

**GCSE
MATHEMATICS
8300/2F**

Foundation Tier Paper 2 Calculator

Mark scheme

June 2020

Version: 1.0 Final



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.

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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. eg accept 0.5 as well as $\frac{1}{2}$ |
| [a, b] | Accept values between a and b inclusive. |
| [a, b) | Accept values $a \leq \text{value} < b$ |
| 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 | 6 : 8 | B1 | |

| Q | Answer | Mark | Comments |
|----------|---------------|-------------|-----------------|
| 2 | 250° | B1 | |

| Q | Answer | Mark | Comments |
|----------|---------------|-------------|-----------------|
| 3 | $x - 4$ | B1 | |

| Q | Answer | Mark | Comments |
|----------|---------------|-------------|-----------------|
| 4 | 14 | B1 | |

| Q | Answer | Mark | Comments |
|------|---|------|----------|
| 5(a) | 8 | B1 | |
| | Additional Guidance | | |
| | $56 \div 7 = 8$ | | B1 |
| | Answer of $\times 8$ (unless recovered) | | B0 |
| | Answer of $8x$ (unless recovered) | | B0 |
| | Award the mark for an embedded answer only if the answer is selected eg1 $7 \times 8 = 56$ with no answer or with incorrect answer eg2 $7 \times \textcircled{8} = 56$ with no contradictory answer | | B0 B1 |

| Q | Answer | Mark | Comments |
|------|---|------|----------|
| 5(b) | 7 | B1 | |
| | Additional Guidance | | |
| | $25 - 18 = 7$ | | B1 |
| | $18 - 25 = 7$ (allow recovery) | | B1 |
| | Answer of -7 (unless recovered) | | B0 |
| | Answer of $7y$ (unless recovered) | | B0 |
| | Award the mark for an embedded answer only if the answer is selected eg1 $25 - 7 = 18$ with no answer or with incorrect answer eg2 $25 - \textcircled{7} = 18$ with no contradictory answer | | B0 B1 |

| Q | Answer | Mark | Comments |
|------|--------|------|----------|
| 6(a) | 9 | B1 | |

| Q | Answer | Mark | Comments |
|------|---|------|---|
| 6(b) | 3 9 9 9 12 14 15 16 18 18 20 or 20 18 18 16 15 14 12 9 9 9 3 or 3 9 9 9 12 14 or 20 18 18 16 15 14 | M1 | allow one miscopy, extra or omission in full ordered list |
| | 14 | A1 | |
| | Additional Guidance | | |
| | Answer only of 14 | | M1A1 |
| | 14 from an incorrect list will be M1 max eg 3 9 9 9 12 14 15 16 18 19 20 Answer 14 | | M1A0 |
| | List ordered but clearly used for mean or mode or range in (b) eg1 $3 + 9 + 9 + 9 + 12 + 14 + 15 + 16 + 18 + 18 + 20 = 143$ Answer 13 eg2 $3 9 9 9 12 14 15 16 18 18 20 = 143$ Answer 13 eg3 $3 + 9 + 9 + 9 + 12 + 14 + 15 + 16 + 18 + 18 + 20$ Answer 13 eg4 $3 9 9 9 12 14 15 16 18 18 20$ Answer 9 (mode) eg5 $3 9 9 9 12 14 15 16 18 18 20$ Answer 17 (range) | | M0A0 M0A0 M0A0 M0A0 M0A0 |
| | Answer 13 may come from value between 12 and 14 eg1 $3 9 9 9 12 14 15 16 18 18 20$ Answer 13 (bod) eg2 $3 9 9 9 12 14 15 16 18 20$ Answer 13 | | M1A0 M1A0 |
| | Allow the ordered list to be seen by the given list | | |

| Q | Answer | Mark | Comments |
|------|----------------------------|------|----------|
| 7(a) | (3, 4) | B1 | |
| | Additional Guidance | | |
| | (3x, 4y) | | B0 |

| Q | Answer | Mark | Comments |
|------|----------------------------|------|-------------------------------------|
| 7(b) | (0, 8) | B1 | SC1 (4, 3) in (a) and (8, 0) in (b) |
| | Additional Guidance | | |
| | (0x, 8y) | | B0 |

