Level 3 Certificate in Using and Applying Mathematics Paper 2: Mathematical Comprehension and Communicating with mathematics

Sample assessment 2

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You should have the following for this examination

- a clean copy of the pre-release material
- pen with black or blue ink
- pencil
- 30cm ruler
- calculator
- graph paper.

General instructions

- There are **60 marks** for this paper.
- You have 2 hours to complete this paper.
- Answer all of the questions.
- Write all working out and answers in this booklet.
- There are **two** parts to this paper
  Part 1: Mathematical comprehension
  Part 2: Communicating with mathematics.
- You are advised to divide your time equally between the two parts.

You may use

- A scientific or graphical calculator.
- A PC installed with the following standard application office software:
  - word processor
  - spreadsheet
  - database
  - graphics and presentation packages.

You must not use

- internet
- email
- internal or externally saved files
- mobile phones.

Marks available and weighting:

Paper 2	**Component**	**Maximum raw mark**	**Scaling Factor**	**Maximum scaled mark**
Part 1 a) 32 marks b) 28 marks	Mathematical comprehension	60	0.5	**30 marks**
Part 2 30 marks	Communicating with mathematics	30	1	**30 marks**

Part 1: Mathematical comprehension.
You should spend about one hour working on this part.

(a) Refer to *Debtor days* in the pre-release material.

1. Give **two** different spreadsheet formulae that might be used to calculate the company's 3 month total in cell I12.

(4 marks)

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2. If the number of working weeks shown in the spreadsheet of **Figure 1** had been taken to be 13 would this have raised or lowered the calculated value of debtor days?
Explain your reasoning.

(4 marks)

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3.

(a) What is the value of the sales tax applied in the calculations shown in the spreadsheet of **Figure 1**?
Explain how you know this.

(3 marks)

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(b) Give a formula that could be used in cell I20 to calculate the value of DEBTORS without sales tax.

(2 marks)

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4. The values of *debtor days* for Birmingham and Manchester vary by only 3 days. What can you deduce from this?

(2 marks)

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5. If the sales tax was charged at a different rate is it likely to affect the *debtors days* indicator? Explain your reasoning.

(2 marks)

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6. The company's sales in construction and engineering in March were £65,924 and £42,611 respectively.

The value of DEBTORS at the end of March was £135,623 in construction and £56,207 in engineering.

Take the number of working weeks in the three months January, February and March to be 13.

Calculate values of *debtor days* for (i) construction and (ii) engineering and (iii) the company overall for these three months.

(9 marks)

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7. Calculate the value of *debtor* days in the month of August for the company overall using values from the spreadsheet in **Figure 2**. Show all your calculations.

(3 marks)

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8. A **weighted** moving average gives more weighting to the most recent months' data.

For three mean values m_1, m_2, and m_3 the weighted moving average m is calculated using $m = \frac{3m_3 + 2m_2 + m_1}{6}$ where m_3 is the value for the most recent month, m_2, is the value for the previous month and m_1 is the value from two months earlier.

For February calculate the value of this weighted moving average.

(3 marks)

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(Part A total 32 marks)

(b) Refer to *Designing for comfort* in the pre-release material.

9. The article states that in the example of hanging paintings "To ensure that both men and women are satisfied the designer would be advised to hang each painting so that its centre is between 1576 mm and 1602 mm above the floor." Explain how this conclusion has been reached based on the results of the calculations given in the article.

(2 marks)

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10. In the example which calculates the maximum height of a shelf in a supermarket, the equation $z = 1.28 = \frac{1901 - x}{80}$ is solved to find $x = 1799$

Draw a sketch of the standardised normal distribution and indicate clearly the z-value of 1.28.

(2 marks)

11. Write a brief explanation of what is meant by the 25th percentile of a population.

(2 marks)

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12. For a population that is normally distributed what percentage lies within ± 1 standard deviation of the mean? Illustrate this on a diagram.

(3 marks)

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13. (a) Show detailed calculations that confirm that for the total population of the UK the standard deviation, σ, of the vertical reach grip is 133mm.

(4 marks)

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(b) Explain why the standard deviation for men and women together is greater than it is for each of men and women separately.

(2 marks)

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14. (a) In a kitchen the base of a sink is 800 mm from the floor. Find the percentage of men who have a fist height above 800 mm. These men will need to bend down slightly when using the sink.

(5 marks)

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(b) Referring to data from the article and without carrying out any further calculations, how do you know that fewer women will have to bend down at this sink?

(2 marks)

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15. When producing a car seat it needs to be designed so that it is 50 mm wider than the width that would comfortably seat 85% of **women**. The designer finds this width using dimension 19 (hip width) in the Table in **Figure 2**.

Calculate the width of the car seat using this method.

(6 marks)

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(Part B total 28 marks)

End of part 1.

Part 2: Communicating with mathematics
You should spend about one hour working on this part.

Refer to *Earnings* in the pre-release material.

Imagine you work for an organisation that supports the low-paid.

Use information from the *Earnings* data to write a convincing argument for the organisation's newsletter that sets out a case as to why the lowest paid deserve to have a pay increase.

Your work should be around a single page of A4 including any diagrams.

(30 marks)

There is space on the following pages for your article and workings, or additional inserts/printouts can be used.

End of Paper 2.