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# GCSE MATHEMATICS 8300/3F

Foundation Tier Paper 3 Calculator

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Mark scheme

November 2023

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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.

|                        |                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>M</b>               | Method marks are awarded for a correct method which could lead to a correct answer.                                                    |
| <b>A</b>               | 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>B</b>               | Marks awarded independent of method.                                                                                                   |
| <b>ft</b>              | Follow through marks. Marks awarded for correct working following a mistake in an earlier step.                                        |
| <b>SC</b>              | Special case. Marks awarded for a common misinterpretation which has some mathematical worth.                                          |
| <b>M dep</b>           | A method mark dependent on a previous method mark being awarded.                                                                       |
| <b>B dep</b>           | A mark that can only be awarded if a previous independent mark has been awarded.                                                       |
| <b>oe</b>              | Or equivalent. Accept answers that are equivalent.<br>eg accept 0.5 as well as $\frac{1}{2}$                                           |
| <b>[a, b]</b>          | Accept values between a and b inclusive.                                                                                               |
| <b>[a, b)</b>          | Accept values $a \leq \text{value} < b$                                                                                                |
| <b>3.14 ...</b>        | Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416                                                                                 |
| <b>Use of brackets</b> | 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.

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| <b>Q</b> | <b>Answer</b> | <b>Mark</b> | <b>Comments</b> |
|----------|---------------|-------------|-----------------|
| <b>1</b> | 17            | B1          |                 |

| <b>Q</b> | <b>Answer</b>             | <b>Mark</b> | <b>Comments</b>                                  |
|----------|---------------------------|-------------|--------------------------------------------------|
| <b>2</b> | 700 or (seven) hundred(s) | B1          | accept 100(s)<br>ignore spelling, mark intention |

| <b>Q</b>    | <b>Answer</b> | <b>Mark</b> | <b>Comments</b>                 |
|-------------|---------------|-------------|---------------------------------|
| <b>3(a)</b> | Equilateral   | B1          | ignore spelling, mark intention |

| <b>Q</b>    | <b>Answer</b> | <b>Mark</b> | <b>Comments</b>                 |
|-------------|---------------|-------------|---------------------------------|
| <b>3(b)</b> | Chord         | B1          | ignore spelling, mark intention |

| Q | Answer                                                                                                                                                               | Mark | Comments                                                                                                                                                                     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | 1, 3, 5, 9, 15, 45                                                                                                                                                   | B2   | any order<br>B1 5 or 6 correct values with up to 2 incorrect values<br>or<br>4 correct values with 0 or 1 incorrect values<br>or<br>3 correct values with 0 incorrect values |
|   | Additional Guidance                                                                                                                                                  |      |                                                                                                                                                                              |
|   | Allow values given in products or ‘coordinates’<br>eg1 1 × 45, 3 × 15, 5 × 9<br>eg2 (1, 45), (3, 15)                                                                 |      | B2<br>B1                                                                                                                                                                     |
|   | Lists with repeated values cannot score B2, but ignore repeated values in any format for B1<br>eg1 1, 3, 5, 9, 9<br>eg2 1 × 45, 3 × 15, 5 × 9, 45 × 1, 15 × 3, 9 × 5 |      | B1<br>B1                                                                                                                                                                     |

| Q    | Answer                             | Mark | Comments        |
|------|------------------------------------|------|-----------------|
| 5(a) | $15^2 - 2 \times 63$ or 225 or 126 | M1   | –126 implies M1 |
|      | 99                                 | A1   |                 |

| Q    | Answer              | Mark | Comments |
|------|---------------------|------|----------|
| 5(b) | $m - k$ or $-k + m$ | B1   |          |

| Q    | Answer | Mark | Comments               |
|------|--------|------|------------------------|
| 6(a) | (5, 3) | B1   | may be seen on diagram |

| Q    | Answer | Mark | Comments               |
|------|--------|------|------------------------|
| 6(b) | 16     | B1   | may be seen on diagram |

| Q | Answer                                                                                                                                      | Mark | Comments                                                                                                                |
|---|---------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------|
| 7 | $99.2(0) \div 5 \times 24$<br>or<br>$19.84 \times 24$<br>or<br>$4.8 \times 99.2(0)$<br>or<br>$2380.8(0) \div 5$<br>or<br>$\frac{11904}{25}$ | M2   | oe<br>M1 $99.2(0) \div 5$ or $19.84$ oe<br>or<br>$24 \div 5$ or $4.8$ oe<br>or<br>$24 \times 99.2(0)$ or $2380.8(0)$ oe |
|   | 476.16                                                                                                                                      | A1   |                                                                                                                         |
|   | <b>Additional Guidance</b>                                                                                                                  |      |                                                                                                                         |
|   | (One year's broadband cost) 238.08 oe implies M1                                                                                            |      |                                                                                                                         |

