AQA

# GCSE
# MATHEMATICS
# 8300/3F

Foundation Tier Paper 3 Calculator

**Mark scheme**

June 2024

Version: 1.0 Final

246G8300/3F/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

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**Glossary for Mark Schemes**

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

| | |
|---|---|
| **M** | Method marks are awarded for a correct method which could lead to a correct answer. |
| **A** | Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied. |
| **B** | Marks awarded independent of method. |
| **ft** | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| **SC** | Special case. Marks awarded for a common misinterpretation which has some mathematical worth. |
| **M dep** | A method mark dependent on a previous method mark being awarded. |
| **B dep** | A mark that can only be awarded if a previous independent mark has been awarded. |
| **oe** | Or equivalent. Accept answers that are equivalent.<br>eg accept 0.5 as well as $\frac{1}{2}$ |
| **[a, b]** | Accept values between a and b inclusive. |
| **[a, b)** | Accept values $a \leqslant$ value $< b$ |
| **3.14…** | Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416 |
| **Use of brackets** | It is not necessary to see the bracketed work to award the marks. |

Examiners should consistently apply the following principles.

**Diagrams**

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

**Responses which appear to come from incorrect methods**

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

**Questions which ask students to show working**

Instructions on marking will be given but usually marks are not awarded to students who show no working.

**Questions which do not ask students to show working**

As a general principle, a correct response is awarded full marks.

**Misread or miscopy**

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

**Further work**

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

**Choice**

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

**Work not replaced**

Erased or crossed out work that is still legible should be marked.

**Work replaced**

Erased or crossed out work that has been replaced is not awarded marks.