| Q | Answer | Mark | Comments |
|------|-------------------------------|------|------------------------|
| 8(a) | Any even square whole number | B1 | eg 4 or 16 or 36 or 64 |
| | Additional Guidance | | |
| | 0 | | B1 |
| | $2^2 = 4$ | | B1 |
| | Answer only of 2^2 | | B0 |
| | Answer only of $\frac{16}{4}$ | | B0 |

| Q | Answer | Mark | Comments |
|------|--|------|--|
| 8(b) | 125 216 343 with no extras | B2 | B1 125 216 343 seen with extras or two of 125 216 343 seen alone or with extras or $5^3 6^3 7^3$ |
| | Additional Guidance | | |
| | 125 216 343 seen with answer $5^3 6^3 7^3$ | | B2 |
| | $5^3 6^3 7^3$ only | | B1 |
| | 125 216 343 seen with answer 5 6 7 | | B1 |
| | 5 6 7 only | | B0 |
| | Extras may be incorrect for B1 | | |

| Q | Answer | Mark | Comments | |
|------|--|------|--------------|----------------|
| 8(c) | 3 and 72 or 6 and 36 or 9 and 24 or 12 and 18 | B1 | either order | |
| | Additional Guidance | | | |
| | Answer line takes precedence | | | |
| | Award the mark for embedded answers only if the answers are selected eg1 $216 \div 3 = 72$ with no answer or with incorrect answer eg2 $216 \div (3) = (72)$ with no contradictory answer eg3 3×72 in working with no contradictory answer | | | B0 B1 B1 |

| Q | Answer | Mark | Comments |
|---|--|------|---|
| 9(a) | Valid reason | B1 | eg the percentages do not add to 100(%) or there are 10(%) too many or they add to 110(%) |
| | Additional Guidance | | |
| | One of the percentages is 10(%) too big | B1 | |
| | Allow $18 + 54 + 38 = 110$ | B1 | |
| | They add up to more than 100(%) | B1 | |
| | It does not equal 100(%) | B1 | |
| | It's not possible to have 110(%) | B1 | |
| | Condone eg percentages only go up to 100, percentages are out of 100, percentage = 100(%) | B1 | |
| | They don't add up correctly | B0 | |
| | There are too many adults | B0 | |
| | Seniors must also be adults | B0 | |
| | Ignore irrelevant statements alongside a correct statement eg the percentages do not add up to 100, there should be more seniors than juniors | B1 | |
| Two statements, one correct, one incorrect eg the percentages do not add up to 100, they add up to 111 | B0 | | |

| Q | Answer | Mark | Comments | |
|------|--|------|------------|----------------------------|
| 9(b) | 2×120 or 240 | M1 | oe | |
| | $(3 \times) \frac{1}{5} \times 120$ or 24 or 72 | M1 | oe | |
| | 312 | A1 | SC2 528 | |
| | Additional Guidance | | | |
| | $\frac{1}{5}$ of 120 with no correct evaluation | | | 2nd M0 |
| | Do not allow a misread of the fraction | | | |
| | eg $\frac{1}{5} = 2\%$ stated with no method shown and then 2% used | | | 2nd M0 |
| | Allow 3 adults and/or 2 juniors as a misread eg1 3×120 eg2 3×120 and $2 \times \frac{1}{5} \times 120$ | | M1 M2A0 | |
| | $240 \div 5$ | | | M1M0A0 |
| | $\frac{1}{5} \times 120 = 24$ and $120 - 24$ (working out $\frac{4}{5}$) | | | 2nd M0 (but may score SC2) |
| | Using $\frac{4}{5}$ can score SC2 for the ft answer or a max of M1 for 240 seen | | | |
| | Allow up to M2 even if not subsequently used | | | |

| Q | Answer | Mark | Comments |
|-------|--------------------------------------|------|----------|
| 10(a) | 73 | B1 | |
| | Additional Guidance | | |
| | Mark output box if answer line blank | | |