| Q | Answer                                       | Mark | Comments                                                                                                                                                                    |
|---|----------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8 | 69.3                                         | B2   | B1 $3.8 \times 6.75 \times 2.7$ oe<br>or<br>$\frac{13\ 851}{200}$ or $69.25(5)$ or $69.2(6)$<br>or<br>correct rounding to 1 dp of a number to 2 dp or more, other than 6.75 |
|   | <b>Additional Guidance</b>                   |      |                                                                                                                                                                             |
|   | $(3.8 + 6.75 + 2.7 =) 13.25$ and answer 13.3 |      | B1                                                                                                                                                                          |

| Q | Answer                                                                                                                                                                                                                                     | Mark | Comments                                                                                                                                     |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 9 | Key is missing                                                                                                                                                                                                                             | B1   | oe<br>implied by correct key drawn                                                                                                           |
|   | Symbols are inconsistent                                                                                                                                                                                                                   | B1   | oe<br>eg Prawn Cocktail should have half a symbol<br>or<br>eg if Prawn Cocktail is right the others are wrong<br>or<br>eg total is incorrect |
|   | <b>Additional Guidance</b>                                                                                                                                                                                                                 |      |                                                                                                                                              |
|   | Ignore irrelevant or incorrect statements                                                                                                                                                                                                  |      |                                                                                                                                              |
|   | Examples of 'Key is missing' for B1<br>Not labelled what each quarter represents<br>Hasn't said what a full circle shows<br>Doesn't say how many people is one piece                                                                       |      |                                                                                                                                              |
|   | Examples of 'Symbols are inconsistent' for B1<br>Nicki's total is 32 not 30<br>The pictogram has inconsistent values<br>4 for PC it should be 2<br>Prawn Cocktail is the wrong amount<br>Prawn Cocktail is two, but there's a whole circle |      |                                                                                                                                              |
|   | Incorrect results displayed on chart                                                                                                                                                                                                       |      | B0                                                                                                                                           |

| Q  | Answer                                                                                                                       | Mark  | Comments                                                                                    |
|----|------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------|
| 10 | $0.84 \times 1.75$ or 1.47<br>or<br>$84 \times 1.75$ or 147                                                                  | M1    | oe                                                                                          |
|    | $9.03 - \text{their } 1.47$ or 7.56<br>or<br>$903 - \text{their } 147$ or 756                                                | M1    | oe<br>their $1.47 < 9.03$<br>their $147 < 903$<br>units must be consistent unless recovered |
|    | their $7.56 \div 4$<br>or<br>their $756 \div 4$ or 189                                                                       | M1dep | oe<br>dep on 2nd M                                                                          |
|    | 1.89                                                                                                                         | A1    |                                                                                             |
|    | <b>Additional Guidance</b>                                                                                                   |       |                                                                                             |
|    | Up to M3 may be awarded for correct work, with no answer or incorrect answer, even if this is seen amongst multiple attempts |       |                                                                                             |
|    | Accept 189 on answer line with £ crossed out and p(ence) added                                                               |       |                                                                                             |
|    | $9.03 - 1.68 = 7.35$                                                                                                         |       | M0M1                                                                                        |
|    | $9.03 - 1.68$ and $7.35 \div 4$                                                                                              |       | M0M1M1                                                                                      |
|    |                                                                                                                              |       |                                                                                             |

| Q     | Answer                                                                                                                                                              | Mark | Comments                                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------|
| 11(a) | $10x + 4y - 6$<br>or<br>$2(5x + 2y - 3)$                                                                                                                            | B3   | any order<br>B2 two terms correct<br>B1 one term correct |
|       | <b>Additional Guidance</b>                                                                                                                                          |      |                                                          |
|       | B1 may be awarded for correct work, with no answer or incorrect answer, even if this is seen amongst multiple attempts                                              |      |                                                          |
|       | Further incorrect work after a B3 response is B2<br>eg1 $10x + 4y - 6 = 8xy$<br>eg2 $10x + 4y - 6$ and $10x = -10$<br>eg3 $10x + 4y - 6$ and $2(5x + 2y - 6)$       |      | B2                                                       |
|       | Further incorrect work after a B2 or B1 response is B1<br>eg1 $10x + 4y + 6 = 20xy$<br>eg2 $10x - 4y + 6$ and $10x = -2$<br>eg3 $10x + 4y + 6$ and $2(5x + 2y + 6)$ |      | B1                                                       |
|       | $10x + 4y + 6$ and $2(5x + 2y + 3)$                                                                                                                                 |      | B2                                                       |
|       | $10x$ and $4y$ and $-6$                                                                                                                                             |      | B2                                                       |