**Premature approximation**

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

**Continental notation**

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 1(a) | Correct bar in correct position | B1 | |
| | **Additional Guidance** | | |
| | Mark intention | | |
| | Shading not required | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 1(b) | 9 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 2 | –7 –5 –1 3 | B2 | B1 answer begins –7 or ends 3<br>SC1 reverse order |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 3(a) | 23 | B1 | ignore further terms |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 3(b) | add 6 | B1ft | accept + 6<br>ft their 23 or correct answer |
| | **Additional Guidance** | | |
| | 20 in part (a) answer + 3<br>34 in part (a) answer × 2 | | B1ft<br>B1ft |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 4 | 50p 10p 10p 1p | B2 | any order<br>units required for each coin<br>B1 50 10 10 1 in any order without all units<br>or<br>set of valid coins that make 71p (with correct units or without units)<br>eg 10 1 20 20 20 or 50 20 1 |
| | **Additional Guidance** | | |
| | Units may be seen in the working but missing on the answer line for B2 | | |
| | 50p 10p 10p 1p in working with answer 0.50p 0.10p 0.10p 0.01p | | B1 |
| | Accept £0.50, condone £0.50p | | |
| | Units of the form 0.50p are incorrect | | |
| | If all four coins are in a consistent form to show 50 10 10 1<br>eg 0.50p 0.10p 0.10p 0.01p condone for B1 | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 5 | $>$ | B1 | |
| | $=$ | B1 | |
| | $<$ | B1 | |
| | **Additional Guidance** | | |
| | Must use the correct symbol, not word equivalents | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 6(a) | 6 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 6(b) | 8 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 6(c) | 1 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 7(a) | 40 in correct position in number machine | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 7(b) | $+ 11$ in correct position in number machine | B1 | oe operation to reach 18<br>eg $- -11$ or $\times \frac{18}{7}$ |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 7(c) | 3 and 2 in correct positions in number machine | B2 | B1<br>correct operations for input 5, output 13<br>or<br>correct operations for input 10, output 28 |
| | **Additional Guidance** | | |
| | B1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts | | |
| | Examples of correct operations for input 5, output 13 include<br>$\times 2.6$ and $- 0$ **or** $\times 4$ and $- 7$ **or** $\times 5$ and $- 12$ | | B1 |
| | Examples of correct operations for input 10, output 28 include<br>$\times 2.8$ and $- 0$ **or** $\times 4$ and $- 12$ **or** $\times 5$ and $- 22$ | | B1 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 8 | 0.4 or 0.8 or 220 or 700 | M1 | oe |
| | $2.2 + 2 \times 0.4 + 7$<br>or<br>10 or 1000 | M1 | oe<br>allow mixed units<br>10 or 1000 implies M2 |
| | $\frac{7}{10}$ or $\frac{700}{1000}$ | A1 | oe fraction<br>SC2 0.7(0) or 70% |
| | **Additional Guidance** | | |
| | Ignore simplification attempts after a correct fraction is seen | | |
| | $\frac{7}{10}$ in working with 0.7 on answer line | | M1M1A0 |
| | Condone eg 0.80p for first M1 | | |
| | Do not allow eg £220 for first M1 | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 9 | 368 | B2 | B1 25 or 343 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 10 | 1550 in Away | B1 | |
| | 1370 in Home Yes | B1 | |
| | 5480 in Home No | B1ft | ft 6850 – their 1370<br>their 1370 must be less than 6850 |
| | 949 in Away Yes | B1ft | ft 2319 – their 1370<br>their 1370 must be less than 2319 |
| | 601 in Away No | B1ft | ft their 1550 – their 949<br>their 1550 must be greater than their 949 |
| | **Additional Guidance** | | |
| | If Away oval is blank then condone an indication of 1550 as Away | | |
| | If Home Yes oval is blank then condone an indication of 1370 as Home Yes | | |
| | ft values must be from ovals | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 11(a) | (–2, –1) | B1 | |
| | **Additional Guidance** | | |
| | Check the diagram if answer line is blank | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 11(b) | (8, –1) | B1 | SC1 (–1, –2) in (a) and (–1, 8) in (b) |
| | **Additional Guidance** | | |
| | Check the diagram if answer line is blank | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 12(a) | Distance (km) | B1 | oe<br>must have units |
| | (8, 38) and (8.5, 42) plotted | B1 | $\pm\frac{1}{2}$ square |
| | **Additional Guidance** | | |
| | Ignore any lines | | |
| | Ignore other plots | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 12(b) | Positive | B1 | oe |
| | Strong | B1 | oe eg fairly strong<br>SC1 answers in reverse order |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 13 | **Alternative method 1: working separately** | | |
| | 180 – 127 or 53 | M1 | implied by 106 |
| | 360 – 90 – 163 or 107 | M1 | oe<br>implied by 53.5 |
| | No and 106 and 107<br>or No and 53 and 53.5<br>or No and 53 and 107 – 53 = 54 | A1 | |
| | **Alternative method 2: starting with $y$** | | |
| | 180 – 127 or 53 | M1 | implied by 106 |
| | 360 – 90 – 2 × their 53 or 164<br>or<br>360 – 163 – 2 × their 53 or 91<br>or<br>2 × their 53 + 90 + 163 or 359 | M1dep | oe |
| | No and 164<br>or No and 91<br>or No and 359 | A1 | |
| | **Alternative method 3: starting with $x$** | | |
| | 360 – 90 – 163 or 107 | M1 | oe<br>implied by 53.5 |
| | 180 – their 107 ÷ 2 or 126.5<br>or<br>127 + their 107 ÷ 2 or 180.5 | M1dep | oe |
| | No and 126.5<br>or No and 180.5 | A1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 14 | $6x + 24$ | B2 | B1 $6x$ or $(+)\ 24$ |
| | **Additional Guidance** | | |
| | $24 + 6x$ | | B2 |
| | Ignore any attempt to solve $6x + 24 = 0$ | | |
| | $6x + 24$ in working with answer $30x$ | | B1 |
| | $6x + 25$ in working with answer $31x$ | | B1 |

