Mark Scheme

GCSE Mathematics and Numeracy Unit 3 Foundation Tier SAMs	Mark	Comments
1.(a) (2024 – 1856 =) 168 (years)	B1	
1.(b) 246 × 35 = 8650	B1	
2. (a) Evidence of square counting (Number of squares =) 33 (Total area = 33 × 2.25 =) 74(.25) (m^2)	M1 A1 B1	 Allow 31 to 35 squares. Allow 69.75 to 78.75 (m^2). FT 2.25 × 'their area'.
Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a clear and logical way • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • use correct mathematical form in their working • use appropriate terminology, units, etc
(b) 74.25 × 0.94 or 74.25 × 94 (£) 69.80	M1 A2	FT 'their area' × 0.94 or 'their area' × 94. Allow use of 'their area' rounded to nearest whole or rounded to 1 d.p. For reference: • 69.75 × 0.94 = 65.56(5) • 78.75 × 0.94 = 74.02(5) Award A1 for one of the following: • an equivalent answer in pence (correct to the nearest penny) • an answer correctly given in pounds, but not correctly rounded e.g. £69.79 or £70.
3. C (and) G	B2	B1 for at least one correct answer and no more than one incorrect answer.

<table>
<tr><td>4. Completed table:
<table><tr><th></th><th>Cheese</th><th>Ham</th><th>Tuna</th><th>Total</th></tr><tr><td>White bread</td><td>26</td><td>12</td><td>**18**</td><td>56</td></tr><tr><td>Brown bread</td><td>59</td><td>**28**</td><td>37</td><td>**124**</td></tr><tr><td>Total</td><td>**85**</td><td>**40**</td><td>55</td><td>**(180)**</td></tr></table>
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B2 for any 7 (or more) correct entries.

B1 for 4 or 5 of the **bold** entries.

If B1 awarded with one error, allow the following FT answers for a second B1 (awarding a total of B2 for 7 or 8 entries involving one error):
• a = ‘their 40’ – ‘their 28’
• b = 180 – ‘their 124’
• c = 180 – ‘their 85’ – ‘their 40’</td></tr>
<tr><td>5.(a) Bars drawn correctly.
Frequencies of 11 for Bus and 1 for Train.</td><td>B2</td><td>For B2, bars must be two squares wide. Condone inconsistent gaps between bars.
B1 for one of the following:
• any indication of 11 for Bus and 1 for Train
• any indication of 12 for Bus and 0 for Train</td></tr>
<tr><td>5.(b)(i) 0.2 0.9 1.4 1.7 2.1 2.1 2.8
(Median =) 1.7 (km)</td><td>M1
A1</td><td>For arranging the 7 numbers in order.
CAO
Unsupported 1.7 gains M1 A1</td></tr>
<tr><td>5.(b)(ii) (Range =) 2.6 (km)</td><td>B1</td><td>B0 for 2.8 – 0.2 or 0.2 – 2.8</td></tr>
<tr><td>5.(b)(iii) 2.1 + 1.7 + 0.9 + 1.4 + 2.1 + 2.8 + 0.2
(= 11.2)
÷ 7
(Mean =)1.6 (km)</td><td>M1

m1
A1</td><td>Attempt to add <u>all</u> 7 numbers.

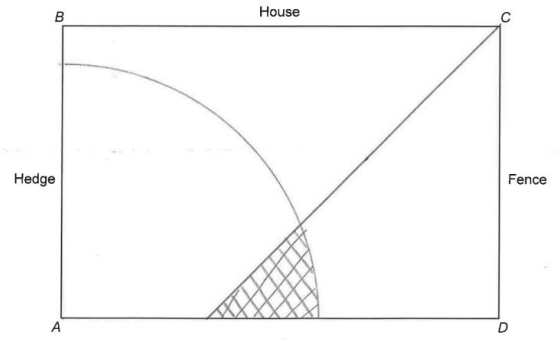
FT ‘their total’
CAO</td></tr>
<tr><td>5.(b)(iv) Indication that ‘The mean will decrease’
AND
Valid reason e.g.
0.4 is less than the mean of 1.6;
the new member is younger than the mean age.</td><td>E1</td><td>FT ‘their derived mean’ in part (b)(iii) provided at least M1 was awarded.