| Q | Answer | Mark | Comments |
|-------|--------------------------------------|------|----------|
| 10(b) | -21 | B1 | |
| | Additional Guidance | | |
| | Mark output box if answer line blank | | |

| Q | Answer | Mark | Comments |
|-------|--------|------|----------|
| 10(c) | 3 | B1 | |

| Q | Answer | Mark | Comments |
|------------------------------|---|------|---------------------------|
| 11 | B and (A =) -11 and (B =) -13 | B2 | B1 (A =) -11 or (B =) -13 |
| | Additional Guidance | | |
| | If answer line blank, accept B clearly indicated in working | | |
| | Accept -13 on answer line instead of B | | |
| | Accept $47 \times 21 - 10^3$ on answer line instead of B | | |
| B with neither value correct | | | B0 |

| Q | Answer | Mark | Comments | |
|----|--|------|---------------------------|--|
| | All 4 correct matches | B4 | B1 for each correct match | |
| 12 | Additional Guidance | | | |
| | | | B4 | |
| | Two different matches from left hand column is choice for that box | | | |
| | Accept any unambiguous indication | | | |

| Q | Answer | Mark | Comments |
|----|---|-------|-----------------------------------|
| 13 | 318 ÷ 30 or 10.6(0) or 287 ÷ 28 or 10.25 | M1 | oe eg working in pence |
| | 318 ÷ 30 – 287 ÷ 28 or 10.6(0) – 10.25 or 0.6(0) – 0.25 or 0.35 | M1dep | oe eg working in pence |
| | 35 | A1 | allow £0.35 pence or £0.35p pence |
| | Additional Guidance | | |
| | Answer 0.35 pence | | M2A0 |
| | £0.35 seen but answer 0.35 pence | | M2A0 |
| | 35p seen but answer 0.35 pence | | M2A0 |
| | Allow recovery of units eg 10.6(0) – 10.25 = 35 | | M2A1 |

| Q | Answer | Mark | Comments |
|----|---|------|--|
| 14 | True False False True | B3 | B2 three correct B1 two correct allow any unambiguous indication |
| | Additional Guidance | | |
| | A tick and a cross in the same row – mark the tick | | |
| | Only a cross used in a row – regard cross as their selection for that row | | |

| Q | Answer | Mark | Comments |
|--|---|-------|---|
| 15 | Alternative method 1 | | |
| | 150×0.19 or 28.5(0) | M1 | oe eg working in pence |
| | $4 \times 150 \times 0.07$ or 42 | M1 | oe eg working in pence 70.5 implies M2 |
| | 70.50 | A1 | allow £70.50p |
| | Alternative method 2 | | |
| | $0.19 + 4 \times 0.07$ or 0.47 | M1 | oe eg working in pence |
| | $150 \times \text{their } 0.47$ or 70.5 | M1dep | oe eg working in pence |
| | 70.50 | A1 | allow £70.50p |
| | Additional Guidance | | |
| | 70.50 seen in working but answer of 70.5 | | M2A1 |
| | 70.5 without 70.50 seen | | M2A0 |
| | 4×0.07 only | | M0 |
| | $150 \times 0.19 = 28$ and answer 70 (implies 42) | | M2A0 |
| | 150×0.19 and $150 \div 4$ | | M1M0A0 |
| | $150 \times 0.19 = 28.5$ and 28.5×4 | | M1M0A0 |
| $4 \times 150 \times 0.19$ | | M0 | |
| Allow up to M2 even if not subsequently used | | | |

