

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel
Level 3 GCE**

Centre Number

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Candidate Number

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Thursday 16 May 2019

Afternoon

Paper Reference **8FM0-23**

Further Mathematics

Advanced Subsidiary

Further Mathematics options

23: Further Statistics 1

(Part of options B, E, F and G)

You must have:

Mathematical Formulae and Statistical Tables (Green), calculator

Total Marks

Candidates may use any calculator allowed by Pearson regulations. Calculators must not have the facility for symbolic algebra 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.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- 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.
- The total mark for this part of the examination is 40. There are 4 questions.
- 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.

Turn over ►

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2. A spinner used for a game is designed to give scores with the following probabilities

Score	1	2	3	4	6
Probability	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{2}{5}$	$\frac{1}{10}$

The spinner is spun 80 times and the results are as follows

Score	1	2	3	4	6
Frequency	15	4	12	41	8

Test, at the 10% level of significance, whether or not the spinner is giving scores as it is designed to do. Show your working and state your hypotheses clearly.

(7)

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4. The discrete random variable X has probability distribution

x	-3	-1	1	2	4
$P(X = x)$	q	$\frac{7}{30}$	$\frac{7}{30}$	q	r

where q and r are probabilities.

(a) Write down, in terms of q , $P(X \leq 0)$ (1)

(b) Show that $E(X^2) = \frac{7}{15} + 13q + 16r$ (2)

Given that $E(X^3) = E(X^2) + E(6X)$

(c) find the value of q and the value of r (7)

(d) Hence find $P(X^3 > X^2 + 6X)$ (4)

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