NCFE Level 3 Certificate Mathematics for Everyday Life (603/3437/X)

DATE

Paper 1: **SAMPLE**

Mark Scheme

v1.0

This mark scheme has been written by the Assessment Writer and refined, alongside the relevant questions, by a panel of subject experts through the external assessment writing process and at standardisation meetings.

The purpose of this mark scheme is to give you:

- examples and criteria of the types of response expected from a learner
- information on how individual marks are to be awarded
- the allocated assessment objective(s) and total mark for each question.

Marking guidelines

General guidelines

You must apply the following marking guidelines to all marking undertaken throughout the marking period. This is to ensure fairness to all learners, who must receive the same treatment. You must mark the first learner in exactly the same way as you mark the last.

- The mark scheme must be referred to throughout the marking period and applied consistently. Do not change your approach to marking once you have been standardised.
- Reward learners positively giving credit for what they have shown, rather than what they might have omitted.
- Be prepared to award zero marks if the learner's response has no creditworthy material.
- Do not credit irrelevant material that does not answer the question, no matter how impressive the response might be.
- The marks awarded for each response should be clearly and legibly recorded in the grid on the front of the question paper.
- If you are in any doubt about the application of the mark scheme, you must consult with your Team Leader or the Chief Examiner.

Guidelines for using the marking grid

Marks in the mark scheme are explicitly referenced against the following:

M	Method Marks: Marks available for the correct or suitable method used.
A	Accuracy Marks: Marks available for an accurate answer where the correct or suitable method has also been used. Unless otherwise stated with cao.
BOD	Benefit of the doubt: Marks available for the correct answer with no working shown.
B	Independent of other marks available used to award for a single correct answer.
G	Graph marks: marks available for completing a graph or diagram accurately.
E	Explanation: Marks available for an accurate explanation
CAO	Correct Answer only: Marks available for the correct answer- no method required.
FT	Follow through

Assessment objectives

This unit requires learners to:

AO1	Deepen competence in the selection and use of mathematical methods and techniques.
AO2	Develop confidence in representing and analysing authentic situations mathematically and in applying mathematics to address related questions and issues.
AO3	Build skills in mathematical thinking, reasoning and communication.

The weightings of each assessment objective can be found in the qualification specification.

Qu	Mark scheme	Total marks

Section 1 **Total for this section: 8 marks**

1	**Which of the following correlation coefficients (r)** best **matches this scatter graph?** Answer: **B -**0.87	**1** **AO1=1**

2	**Approximately what percentage of 6-week-old babies consume between 410ml and 432.5ml per day?** Answer: **C** 82.5%	**1** **AO1=1**

3	**If the coin is tossed five times, which of these correctly calculates the probability of getting exactly three heads?** Answer: **A** ${}^5C_3 \times (0.6)^3 \times (0.4)^2$	**1** **AO1=1**

4	**Which formula would be** best **used to find the total investment value of £6000, invested for four years at 2.1% per annum compound interest?** Answer: **D** 6000×1.021^4	**1** **AO1=1**

5	**What was the original price of the dress?** Answer: **C** £70	**1** **AO1=1**

6	**Which three inequalities describe the region R?** Answer: **B**. $x < 2y$ $x \geq 10$ $x + y \leq 60$	**1** **AO1=1**

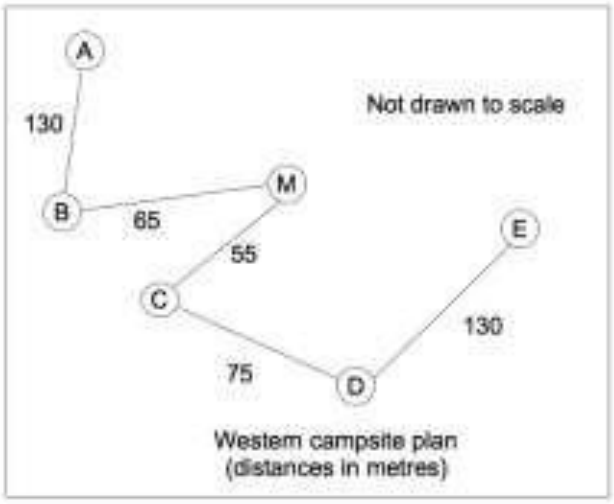
7	**Given that this chosen student studies Core Maths, what is the probability that they also study Engineering?** Answer: **D.** $\frac{16}{39}$	**1** **AO1=1**

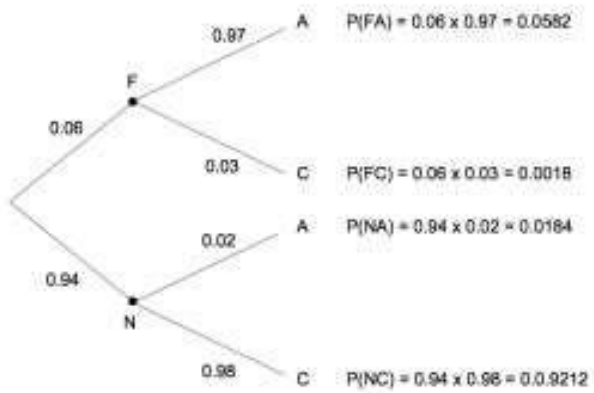
8	**What is the earliest start time for activity F?** Answer: **C** 9 days	**1** **AO1=1**

