

Pearson Edexcel Level 3 Certificate

Wednesday 22 May 2019

Morning (Time: 1 hour 40 minutes)

Paper Reference **7MC0/02**

Mathematics in Context

Paper 2: Applications

Source booklet

Do not return this source booklet with the question paper

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Formulae sheet

There will be no credit for anything you write on this formulae sheet.

Mean of a frequency distribution $= \frac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \frac{\sum fx}{\sum f}$, where x is the mid-interval value

Variance $= \frac{\sum (x - \bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum (x - \bar{x})^2}{n} \right]}$

where $\bar{x}$ is the mean of the set of values

Standard deviation
(discrete frequency distribution) $\sqrt{\left[\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum f(x - \bar{x})^2}{\sum f} \right]}$

Spearman's rank correlation coefficient $1 - \frac{6\sum d^2}{n(n^2 - 1)}$

The product moment correlation coefficient is

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}} = \frac{\sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{\sqrt{\left(\sum x_i^2 - \frac{(\sum x_i)^2}{n}\right)\left(\sum y_i^2 - \frac{(\sum y_i)^2}{n}\right)}}$$

The regression coefficient of y on x is $b = \frac{S_{xy}}{S_{xx}}$

Least squares regression line of y on x is $y = a + bx$ where $a = \bar{y} - b\bar{x}$

Arithmetic series

$$u_n = a + (n - 1)d$$

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_\infty = \frac{a}{1 - r} \text{ for } |r| < 1$$

There will be no credit for anything you write in this source booklet.

SECTION A: AIR TRAVEL

The following tables show information about flight delays, to the nearest minute, at Heathrow airport in 2005 and 2015

2005	
Delay (minutes)	Number of flights
0–15	319 099
16–30	74 708
31–60	48 687
61–180	23 679
181–360	1 983
Total	468 156

2015	
Delay (minutes)	Number of flights
0–15	354 461
16–30	57 334
31–60	36 564
61–180	18 810
181–360	1 838
Total	469 007

Adapted from <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Flight-reliability/Datasets/UK-flight-punctuality-data/>

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