| Q | Answer | Mark | Comments |
|------------------------------------|--|-------|---|
| 16(a) | Alternative method 1 | | |
| | 9×2 or 18 or $(8 - 2) \times 4$ or 24 | M1 | oe |
| | $9 \times 2 + (8 - 2) \times 4$ | M1dep | oe eg $(9 - 4) \times 2 + (8 - 2) \times 4 + 4 \times 2$ |
| | 42 | A1 | |
| | Alternative method 2 | | |
| | 8×4 or 32 or $(9 - 4) \times 2$ or 10 | M1 | oe |
| | $8 \times 4 + (9 - 4) \times 2$ | M1dep | oe eg $(9 - 4) \times 2 + (8 - 2) \times 4 + 4 \times 2$ |
| | 42 | A1 | |
| | Alternative method 3 | | |
| | 9×8 or 72 or $(8 - 2) \times (9 - 4)$ or 30 | M1 | oe |
| | $9 \times 8 - (8 - 2) \times (9 - 4)$ | M1dep | oe |
| | 42 | A1 | |
| | Additional Guidance | | |
| | A correct area seen but not used may score M1 | | |
| | $9 \times 2 = 18$, $8 \times 4 = 32$ and 18×32 | | M1M0 |
| | $9 \times 2 \times 8 \times 4$ | | M0 |
| | The 2nd M is for a complete method that would lead to an answer of 42 eg $9 \times 2 = 18$, $6 \times 4 = 24$, $18 + 24 = 42$, then $42 \div 2 = 21$ | | M1M0 |
| | Beware eg $8 + 4 + 8 + 4 = 24$ which is M0 without a correct area seen | | M0 |
| Ignore any units given with answer | | | |

| Q | Answer | Mark | Comments |
|--|--|----------------|--|
| 16(b) | Valid criticism | B1 | eg the formula is $\frac{1}{2} \times \text{base} \times \text{height}$ or the answer is double the correct answer or he has forgotten the $\frac{1}{2}$ or it should be $\frac{1}{2} \times 12 \times 8$ or it should be 48 |
| | Additional Guidance | | |
| | He needs to halve 12 (which is 6, $6 \times 8 = 48$) | | B1 |
| | He hasn't halved the base | | B1 |
| | $0.5 \times 12 \times 8 = 48$ | | B1 |
| | His method was to work out a rectangle (insufficient) | | B0 |
| | He should divide by half | | B0 |
| | He didn't use the area of a triangle formula | | B0 |
| | He should have timesed all the measurements and divided by 2 | | B0 |
| | Ignore irrelevant statements alongside a correct statement eg1 he has forgotten to divide by 2, the base should be shorter eg2 should have divided by 2, he worked out the area of a rectangle | | B1 B1 |
| Two statements, one correct, one incorrect eg1 he has forgotten to divide by 2, it should be $14 \times 8 \div 2$ eg2 should have divided by 2, he worked out the area of a square eg3 forgot to halve the base, should have been $6 \times 8 = 49$ | | B0 B0 B0 | |

| Q | Answer | Mark | Comments |
|-------|------------|------|----------|
| 17(a) | reflection | B1 | |

| Q | Answer | Mark | Comments |
|-------|----------|------|----------|
| 17(b) | rotation | B1 | |

| Q | Answer | Mark | Comments |
|----|---|-------|--|
| 18 | Alternative method 1 | | |
| | 14×0.8 or 11.2 or $1.5 \times 2 \div 0.8$ or 3.75 | M1 | oe implied by 8.2 or 5.4(6...) or 5.47 or 5.5 |
| | their 11.2 – 2×1.5 or their 11.2 – 3 or 8.2 or $(14 - \text{their } 3.75) \times 0.8$ or 8.2 | M1dep | oe implied by 5.4(6...) or 5.47 or 5.5 |
| | their $8.2 \div 1.5$ or 5.4(6...) or 5.47 or 5.5 or $5 \rightarrow 7.5$ or $6 \rightarrow 9$ with M2 seen | M1dep | oe |
| | 6 with 5.4(6...) or 5.47 or 5.5 seen or 6 with $5 \rightarrow 7.5$ and $6 \rightarrow 9$ and M2 seen | A1 | |
| | Alternative method 2 | | |
| | 14×0.8 or 11.2 | M1 | oe implied by 7.4(6...) or 7.47 or 7.5 (packs) |
| | their $11.2 \div 1.5$ or 7.4(6...) or 7.47 or 7.5 (packs) or $7 \rightarrow 10.5$ or $8 \rightarrow 12$ with M1 seen | M1dep | oe $\frac{14 \times 0.8}{1.5}$ is M2 |
| | their $7.4(6...) - 2$ or 5.4(6...) or 5.47 or 5.5 or $7 - 2$ or $8 - 2$ with M2 seen | M1dep | oe |
| | 6 with 7.4(6...) or 7.47 or 7.5 seen or 6 with $7 \rightarrow 10.5$ and $8 \rightarrow 12$ and M2 seen | A1 | |

