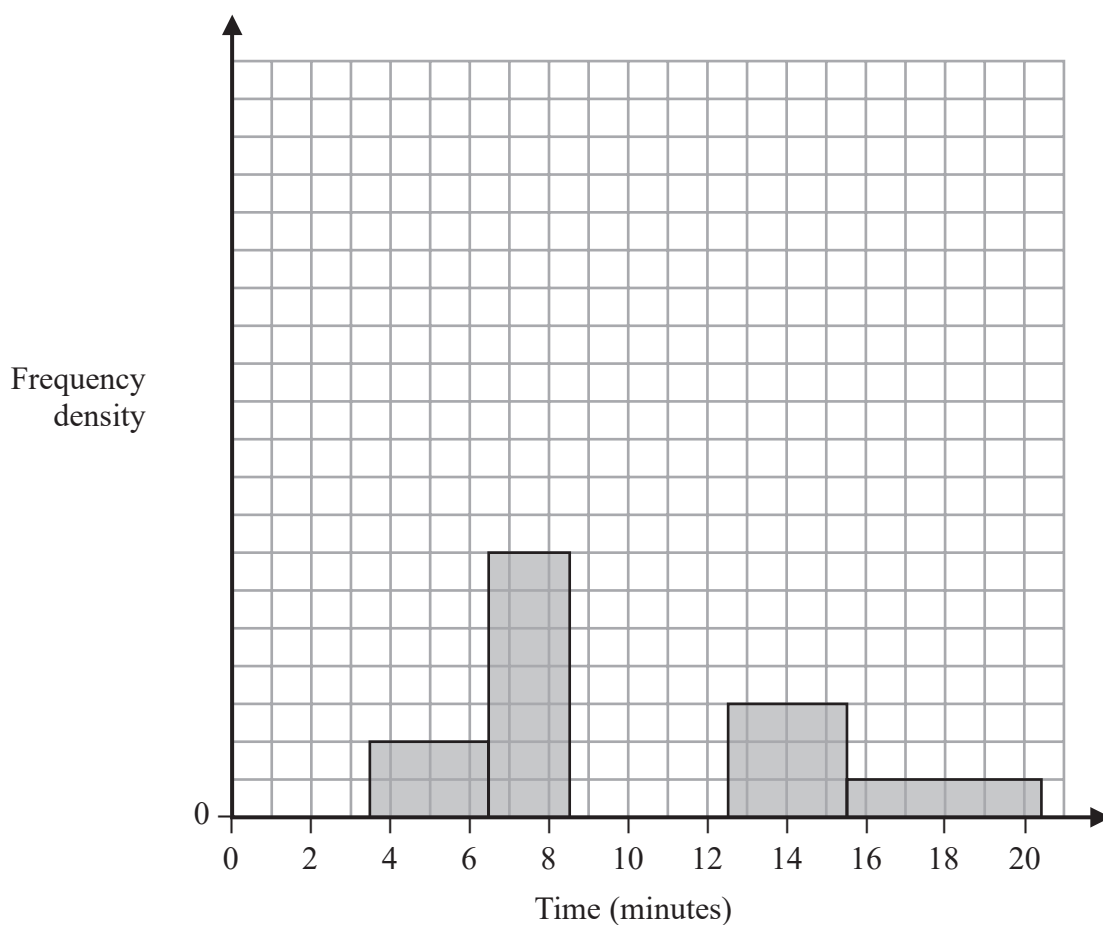


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2. The partially completed histogram and the partially completed table show the time, to the nearest minute, that a random sample of motorists was delayed by roadworks on a stretch of motorway.



Delay (minutes)	Number of motorists
4 – 6	6
7 – 8	
9	17
10 – 12	45
13 – 15	9
16 – 20	

Estimate the percentage of these motorists who were delayed by the roadworks for between 8.5 and 13.5 minutes.

(5)







4. Sara was studying the relationship between rainfall,  $r$  mm, and humidity,  $h\%$ , in the UK. She takes a random sample of 11 days from May 1987 for Leuchars from the large data set.

She obtained the following results.

$h$	93	86	95	97	86	94	97	97	87	97	86
$r$	1.1	0.3	3.7	20.6	0	0	2.4	1.1	0.1	0.9	0.1

Sara examined the rainfall figures and found

$$Q_1 = 0.1 \quad Q_2 = 0.9 \quad Q_3 = 2.4$$

A value that is more than 1.5 times the interquartile range (IQR) above  $Q_3$  is called an outlier.