| Q     | Answer          | Mark | Comments              |
|-------|-----------------|------|-----------------------|
| 11(b) | $\frac{a^2}{2}$ | B1   | accept any indication |

| Q  | Answer                                                                                                                                                                                                | Mark | Comments                                                                              |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------|--|
| 12 | Maths Drama English (MDE)<br>Maths Drama Spanish (MDS)<br>Maths Drama Biology (MDB)<br>Maths Drama Art (MDA)<br>Maths English Spanish (MES)<br>Maths English Biology (MEB)<br>Maths English Art (MEA) | B3   | any order of subjects and/or rows<br>B2 5 or 6 rows correct<br>B1 3 or 4 rows correct |  |
|    | Additional Guidance                                                                                                                                                                                   |      |                                                                                       |  |
|    | Accept any indication for subject                                                                                                                                                                     |      |                                                                                       |  |
|    | Allow repeats and additional rows for up to B2                                                                                                                                                        |      |                                                                                       |  |

| Q     | Answer                                                                                                                 | Mark | Comments |
|-------|------------------------------------------------------------------------------------------------------------------------|------|----------|
| 13(a) | $0.09 \times 1400$                                                                                                     | M1   | oe       |
|       | 126                                                                                                                    | A1   |          |
|       | <b>Additional Guidance</b>                                                                                             |      |          |
|       | M1 may be awarded for correct work, with no answer or incorrect answer, even if this is seen amongst multiple attempts |      |          |
|       | Do not ignore further working after 126 seen                                                                           |      |          |
|       | Do not allow a misread of 0.9 for 0.09                                                                                 |      |          |
|       | $1400 - 126 = 1274$ in working                                                                                         |      | M1       |
|       | $\frac{126}{1400}$ in working                                                                                          |      | M1       |
|       | $\frac{126}{1400}$ on answer line                                                                                      |      | M1A0     |

| Q     | Answer                                                                                                                                                                                                                                         | Mark | Comments                                                                                                                                                              |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13(b) | <b>Alternative method 1</b>                                                                                                                                                                                                                    |      |                                                                                                                                                                       |
|       | $0.67 + 0.48 = 1.15$<br>and<br>the sum (of the probabilities) is greater than 1<br><b>or</b><br>$0.67 + 0.48 = 1.15$<br>and<br>0.15 study both<br><b>or</b><br>$0.67 + 0.48 = 1.15$<br>and<br>more than the total number of students at school | B2   | oe<br>B1 1.15 oe<br>or<br>the sum (of the probabilities) is greater than 1<br>or<br>0.15 oe                                                                           |
|       | <b>Alternative method 2</b>                                                                                                                                                                                                                    |      |                                                                                                                                                                       |
|       | $938 + 672 = 1610$<br>and<br>more than the total number of students at school<br><b>or</b><br>$938 + 672 = 1610$<br>and<br>the total (number of students) is greater than 1400<br><b>or</b><br>938 and 672<br>and<br>210 study both            | B2   | oe<br>B1 $0.67 \times 1400$ oe and $0.48 \times 1400$ oe<br>or<br>938 and 672<br>or<br>1610<br>or<br>the total (number of students) is greater than 1400<br>or<br>210 |