Qu	**Mark scheme**	**Total marks**

Section 2 **Total for this section: 52 marks**

9			**5**
a) What is the full price of Beryl's bike? **b)** Will Beryl have saved enough money to pay the balance in four months' time?			
Mark allocation	5		
Assessment Objective	AO2, AO3		
a) Original price of the bike = 1800 ÷ 0.9 = £2000		**A1** CAO	**1** **AO2=1**
b) Expenses = £400 + 29% of £1150 = 400 + 0.29 × 1150 = 400 + 333.50 =£733.50 Per month Beryl can save 1150 –733.50 = £416.50. In 4 months, she saves 4 × 416.50 = £1666. £1666. She will not have saved enough money because £1666 is less than £1800.		**M1 or BOD1** **M1 or BOD1** **A1** CAO **B1** using **FT.** Must show a comparison using two values, do not accept a conclusion without figures. (eg wouldn't have enough money)	**4** **AO2=4**

10		**3**
Find the total length of the shortest wooden walk ways that the leaders could construct so that it is possible to get to any of the locations directly or indirectly and represent it clearly on the diagram below..		
Mark allocation	3	
Assessment Objective	AO2	
	**M1** This will be implied by the learner giving the correct minimum connector. **A1** Correct minimum connector.	**2** **AO2=2**
455m	**B1** (CAO)	**1** **AO2=1**

<table>
<tr><td>11</td><td></td><td>6</td></tr>
<tr><td colspan="3">Given a randomly chosen bag triggers the alarm, what is the probability that it contains a forbidden item? Give your answer to three decimal places</td></tr>
<tr><td>Mark allocation</td><td colspan="2">6</td></tr>
<tr><td>Assessment Objective</td><td colspan="2">AO3</td></tr>
<tr><td colspan="2">F = bag contains a forbidden item
N = bag does not contain a forbidden item
A = alarm is triggered
C = alarm is not triggered
 
</td><td>M1 Uses a tree diagram.

G1 for left hand branches fully correct including clear labels and probabilities. (0.06, 0.94 seen)

G1 for right hand set of branches fully correct. (0.97, 0.03, 0.02, 0.98 seen)</td><td>3
AO3=3</td></tr>
<tr><td colspan="2">P (alarm sounds) = (0.06 x 0.97) + (0.94 x 0.02) = 0.0582 + 0.0184 = 0.0766

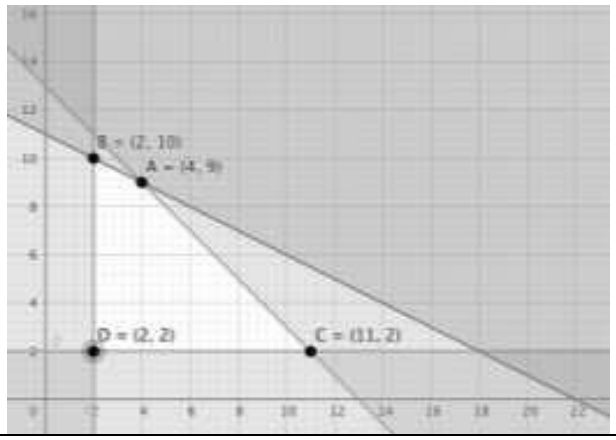
Probability (A/F) = 0.0582/0.0766 = 0.7598
= 0.760</td><td>M1 0.0582 (numerator seen)
M1 0.0766 (denominator seen)
A1 CAO</td><td rowspan="2">3
AO3=3</td></tr>
<tr><td colspan="2">Or Probability (A/F) = 0.0582/(0.0582+ 0.0184) = 0.7598</td><td>BOD2 Correct answer with no working shown</td></tr>
</table>

12		**7**
a) Construct a stem and leaf diagram to represent the data. **b)** What is the median of this data? **c)** The mean of the data is 10.7°C. Would the mean or the median be a better measure of central tendency of the data? Briefly explain your answer.		
Mark allocation	7	
Assessment Objective	AO1, AO2	
a) 0 | 0 1 2 4 6 9 1 | 0 6 8 2 | 0 0 2 Key 1|6 represents 16°C	**G1** Stem (in either order) allow stem 0, 10, 20. **G1** Leaves - do not allow leaves to be written as 10, 16, 18 etc. Ignore commas between leaves. **G1** Sorted and aligned. **G1** Key - allow for missing units – Celsius	**4** **AO1=4**
b) Median = 9.5°C	**B1**	**1** **AO2=1**
c) Median would be a better choice because the mean is affected by the skewness of the distribution.	**B1** For median **E1** Do not allow 'less affected by extremes or outliers unless also mention (positive or negative) skewness. **Note**: allow **E2** for mean if supported by a very convincing argument such as it takes all values into consideration and has no extreme values.	**2** **AO2=2**