Allow E1 for a valid reason or explanation (e.g. calculating the new mean as 11.6/8 = 1.45) without having given a conclusion in their table or in their explanation.
E0 for ‘because you are dividing by a larger number (8)’.</td></tr>
</table>

6. Angle FGH Angle FHG Completed triangle	B1 B1 B1	Allow ±2° Allow ±2° Only if at least one angle correct. Award B1 B1 B0 for one of the following: • a reflection of the completed correct triangle • a completed correct triangle drawn without using a ruler
7. 477 × 3 (Sam's number is) 1431	M1 A1	
8.(a)(i) $8a$	B1	
8.(a)(ii) $b - 7$	B1	
8.(b)(i) 45 (	B1	Accept an embedded answer.
8.(b)(ii) – 68	B1	Accept an embedded answer.
9.(a) Angle 40° (or 11.1…%) 2340 (million) × 40 ÷ 360 or equivalent (or 2340 (million) × 11.1… ÷ 100) (£) 260 (million)	B1 M1 A1	Allow a tolerance of ±2° (or ±0.55…%) FT for M1 only if the angle is out of tolerance but within ±4° (or equivalent working with percentage ±1.11…%). M1 may imply B1. Allow a place value error from misinterpretation of 'million' i.e. 2340(0….) × 40 ÷ 360. Mark final answer. Allow A1 for (£) 260 000 000 in answer space.
9.(b) 280 000	B1	
9.(c) Any one of: • $\frac{2400-2184}{2400}$ (× 100 = 9%) • 0.09 × 2400 (= 216) • 0.91 × 2400 (= 2184) • 100 × 2184 ÷ [100 – 9] (= 2400) • 2184 ÷ 2400 (× 100) (= 0.91 or 91%) 'Yes' indicated or implied AND any one of: • ($\frac{2400-2184}{2400}$ × 100 =) 9% • (2400 – 216 =) 2184 OR (2184 + 216 =) 2400 • (0.91 × 2400 =) 2184 • (100 × 2184 ÷ [100 – 9] =) 2400 • (100% – 91% =) 9%	M1 A1	A correct evaluation implies 'Yes'. Match the corresponding bullet points for the 'A' and 'M' marks.
10. 2.47	B2	B1 for 2.46(8044339…). All places given must be correctly <u>rounded or truncated</u>.

11.(a) 1530 (ml)	B2	Award B1 for sight of any one of the following: • 1360 (+ 170) • 0.17 + 1.36 (× 1000)
11.(b) $\frac{1530}{175}$ (= 8.74….) 8 full cups	M1 A1	FT 'their volume' for part (a), FT provided equivalent decision (to round down) is required. Amount left over, if given, must be correct for A1 e.g. 8.74 with no working is awarded M1 A0; 8 cups with 130 ml left over is awarded M1 A1.
12.(a) 32×6 – 16×3 – 12×2 (= 192 – 48 – 24) 120	M1 A1	 Award M1 A1 for unsupported 120.
12.(b) Strategy to explore possible combinations. 58 × 6 = 348 and 348 – 3 = 345 There were 58 correct answers (and one incorrect answer) The final question is not answered (as the mark drops from 345 to 343).	S1 B1 B1	Award S1 for evidence of trial and improvement or correct answer. This B1 implies S1. May be implied.
13. Position at 260° from Pwllheli Position at 310° from Fishguard Position marked or two intersecting lines	 M1 M1 A1	Allow dots or crosses or any unambiguous indication that the correct bearings have been drawn. FT if at least M1 previously awarded and two intersecting lines. (Lines must originate from P and F).

14. Sight of 190 (Total number of calls = 22 + 48 + 62 + 34 + 14 + 10) Sight of any of the following: • (80% of 190 =) 152 (calls) **AND** (less than 30 seconds =) 132 (calls) • (20% of 190 =) 38 (calls) **AND** (more than 30 seconds =) 58 (calls) • (132 calls = $\frac{132}{190} \times 100 = 69.4(7..)\%$ • (58 calls = $\frac{58}{190} \times 100 = 30.5(2..)\%$ Conclusion 'No'.	B1 M2 A1	Check the graph for answers. FT 'their 190'. M1 for sight of either of the following: • (80% of 190 =) 152 (calls) **OR** (less than 30 seconds =) 132 (calls) • (20% of 190 =) 38 (calls) **OR** (more than 30 seconds =) 58 (calls) FT provided conclusion from correct working only and M2 previously awarded.
15.(a) 13 (cm)	B2	Award B1 for one of the following: • sight of 2.01 and 1.88 • sight of 201 and 188 • sight of 0.13 (m) • 2.01 – 'their 1.88' correctly converted to cm (× 100) • 'their 2.01' – 1.88 correctly converted to cm (× 100) • 'their 2.01' – 'their 1.88' correctly converted to cm (× 100) • 'their 2.01' AND 'their 1.88' correctly converted to cm (× 100) • 10 cm (from 1.85 – 1.75).
15.(b)(i) Explanation with reference to mass and height increasing or decreasing together e.g. "the heavier players are taller" "as mass decreases so does the height" "they both increase"	E1	
15.(b)(ii) (Height =) 1.78 (m) AND (Mass =) 119	B1	
15.(c) Straight line of best fit, following the trend with some points above and some below the line.	B1	Allow intention of a straight line.
15.(d) Explanation of why it is not an appropriate estimate, e.g. "the diagram only considers the trend of players up to 122(kg)" "out of range"	E1	Allow "the heights of the four players around 120 kg are very different so using the line in this region is not appropriate".