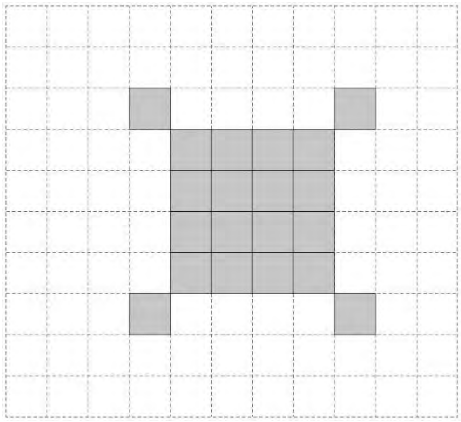
| Q | Answer | Mark | Comments |
|---|---|---|---|
| 15 | $4x$ | B1 | oe |
| | $y$ | B1 | oe |
| | $3t$ | B1 | oe |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 16 | 15 × 0.64 or 9.6 | M1 | oe eg1 $20 \times 0.64 \times \frac{3}{4}$<br>eg2 $20 \times 0.64 - (20 \div 4) \times 0.64$ |
| | 1.7 × 0.9 or 1.53<br>or<br>1.7 × 6 or 10.2 | M1 | oe eg $1.7 - 0.1 \times 1.7$ |
| | 1.7 × 0.9 × 6 or 9.18 | M1dep | oe eg $10.2 - 0.1 \times 10.2$<br>dep on 2nd M1 |
| | their 9.18 + 2 × 0.62<br>or<br>10.42 | M1 | oe<br>their 9.18 must be 6 times their pack price |
| | Shop A Cheaper by £0.82 | A1 | oe eg Shop A Cheaper by 82p |
| | **Additional Guidance** | | |
| | Accept working in pounds or pence | | |
| | Mixed units in the 4th M1 mark must be recovered with a correct value for their calculation<br>960 and 9.18 + 2 × 62<br>960 and 9.18 + 2 × 62 and 10.42 | | <br>M1M1M1M0<br>M1M1M1M1 |
| | 10.20 + 2 × 0.62 or 11.44 score the 2nd and 4th M1 mark | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 17(a) | 12 : 18 | B1 | oe eg 6 : 9<br>may be implied by correct answer |
| | 2 : 3 or 1 : 1.5 or 1 : $\frac{3}{2}$ or $\frac{2}{3}$ : 1 | B1ft | ft their ratio |
| | **Additional Guidance** | | |
| | Accept [0.66, 0.67] for $\frac{2}{3}$ | | |
| | 2 : 3 | | B1B1 |
| | Answer 1 : $\frac{6}{4}$ | | B1B0 |
| | 12 : 30 followed by 2 : 5 | | B0B1ft |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 17(b) | $\frac{3}{11}$ | B1 | oe fraction |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 17(c) | 2.25 or $2\frac{1}{4}$ or $\frac{9}{4}$ | B1 | oe |
| | **Additional Guidance** | | |
| | Condone eg 1 : 2.25 | | B1 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 18(a) |  | B1 | |
| | **Additional Guidance** | | |
| | Mark intention, condone missing interior lines | | |
| | Shading not required | | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 18(b) | 23 | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 19 | $24^2$ or 576 **and** $31^2$ or 961<br>or<br>1537 | M1 | ignore units |
| | $\sqrt{24^2+31^2}$ or $\sqrt{576+961}$<br>or $\sqrt{1537}$ | M1dep | |
| | 39.2(…) | A1 | accept 39 with 1537 seen or M2 awarded |
| | **Additional Guidance** | | |
| | M1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts | | |
| | $31^2 - 24^2$ | | M1M0A0 |
| | $\sqrt{385}$ without seeing $24^2$ or 576 **and** $31^2$ or 961 | | M0M0A0 |
| | Answer only 39.2 | | M2A1 |
| | Answer only 39 | | M0 |
| | 39.2 from only accurate drawing | | M0M0A0 |
| | 39.2 from only trigonometry | | M0M0A0 |
| | 39.2 from only cosine rule | | M1M0A0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 20 | This is not representative of all flats<br>or<br>He didn't take into account flats on the other floors | B1 | oe |
| | **Additional Guidance** | | |
| | Ignore incorrect or irrelevant statements or incorrect values alongside a correct reason, unless contradictory | | |
| | Data is biased | | B1 |
| | Missing floor or Misses top 2 floors (ignore incorrect value) | | B1 |
| | There could be different results on the other 4 floors (ignore incorrect value) | | B1 |
| | Must have a flat from each floor, do another 27 (ignore irrelevant statement) | | B1 |
| | Only doing 5 out of the 8 floors | | B1 |
| | Not tested any on floor 7 or 8 | | B1 |
| | Missing most of the other floors (ignore 'most of' as irrelevant) | | B1 |
| | Some floors might be different to others | | B1 |
| | Sample all floors, sample size too small (ignore incorrect statement) | | B1 |
| | Needs to sample them all (all may refer to all flats not floors) | | B0 |
| | Sample too small | | B0 |
| | Some flats might be different to others | | B0 |
| | Didn't test a third of the flats | | B0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 21 | It is true for **all** values of $x$ | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 22 | 5 × 24.5 or 122.5 | M1 | oe |
| | 24.5 × 0.2 or 4.9 | M1 | oe |
| | 24.5 – their 4.9 or 19.6 | M1dep | oe<br>dep on 2nd M1<br>24.5 × 0.8 oe is 2nd M1 and 3rd M1 |
| | (259.7 – their 122.5) ÷ their 19.6<br>or<br>137.2 ÷ their 19.6 | M1dep | oe<br>dep on 3rd M1<br>eg1 7 × 19.6 = 137.2<br>eg2 122.5 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 + 19.6 = 259.7 |
| | 12 with 19.6 seen<br>or<br>12 with 122.5, 142.1, 161.7, 181.3, 200.9, 220.5, 240.1, 259.7 | A1 | |
| | **Additional Guidance** | | |
| | Up to M3 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts | | |
| | Build up attempts must be fully correct or show method | | |
| | 122.5 + 19.6 | | M1M1M1 |
| | 122.5, 142.1, 161.7, 181.3, 200.9, 220.5, 240.1, 259.7 without 12 | | M1M0M0M0 |