- (a) Show that  $r = 20.6$  is an outlier. (1)

(b) Give a reason why Sara might:

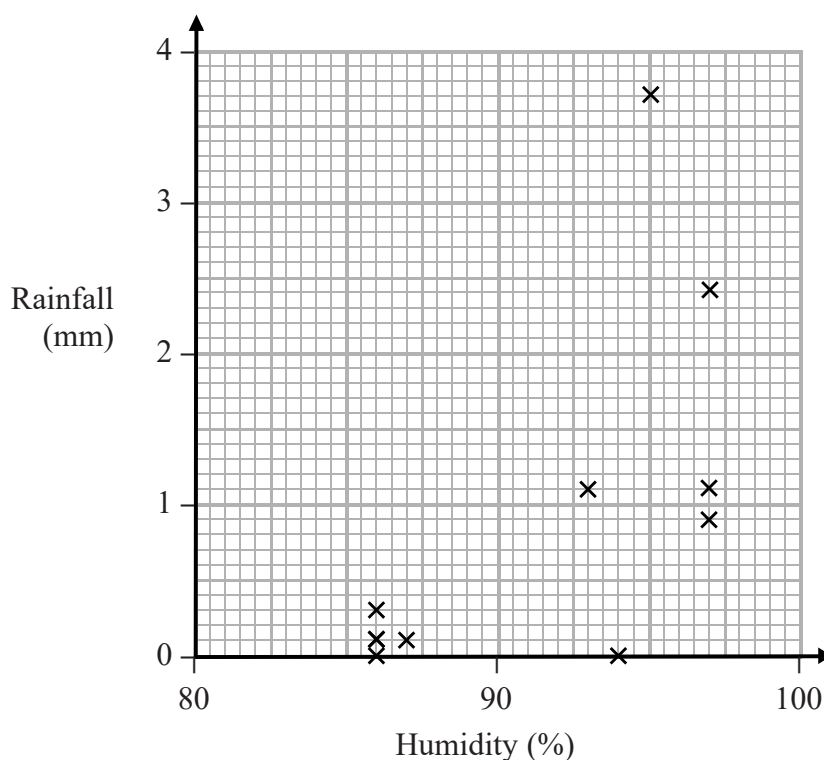
(i) include

(ii) exclude

this day's reading.

(2)

Sara decided to exclude this day's reading and drew the following scatter diagram for the remaining 10 days' values of  $r$  and  $h$ .



- (c) Give an interpretation of the correlation between rainfall and humidity. (1)













7. A car is moving along a straight horizontal road with constant acceleration. There are three points  $A$ ,  $B$  and  $C$ , in that order, on the road, where  $AB = 22$  m and  $BC = 104$  m. The car takes 2 s to travel from  $A$  to  $B$  and 4 s to travel from  $B$  to  $C$ .

Find

- (i) the acceleration of the car,  
(ii) the speed of the car at the instant it passes  $A$ .

(7)

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9.

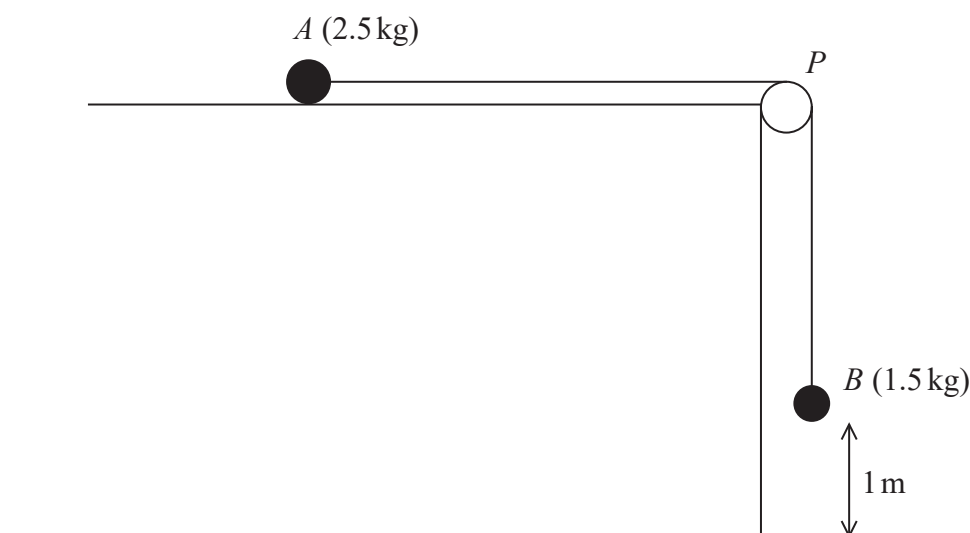


Figure 2

A small ball  $A$  of mass  $2.5 \text{ kg}$  is held at rest on a rough horizontal table.

The ball is attached to one end of a string.

The string passes over a pulley  $P$  which is fixed at the edge of the table. The other end of the string is attached to a small ball  $B$  of mass  $1.5 \text{ kg}$  hanging freely, vertically below  $P$  and with  $B$  at a height of  $1 \text{ m}$  above the horizontal floor.

The system is released from rest, with the string taut, as shown in Figure 2.

The resistance to the motion of  $A$  from the rough table is modelled as having constant magnitude  $12.7 \text{ N}$ . Ball  $B$  reaches the floor before ball  $A$  reaches the pulley.

The balls are modelled as particles, the string is modelled as being light and inextensible, the pulley is modelled as being small and smooth and the acceleration due to gravity,  $g$ , is modelled as being  $9.8 \text{ m s}^{-2}$ .

- (a) (i) Write down an equation of motion for  $A$ .
- (ii) Write down an equation of motion for  $B$ . (4)
- (b) Hence find the acceleration of  $B$ . (2)
- (c) Using the model, find the time it takes, from release, for  $B$  to reach the floor. (2)
- (d) Suggest two improvements that could be made in the model. (2)

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