Mark scheme and Additional Guidance continues on the next page

| Q | Answer | Mark | Comments |
|---|---|-------|---|
| 18 cont | Alternative method 3 Working in weeks | | |
| | 1.5 ÷ 0.8 or 1.875 | M1 | oe implied by 7.4(6...) or 7.47 or 7.5 (packs) |
| | 14 ÷ their 1.875 or 7.4(6...) or 7.47 or 7.5 (packs) or 7 → 13.1(25) or 8 → 15 | M1dep | oe |
| | their 7.4(6...) – 2 or 5.4(6...) or 5.47 or 5.5 or 7 – 2 or 8 – 2 with M2 seen | M1dep | oe |
| | 6 with 7.4(6...) or 7.47 or 7.5 seen or 6 with 7 → 13.1(25) and 8 → 15 seen | A1 | |
| | Additional Guidance | | |
| | Select the scheme that favours the student for the first 2 M marks even if not subsequently used | | |
| | Alts 2 and 3 the 7.5 must be packs not 7.5 kg (from 5 × 1.5) | | |
| | For the final mark of Alt 1, eg 5 → 7.5 and 0.7 (short) is sufficient evidence and there are equivalents for Alts 2 and 3 | | |
| | For the final mark of Alt 1, eg 6 → 9 and 0.8 (over) is sufficient evidence and there are equivalents for Alts 2 and 3 | | |
| Accept repeated addition or subtraction of 1.5 if clear eg 1.5 + 1.5 + 1.5 + 1.5 + 1.5 = 7.5 implies 5 → 7.5 | | | |

| Q | Answer | Mark | Comments |
|----|--|-------|---------------------------------|
| 19 | Alternative method 1 | | |
| | 6.5 – 4 or 2.5 | M1 | |
| | 50 ÷ their 2.5 or 50 × 100 ÷ their 2.5 or 2000 | M1dep | oe |
| | 1 cm represents 20 metres | A1 | |
| | Alternative method 2 | | |
| | 80 and 130 seen | M1 | |
| | 80 ÷ 4 with 130 seen or 130 ÷ 6.5 with 80 seen | M1dep | oe eg 20 × 4 = 80 with 130 seen |
| | 1 cm represents 20 metres | A1 | |
| | Additional Guidance | | |
| | In Alt 1, 65 – 40 unless recovered | | M0 |
| | In Alt 1, 0.065 – 0.04 unless recovered | | M0 |
| | In Alt 2, 0.08 and 0.13 unless recovered | | M0 |

| Q | Answer | Mark | Comments |
|-------|---|------|--|
| 20(a) | $(24 + 8 =) 32$ | B2 | B1 $(2a =) 2 \times 12$ or $(2a =) 24$ or $(b =) 8$ |
| | Additional Guidance | | |
| | 32 with no incorrect working | | B2 |
| | 32 from incorrect working eg $22 + 10 = 32$ | | B0 |
| | $24 + 9 = 33$ | | B1 |
| | $22 + 8 = 30$ | | B1 |
| | $24a$ without a B1 response | | B0 |
| | $8b$ without a B1 response | | B0 |
| | $24a + 8b$ without a B1 response | | B0 |
| | Use of inequalities in answer without a B1 response | | B0 |

| Q | Answer | Mark | Comments |
|--|---|------|---|
| 20(b) | An example where x and y are both negative and $\frac{y}{x} = 4$ | B1 | eg $x = -1$ and $y = -4$ values of x and y can be implied eg $\frac{-12}{-3} (= 4)$ |
| | Additional Guidance | | |
| | Correct use of \div instead of fractions is allowed eg $-12 \div -3$ | | B1 |
| | Must show the fraction or division or state which is x and which is y eg -1 and -4 | | B0 |
| | Decimals and / or fractions may be used eg $\frac{-6.4}{-1.6}$ or $\frac{-2}{-\frac{1}{2}}$ | | B1 |
| One correct example among several attempts | | B1 | |

