

Pearson Edexcel Level 3 Certificate

Mathematics in Context

Paper 2: Applications

Wednesday 24 May 2017 – Morning

Source booklet

Paper Reference

7MC0/02

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Formulae sheet

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

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

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

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

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

or

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

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

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

or

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

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

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

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

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

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

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SECTION A: Energy Costs

There are three ways to pay for electricity

- standard credit
- direct debit
- prepayment

People pay different rates depending on their payment method.

Electricity is supplied to users by either

- home suppliers – the electricity company that originally supplied to all homes in the area
- or
- non-home suppliers – a different electricity company other than the original supplier.

Data Source A

Table 1 Average annual domestic standard electricity bills, (£), by home and non-home supplier based on consumption of 3,800 kWh/year for the United Kingdom

	Pounds											
	Standard credit				Direct debit				Prepayment			
	Home suppliers	Non-home suppliers	All consumers	Home suppliers	Non-home suppliers	All consumers	Home suppliers	Non-home suppliers	All consumers	Home suppliers	Non-home suppliers	All consumers
Cash terms												
1996	-	-	336	-	-	330	-	-	-	-	-	359
1997	-	-	322	-	-	315	-	-	-	-	-	342
1998	-	-	303	-	-	293	-	-	-	-	-	323
1999	301	277	299	290	265	287	318	306	318	306	306	318
2000	294	273	291	283	262	278	312	309	311	309	309	311
2001	288	268	283	278	258	271	304	297	303	297	297	303
2002	290	264	282	281	253	269	306	290	300	290	290	300
2003	292	268	283	282	257	270	304	296	301	296	296	301
2004	300	275	291	292	262	277	318	299	311	299	299	311
2005	334	308	322	321	291	305	350	337	345	337	337	345
2006	388	376	382	371	343	355	402	414	407	414	414	407
2007	442	408	428	420	378	395	450	441	446	441	441	446
2008	511	468	492	489	430	454	521	507	514	507	507	514
2009	532	481	507	501	446	466	535	501	519	501	501	519
2010	517	469	493	484	436	453	522	489	505	489	489	505
2011	554	515	533	516	481	493	558	529	542	529	529	542
2012	584	549	565	543	511	521	588	552	568	552	552	568
2013	621	588	602	579	548	557	625	594	605	594	594	605
2014	641	602	619	590	560	570	646	608	623	608	608	623
% Change												
2013-2014	+3.2	+2.4	+2.8	+1.9	+2.2	+2.3	+3.4	+2.4	+3.0	+2.4	+2.4	+3.0

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