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">23</td><td>42 ÷ (2 × 3) or 7<br>or<br>rectangle with height 2 cm</td><td>M1</td><td>oe<br>implied by rectangle with one side 7 cm</td></tr>
<tr><td>Rectangle with height 2 cm and width 7 cm</td><td>A1</td><td>any position on the grid</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Mark intention, condone interior lines</td><td></td></tr>
<tr><td colspan="2">Accept unruled lines</td><td></td></tr>
<tr><td colspan="2">Side elevation<br> </td><td>M1A1</td></tr>
<tr><td colspan="2">Cuboid with rectangle height 2 cm and / or width 7 cm</td><td>M1A0</td></tr>
</table>

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 24(a) | **Alternative method 1: working in metres per second or kilometres per second** | | |
| | 1500 (metres) or 0.05 (km) | B1 | implied by 30 or 1200 |
| | their 1500 ÷ 50 × 40<br>or<br>1.5 ÷ their 0.05 × 40<br>or<br>1200 | M2 | oe<br>M1 their 1500 ÷ 50 or 30 oe<br>or 50 ÷ 40 or 1.25 oe<br>or 1.5 ÷ their 0.05 oe<br>their 1500 must be using digits 15 (and zeros)<br>their 0.05 must be using single digit 5 (and zeros) |
| | their 1200 ÷ 60 | M1dep | oe<br>dep on M2 |
| | 20 | A1ft | ft their 1500 or their 0.05 |
| | **Alternative method 2: working in metres per minute or kilometres per minute** | | |
| | 1500 (metres) or 0.05 (km) | B1 | implied by 0.075 |
| | 40 ÷ 60 or $\frac{2}{3}$ | M1 | oe<br>accept [0.66, 0.67] |
| | 50 ÷ (40 ÷ 60) or 75<br>or<br>$\frac{\text{their } 0.05}{(40 \div 60)}$ or 0.075<br>or<br>their 1500 × (40 ÷ 60) | M1dep | oe calculation<br>their 1500 must be using digits 15 (and zeros)<br>their 0.05 must be using single digit 5 (and zeros) |
| | their 1500 ÷ their 75<br>or<br>1.5 ÷ their 0.075<br>or<br>their 1500 × (40 ÷ 60) ÷ 50 | M1dep | oe |
| | 20 | A1ft | ft their 1500 or their 0.05 |