| Q | Answer | Mark | Comments |
|-----------|---|-------|--|
| 21 | Alternative method 1 | | |
| | 30 × 8 or 240 | M1 | |
| | 440 – their 240 or 200 | M1dep | implied by 10 (medium) and 5 (large) or numbers of sweets in medium and in large totalling 200 |
| | 12 <i>m</i> + 16 <i>l</i> where <i>m</i> and <i>l</i> are integers with <i>m</i> = 2 <i>l</i> or 12 × 2 + 16 or 120 (sweets in medium) and 80 (sweets in large) or 10 medium or 5 large | M1 | eg 12 × 6 + 16 × 3 or 72 + 48 with 6 (medium) and 3 (large) shown medium or large may be implied |
| | 30 : 10 : 5 | A1 | oe ratio eg 6 : 2 : 1 |
| | Alternative method 2 | | |
| | 30 × 8 or 240 | M1 | |
| | 440 – their 240 or 200 | M1dep | implied by 10 (medium) and 5 (large) or numbers of sweets in medium and in large totalling 200 |
| | 12 × 2 <i>x</i> + 16 <i>x</i> = their 200 or <i>x</i> = 5 or 12 <i>y</i> + 16 × $\frac{1}{2}$ <i>y</i> = their 200 or <i>y</i> = 10 | M1dep | oe equation in terms of large bags any letter oe equation in terms of medium bags any letter |
| | 30 : 10 : 5 | A1 | oe ratio eg 6 : 2 : 1 |
| | Additional Guidance | | |
| | Ignore incorrect simplification if 30 : 10 : 5 seen | | |
| | Answer 240 : 120 : 80 | | M1M1M1A0 |
| | Award up to M3 even if working not subsequently used | | |

| Q | Answer | Mark | Comments |
|------------------|--|------|--|
| 22(a) | 2 and 5 with no other roots | B2 | either order B1 at least one correct root with up to one incorrect root SC1 (2, 0) or (5, 0) or (2, 5) or (5, 2) |
| | Additional Guidance | | |
| | $x = 2$ and $x = 5$ | | B2 |
| | 2, 5 or 5, 2 | | B2 |
| | (2, 0) and (5, 0) and 2 and 5 | | SC1 |
| | (2, 0) and (5, 0) and -2 and -5 | | B0 |
| | 2, 0 and 5, 0 (both pairs imply coordinates) | | SC1 |
| | 2, 0 or 5, 0 (one pair implies roots) | | B1 |
| | (0, 2) and (0, 5) | | B0 |
| | 0, 2 and 0, 5 (both pairs imply coordinates) | | B0 |
| | 0, 2 or 0, 5 (one pair implies roots) | | B1 |
| | Both answers embedded $2^2 - 7 \times 2 + 10 = 0$ and $5^2 - 7 \times 5 + 10 = 0$ | | B1 |
| $(x - 2)(x - 5)$ | | B0 | |

| Q | Answer | Mark | Comments |
|-------|---|------|----------|
| 22(b) | 3.5 | B1 | oe |
| | Additional Guidance | | |
| | $x = 3.5$ | | B1 |
| | $3.5x$ | | B0 |
| | Ignore any y-coordinate even with brackets omitted eg (3.5, -2.25) or 3.5, -2 or $x = 3.5$ $y = -2.25$ or $x = 3.5$ $y = 2$ | | B1 |
| | $(-2.25, 3.5)$ | | B0 |

| Q | Answer | Mark | Comments | |
|-------|--|------|---|--|
| 23(a) | Plots at least 3 points correctly | M1 | $\pm \frac{1}{2}$ square | |
| | All four points correctly plotted and joined | A1 | $\pm \frac{1}{2}$ square ignore working for part (b) | |
| | Additional Guidance | | | |
| | $\pm \frac{1}{2}$ square means half a small square horizontally and vertically | | | |
| | If a point is within tolerance the line must be within $\pm \frac{1}{2}$ square of their point | | | |
| | Mark intention for joining point to point | | | |