13		**10**
a) i) Using the information on page 14, work out Jamie's total pay for each contract option. **ii)** Identify which one of the contract options would be better for Jamie. **b)** Which option would be best if Jamie had actually worked for five hours on Monday and five hours on Sunday?		
Mark allocation	10	
Assessment Objective	AO1, AO3	

a) Option 1 6 x £8 = £48 (Retainer) Hours worked – 25 25 × £6.50 = £162.50 Total pay = £48 + £162.50 = £210.50.	**M1** **A1**	**2** **AO1=1 AO3=1**
a) Option 2 6 × £6 = £36 (Retainer) 25 × £7 = £175 Total pay = £36 + £175 = £211.	**M1** **A1**	**2** **AO1=1** **AO3=1**
a) Option 3 No retainer 19 hours normal rate = 19 × £8 = £152 6 hours overtime = 6 × £10 = £60 Total pay = £160 + £60 = £212	**M1** **A1**	**2** **AO1=1** **AO3=1**
a) ii Option 3 would be the best choice.	**B1**	**1** **AO3=1**
b) Option 1 and 2 unchanged. Option 3 20 x £8 = £160 normal time plus 5 x £10 = £50 Total wages = £210 So Option 2 would be a better choice.	**M1** **A1 E1**	**3** **AO3=3**

14		**12**
a) Define appropriate variables from the above information and derive four inequalities which must be satisfied by those variables. **b)** Represent your inequalities on a graph and clearly identify the feasible region. **c)** The manufacturer wants to maximise the weekly profit. Find the optimal solution and the profit he makes.		
Mark allocation	12	
Assessment Objective	AO1, AO2, AO3	

a) Let *x* be the number of Arnie's constructed Let *y* be the number of Buk's constructed. 1. Then $3x + 3y \leq 39$ or $x + y \leq 13$ 2. And $2x + 4y \leq 44$ or $x + 2y \leq 22$ 3. $x \geq 2$ 4. $y \geq 2$	**B1** adequate definition "number of" **B4** (one for each inequality – they need not be simplified) **Note** Strict inequalities throughout lose 1 mark)	**5** **AO2=5**
b)  	**B1** inclined line $x + y = 13$ **B1** inclined line $x + 2y = 22$ **B1** $x = 2$, y = 2 **B1** Correct area clearly identified.	**4** **AO1=4**
c) Profit = $25x + 35y$ At (2,10), P = 400 At (4,9), P = 415 At (11,2) P = 345 Maximum profit £415	**B1** for coordinates of vertices seen or implied. **M1** optimisation by evaluating and comparing at their 3 appropriate points) **Or** **M1** If a series of correct profit lines drawn in the form	**3** **AO3=3**

	25x + 35y = k where k could be 350, 400, etc. then only the value at (4,9) needs to be seen) **A1 cao** for 415 seen. **Note** maximum 2 marks for **B1** and **A1,** if 415 seen without the preceding **M** mark.	

<table>
<tr><td colspan="2">15</td><td></td><td>9</td></tr>
<tr><td colspan="4">a) Find the probability that the speed of a random car passing through the check point is more than 90km/h.
b) Does your result support the claim in the newspaper that about 10% of the drivers were exceeding 90km/h? Justify your answer.
c) Approximately how many cars exceeded 80km/h as they passed through the check point?</td></tr>
<tr><td colspan="2">Mark allocation</td><td colspan="2">9</td></tr>
<tr><td colspan="2">Assessment Objective</td><td colspan="2">AO2, AO3</td></tr>
<tr><td colspan="2">a) Let X be the distribution of the speeds of the cars passing the check point Then X = $N(85,4^2)$
Let $x_1 = 90$
Then $z_1 = (90 – 85)/4 = 1.2$
$\phi(1.2) = 0.8849$
$P(x < 90) = 0.8849$
Probability that a car exceeds 90km/h
$= P(x > 90) = 1 – 0.8849 = 0.1151$</td><td>M1 for standardising the variable
A1 for z = 1.2
A1 cao (min 3 sf)</td><td>3
AO3=3</td></tr>
<tr><td colspan="2">b) 11.5%, so it is about 10%.</td><td>B1 for writing as a percentage (allow FT</td><td>1
AO2=1</td></tr>
<tr><td colspan="2">c) Now let $x_2 = 80$
Then $z_2 = (80 – 85)/4 = -1.2$
$\phi(-1.2) = 1 - \phi(1.2) = 0.1151$
$P(x > 80) = 1- 0.1151 = 0.8849$
Number of cars exceeding the speed limit is 420 x 0.8849 = 371.6</td><td>M1 for standardising the variable
A1 for z = -1.2
A1 CAO (min 3 sf)
M1 for use of expected values
A1 for 372 (allow 371)</td><td>5
AO2=5</td></tr>
</table>

Assessment Objective Grid

Question	AO1	AO2	AO3	Total
1— 8	8	0	0	8
9	0	5	0	5
10	0	3	0	3
11	0	0	6	6
12	4	3	0	7
13	3	0	7	10
14	4	5	3	12
15	0	6	3	9
Total	**19**	**22**	**19**	**60**