**Additional Guidance continues on the next page**

| 13(b)<br>cont | Additional Guidance                                                                                                    |    |
|---------------|------------------------------------------------------------------------------------------------------------------------|----|
|               | B1 may be awarded for correct work, with no answer or incorrect answer, even if this is seen amongst multiple attempts |    |
|               | $938 + 672 = 1610$ and $1610 > 1400$                                                                                   | B2 |
|               | $938 + 672 = 1610$ and students doing both as more than the total                                                      | B2 |
|               | $0.67 + 0.48 = 1.15$ and $1.15 > 1$                                                                                    | B2 |
|               | $67 + 48 = 115$ and students doing both as over 100                                                                    | B2 |
|               | $67 + 48 = 115$ and 15% doing both                                                                                     | B2 |
|               | $67 + 48 = 115$ and 15 doing both                                                                                      | B1 |
|               | $0.67 + 0.48 = 1.15$ and needs to add to one                                                                           | B1 |
|               | $67 + 48 = 115$                                                                                                        | B1 |
|               | $0.67 + 0.48 = 1.15$ and students doing both as over 100<br>(must be consistent form for comparison)                   | B1 |
|               | $\frac{938}{1400}$ and $\frac{672}{1400}$                                                                              | B1 |
|               | $0.67 + 0.48$ is more than 1                                                                                           | B1 |

| Q  | Answer                                                                                                                             | Mark  | Comments                                                                 |
|----|------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------|
| 14 | <b>Alternative method 1</b>                                                                                                        |       |                                                                          |
|    | $0.6 + 0.6 + 1.3 + 0.8 + 1.7$ or 5                                                                                                 | M1    | oe<br>condone one missing or incorrect distance                          |
|    | their $5 \times 3$ or 15                                                                                                           | M1dep |                                                                          |
|    | their $15 \times 0.4(0) + 3 \times 1.35$<br>or $6(.00) + 4.05$                                                                     | M1dep | oe working in pence<br>their 15 can be a truncated or rounded up decimal |
|    | 10.05                                                                                                                              | A1    | SC2 6.05                                                                 |
|    | <b>Alternative method 2</b>                                                                                                        |       |                                                                          |
|    | $0.6 \times 3$ or 1.8 or $1.2 \times 3$ or 3.6<br>or $1.3 \times 3$ or 3.9<br>or $0.8 \times 3$ or 2.4<br>or $1.7 \times 3$ or 5.1 | M1    |                                                                          |
|    | $0.6 \times 3 + 0.6 \times 3 + 1.3 \times 3 + 0.8 \times 3 + 1.7 \times 3$<br>or $1.8 + 1.8 + 3.9 + 2.4 + 5.1$<br>or 15            | M1dep | oe<br>condone one missing or incorrect distance                          |
|    | their $15 \times 0.4(0) + 3 \times 1.35$<br>or $6(.00) + 4.05$                                                                     | M1dep | oe working in pence<br>their 15 can be a truncated or rounded up decimal |
|    | 10.05                                                                                                                              | A1    | SC2 6.05                                                                 |

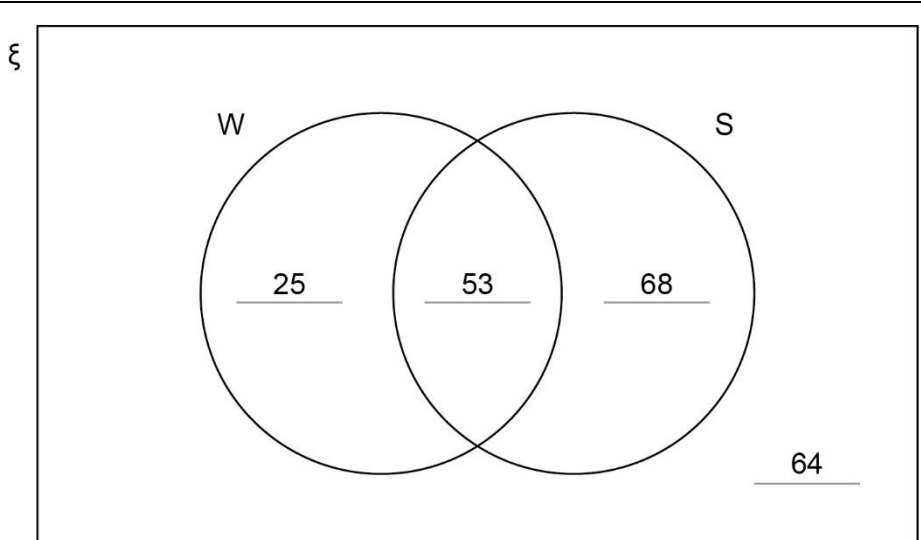
**Mark scheme and Additional Guidance continue on the next page**