| Q | Answer | Mark | Comments |
|-------|---|------|----------|
| 23(b) | [70, 78] | B1 | |
| | Additional Guidance | | |
| | Answer in range with or without working, with no graph or incorrect graph | | B1 |
| | 70.5 – 75 on answer line (both values in range) | | B1 |

| Q | Answer | Mark | Comments |
|----|---|----------------|---|
| 24 | 15 | B2 | B1 answer 3 or answer 5 or answer 3 (×) 5 or (75 =) 3 (×) 5 (×) 5 or (75 =) 3 (×) 5 ² or (105 =) 3 (×) 5 (×) 7 or (1) 3 5 15 25 (75) or (1) 3 5 7 15 21 35 (105) |
| | Additional Guidance | | |
| | NB 15 from 3 + 5 + 7 does not score unless working for B1 seen elsewhere | | |
| | Prime factor responses for B1 may be seen in repeated division, on a factor tree or in a Venn diagram eg1 3 5 5 in repeated division or factor tree for 75 eg2 3 5 7 inside one circle of a Venn diagram eg3 3 5 inside the intersection of a Venn diagram | B1 B1 B1 | |
| | For products of prime factors, repeated division, factor trees and Venn diagrams, ignore inclusion of factors of 1 | | |
| | A repeated division needs to reach the final prime factor but does not need to reach 1 | | |
| | B1 can be awarded even if LCM is subsequently worked out | | |
| | List of factors may be seen as factor pairs | | |

| Q | Answer | Mark | Comments |
|-------|--|-------|--|
| 25(a) | Alternative method 1 | | |
| | 200 – 2 × 5 × 5 or 200 – 50 or 150 or 4 × 5 × y or 20y | M1 | oe eg 5y + 5y + 5y + 5y implied by 37.5 or answer 937.5 |
| | 4 × 5 × y = 200 – 2 × 5 × 5 or 4 × 5 × y = 200 – 50 or 4 × 5 × y = 150 or 150 ÷ 4 ÷ 5 or 150 ÷ 20 or 7.5 | M1dep | oe eg 20y = 150 |
| | 187.5 | A1 | oe |
| | Alternative method 2 | | |
| | 200 – 2 × 5 × 5 or 200 – 50 or 150 | M1 | oe implied by 37.5 or answer 937.5 |
| | 150 ÷ 4 × 5 or 37.5 × 5 | M1dep | oe |
| | 187.5 | A1 | oe |
| | Additional Guidance | | |
| | Embedded 7.5 eg 4 × 5 × 7.5 = 150 | | M1M1 |

| Q | Answer | Mark | Comments |
|-------|---|------|----------|
| 25(b) | It is smaller than the answer to part (a) | B1 | |

| Q | Answer | Mark | Comments |
|----|--------|------|----------|
| 26 | 39 | B1 | |

| Q | Answer | Mark | Comments |
|---|--|------|--|
| 27 | 40 (women) and 44 (men) and No or 40 : 44 and No or 84 and No or 8 (women leave) and 2 (men arrive) and No | B2 | oe B1 40 (women) and 44 (men) or 40 : 44 or 84 or 8 (women leave) and 2 (men arrive) |
| | Additional Guidance | | |
| | NB 84 from incorrect working eg $41 + 43 = 84$ | | B0 |
| | For B1 the values may be seen among others eg1 20 : 22 30 : 33 40 : 44 50 : 55 eg2 21, 42, 63, 84, 105, ... eg3 10, 20, 30, 40, 50, ... and 11, 22, 33, 44, 55, ... eg4 $\frac{44}{84}$ (implies 84) | | B1 |
| For B2 the value(s) must be chosen by eg circling or a list stopping at that point and No must be indicated | | | |