16. (*QR* =) $\frac{2\times36}{8}$ or equivalent	M1	Check diagram for answers. Award M1 for $\frac{8\times QR}{2} = 36$.
= 9 (cm)	A1	May be implied in later working (M1A1).
(*PR*^{2} =) $8^2 + 9^2$ or equivalent	M1	Note: (*PR*^{2} =) 64 + 81. FT 'their derived 9'.
PR^2 = 145 or (*PR* =) $\sqrt{145}$	A1	Final answer of x = 145 is M1A0A0. FT provided their answer > 'their 9' and > 8.
(x =) 12(·041...cm)	A1	FT from M1 for the correctly evaluated square root of 'their 145' provided their answer > 9. <u>*Alternative method to find x*</u> *A correct and complete method (using trigonometric relationships)* *M2* *(x =)* 12(·041...cm) *A1*
17. Unambiguous angle bisector of BCD ± 2° Arc centre A with radius 7 cm ± 2 mm Correct region identified  	 B1 B1 B1	All lines and arcs must be of sufficient length to be able to select the correct region. Any valid method may be used to bisect the angle e.g. using a protractor or a pair of compasses. FT provided B1 awarded for the arc.
18. (Volume of cylinder =) $\pi \times 2.3^2 \times 5$	M1	May be seen or implied in later working.
= 83(.095….) or 26.45π (cm^3)	A1	Accept an answer between 83 and 83.11 inclusive.
(Density of metal =) 423.1 ÷ 83(.095….)	M1	FT 423.1 ÷ 'their derived volume of cylinder', provided π has been used in its calculation.
Accept an answer between 5 and 5.1 (g/cm^3)	A1	

18. Alternative method: *(Density of metal =)* $\frac{423.1}{\pi \times 2.3^2 \times 5}$ *Accept an answer between 5 and 5.1 (g/cm^3)*	*M2* *A2*	*Award M1 for sight of $\pi \times 2.3^2 \times 5$.* A1 for sight of $\frac{423.1}{26.45\pi}$ or $\frac{8462}{529\pi}$ or $\frac{15.9(96\ldots)}{\pi}$ or any other simplified fraction with **one** step left to carry out.

How to read the mark scheme

- ‘M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- ‘m’ marks are dependant method marks. They are only given if the relevant previous ‘M’ mark has been earned.
- ‘A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- ‘S’ marks are awarded for strategy
- ‘E’ marks are awarded for explanation
- ‘U’ marks are awarded for units
- ‘P’ marks are awarded for plotting points
- ‘C’ marks are awarded for drawing curves
- ‘OC’ marks are awarded for ‘organising and communicating’, a strand of OCW (organising, communicating and writing accurately)
- ‘W’ marks are awarded for ‘writing accurately’, a strand of OCW (organising, communicating and writing accurately)
- ‘SC’ marks are awards for special cases
- CAO: correct answer only
- ISW: ignore subsequent working
- FT: follow through

Assessment mapping

Qn	Topic	Max mark	AO1	AO2	AO3	Common Qn (HT)	Common marks (HT)	OCW
1	Year of national anthem; calculations	2	2					
2	Area of lawn; cost of grass seeds	8	3	5				*
3	Identifying congruent shapes	2	2					
4	Sandwich shop table	3			3			
5	School transport bar chart: median, range, mean	9	6	1	2			
6	Accurate drawing of triangle	3	3					
7	Inverse calculation	2	2					
8	Expressions; linear equations	4	4					
9	Gwalia Electric pie chart	6	1	3	2			
10	Calculation + rounding	2	2					
11	Jugs of lemon drink (metric units)	4	2		2			
12	Quiz scores (directed numbers)	5	2		3			
13	Plotting bearings	3	3			Q2a	3	
14	Mali's frequency diagram	4		4		Q3	4	
15	Scatter diagram + units	6	4	1	1	Q4abcd	6	
16	Pythagoras, area and perimeter of triangle	5			5	Q5	5	
17	Loci - Gruff's garden	3		3		Q6	3	
18	Cylinder + density	4		4		Q7	4	
	Totals	**75**	**36**	**21**	**18**		**25**	