**Additional Guidance is on the next page**

| | | |
|---|---|---|
| **24(a) cont** | **Additional Guidance** | |
| | 1500 ÷ 1.25 | B1M2 |
| | 1.5 ÷ 50 × 40 their 1500 must be using digits 15 (and zeros) | B0M2 |
| | 1.5 ÷ 0.5 × 40 their 0.05 must be using single digit 5 (and zeros) | B0M2 |
| | 150 ÷ 50 their 1500 must be using digits 15 (and zeros) | B0M1 |
| | 150 ÷ 1.25 = 120, 120 ÷ 60 = 2 | B0M2M1A1ft |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **24(b)** | It is greater than the answer to part (a) | B1 | |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| **25** | (8 + 9 + 9 + 6 + 9 + 10) ÷ 6<br>or 51 ÷ 6<br>or 8.5 | M1 | oe<br>implied by 34 |
| | 162 ÷ 360 × 100<br>or 45 | M1 | oe |
| | 4 × their 8.5 + their 45<br>or 34 + 45 | M1dep | oe<br>dep on M2 |
| | 79 | A1 | SC2 53.5 or 57.5 |
| | **Additional Guidance** | | |
| | Check table and pie chart for working | | |
| | 34 + 45% | | M1M1M1 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 26 | $1+\frac{5.1}{100}$ or 1.051 or 105.1% | M1 | oe eg $\frac{100+5.1}{100}$<br>may be implied by a correct value after one year of their chosen house value |
| | $1.051^{14}$ **and** [2, 2.01] | A1 | may be implied by a correct value after 14 years of their chosen house value |
| | **Additional Guidance** | | |
| | (house value =) 100 000 and (value after 1 year =) 105 100 | | M1 |
| | (house value =) 100 000 and (value after 14 years =) [200 600, 200 650] | | M1A1 |
| | $\left(1+\frac{5.1}{100}\right)^{14} = 2.006$ | | M1A1 |
| | Do not allow a misread of 5.1%<br>eg1 1.05<br>eg2 1.052 | | <br>M0<br>M0 |

| Q | Answer | Mark | Comments |
|---|---|---|---|
| 27 | **Alternative method 1: population density of Town A** | | |
| | 84 000 ÷ (7 × 2.6)<br>or [4615, 4616] | M2 | oe<br>M1 84 000 ÷ 7 or 12 000 oe<br>or 7 × 2.6 or 18.2 oe |
| | Town B and [4615, 4616] | A1 | |
| | **Alternative method 2: comparing one square mile of population** | | |
| | 84 000 ÷ 7 or 12 000 | M1 | oe |
| | 4695 × 2.6 or 12 207 | M1 | oe |
| | Town B and 12 000 and 12 207 | A1 | |
| | **Alternative method 3: comparing seven square miles of population** | | |
| | 4695 × 2.6 × 7<br>or 85 449 | M2 | oe<br>M1 4695 × 2.6 or 12 207 oe<br>or 7 × 2.6 or 18.2 oe |
| | Town B and 85 449 | A1 | |
| | **Alternative method 4: comparing areas with equal populations** | | |
| | 7 × 2.6 or 18.2 | M1 | oe |
| | 84 000 ÷ 4695<br>or [17.89, 17.9] or 18 | M1 | oe |
| | Town B **and** 18.2<br>**and** [17.89, 17.9] or 18 | A1 | |