| Q | Answer | Mark | Comments |
|-----------|--|-------|--|
| 28 | Alternative method 1 Total % for A after 6 tests – total % for B after 5 tests | | |
| | 60 × 5 or 300 or 52 × 5 or 260 | M1 | oe |
| | $\frac{24}{50} \times 100$ or 0.48×100 or 48 | M1 | oe 348 implies M1M1 |
| | 60 × 5 + $\frac{24}{50} \times 100 - 52 \times 5$ or 300 + 48 – 260 or 88 | M1dep | oe eg 348 – 260 dep on M1M1 |
| | 44 | A1 | allow $\frac{44}{50}$ |
| | Alternative method 2 Total score for A after 6 tests – total score for B after 5 tests | | |
| | $\frac{60}{100} \times 50$ or 30 | M1 | oe allow $\frac{30}{50}$ implied by 150 or 174 |
| | $\frac{52}{100} \times 50$ or 26 | M1 | oe allow $\frac{26}{50}$ implied by 130 |
| | $\frac{60}{100} \times 50 \times 5 + 24 - \frac{52}{100} \times 50 \times 5$ or 150 + 24 – 130 | M1dep | oe eg 174 – 130 dep on M1M1 |
| | 44 | A1 | allow $\frac{44}{50}$ |

Mark scheme and Additional Guidance continues on the next two pages

| Q | Answer | Mark | Comments |
|--------------------|--|-------|---|
| 28 cont | Alternative method 3 Total score for A after 6 tests – total score for B after 5 tests | | |
| | 50 × 5 or 250 | M1 | oe implied by 150 or 130 or 174 |
| | $\frac{60}{100} \times 50 \times 5$ or 150 and $\frac{52}{100} \times 50 \times 5$ or 130 | M1dep | oe allow $\frac{150}{250}$ and $\frac{130}{250}$ |
| | $\frac{60}{100} \times 50 \times 5 + 24 - \frac{52}{100} \times 50 \times 5$ or 150 + 24 – 130 | M1dep | oe eg 174 – 130 |
| | 44 | A1 | allow $\frac{44}{50}$ |
| | Alternative method 4 Difference in scores after 5 tests + 6th score for A | | |
| | 60 – 52 or 8 | M1 | oe |
| | $\frac{60-52}{100} \times 50$ or 4 | M1dep | oe eg $\frac{60}{100} \times 50 - \frac{52}{100} \times 50$ or 30 – 26 allow $\frac{4}{50}$ |
| | $\frac{60-52}{100} \times 50 \times 5 + 24$ or 4 × 5 + 24 or 20 + 24 | M1dep | oe |
| | 44 | A1 | allow $\frac{44}{50}$ |

Additional Guidance is on the next page

| Additional Guidance | |
|----------------------------|--|
| 28 cont | To award the 3rd M a calculation or a value (not an equation) must be seen |
| | Select the scheme that favours the student for the first 2 M marks even if not subsequently used |
| | Alt 1 Do not award 1st M for 300 if incorrect method seen eg $6 \times 50 = 300$ does not score the 1st M |
| | Alt 1 Do not award 2nd M for 48 if incorrect method seen eg $100 - 52 = 48$ does not score the 2nd M |
| | Alt 2 Do not award 2nd M for 26 if incorrect method seen eg $50 - 24 = 26$ does not score the 2nd M |
| | |

| Q | Answer | Mark | Comments |
|-----------|--|-------------|---------------------------------------|
| 29 | 2625 ÷ 250 or 2.625 ÷ 250 or 2625 ÷ 0.000 25 or answer with digits 105 | M1 | oe eg $\frac{2.625 \times 1000}{250}$ |
| | 10.5 | A1 | oe |
| | Additional Guidance | | |
| | Digits 105 may have additional zeros before 1 or after 5 eg1 0.000 105 eg2 10 500 eg3 10.05 | | M1A0 M1A0 MOA0 |

| Q | Answer | Mark | Comments |
|----|--|------|---|
| 30 | $\frac{9-3}{1-2}$ or $\frac{6}{3}$ or $2x (+ c)$ where c is a constant | M1 | oe eg $\frac{3-9}{-2-1}$ or $\frac{-6}{-3}$ |
| | 2 | A1 | |
| | Additional Guidance | | |
| | $2x$ may be implied eg $y - 3 = 2(x + 2)$ | | M1A0 |