|         |                                                                                                                                                                                                                         |          |                                                                  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------|
| 14 cont | <b>Alternative method 3</b>                                                                                                                                                                                             |          |                                                                  |
|         | $0.6 \times 3$ or $1.8$ or $1.2 \times 3$ or $3.6$<br>or $1.3 \times 3$ or $3.9$<br>or $0.8 \times 3$ or $2.4$<br>or $1.7 \times 3$ or $5.1$                                                                            | M1       |                                                                  |
|         | $0.6 \times 3 \times 0.4$ or $0.72$<br>or $1.2 \times 3 \times 0.4$ or $1.44$<br>or $1.3 \times 3 \times 0.4$ or $1.56$<br>or $0.8 \times 3 \times 0.4$ or $0.96$<br>or $1.7 \times 3 \times 0.4$ or $2.04$             | M1dep    | oe working in pence                                              |
|         | $0.6 \times 3 \times 0.4 \times 2 + 1.3 \times 3 \times 0.4 + 0.8 \times 3 \times 0.4 + 1.7 \times 3 \times 0.4 + 3 \times 1.35$<br>or<br>$0.72 \times 2 + 1.56 + 0.96 + 2.04 + 3 \times 1.35$<br>or<br>$6(.00) + 4.05$ | M1dep    | oe working in pence<br>condone one missing or incorrect distance |
|         | 10.05                                                                                                                                                                                                                   | A1       | SC2 6.05                                                         |
|         | <b>Additional Guidance</b>                                                                                                                                                                                              |          |                                                                  |
|         | Units must be consistent unless recovered                                                                                                                                                                               |          |                                                                  |
|         | All correct except for missing the return distance from A<br>eg<br>$0.6 + 1.3 + 0.8 + 1.7$ or $4.4$<br>$4.4 \times 3 = 13.2$<br>$13.2 \times 0.4 + 3 \times 1.35 = 9.33$                                                | M1M1M1A0 |                                                                  |
|         | Example using their 15 truncated or rounded up for each mile<br>$0.6 + 1.3 + 0.8 + 1.7$ or $4.4$<br>$4.4 \times 3 = 13.2$<br>$13 \times 0.4 + 3 \times 1.35 = 9.25$ or $14 \times 0.4 + 3 \times 1.35 = 9.65$           | M1M1M1A0 |                                                                  |
|         | $3.6 + 3.9 + 5.1$ (BC missing)                                                                                                                                                                                          | M1M1     |                                                                  |
|         | $3.9 + 2.4 + 5.1$ without further working (TA and AT missing)                                                                                                                                                           | M1M0     |                                                                  |

| Q  | Answer                                                                                                                                                  | Mark       | Comments                        |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------|
| 15 | $30 \div 6 + 18$ or $5 + 18$                                                                                                                            | M1         | oe                              |
|    | 23                                                                                                                                                      | A1         | 23 may be in either output oval |
|    | $3 \times 30 - a = \text{their } 23$<br>or $90 - a = \text{their } 23$<br>or $3 \times 30 - \text{their } 23 (= a)$<br>or $90 - \text{their } 23 (= a)$ | M1         | oe                              |
|    | 67                                                                                                                                                      | A1ft       | ft 90 – their 23                |
|    | <b>Additional Guidance</b>                                                                                                                              |            |                                 |
|    | Answer 67                                                                                                                                               | M1A1M1A1   |                                 |
|    | $90 - 67 = 23$ shown in working without 67 on answer line                                                                                               | M1A1M1A0   |                                 |
|    | For the ft marks allow decimal or fractional answers<br>eg<br>$30 \div 6 + 18 = 1.25$<br>$90 - 1.25 = 88.75$                                            | M1A0M1A1ft |                                 |
|    | $\frac{23+a}{3} = 30$                                                                                                                                   | M1A1M1     |                                 |
|    | $23 + a \div 3 = 30$                                                                                                                                    | M1A1M0     |                                 |
|    | Allow their 23 to come from working or the first output oval<br>eg 12 written in the first output oval, then answer 78                                  | M0A0M1A1ft |                                 |

| Q  | Answer                                                                                                                          | Mark  | Comments                                                                                                                                   |
|----|---------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 16 | <b>Alternative method 1</b>                                                                                                     |       |                                                                                                                                            |
|    | $\left(\frac{3}{4}=\right) 0.75$<br>or<br>$\left(4\frac{1}{5}=\right) 4.2$                                                      | M1    |                                                                                                                                            |
|    | 2.5 – 0.75 or 1.75<br>and<br>4.2 – 2.5 or 1.7                                                                                   | M1dep |                                                                                                                                            |
|    | $4\frac{1}{5}$ with 1.75 and 1.7 seen                                                                                           | A1    |                                                                                                                                            |
|    | <b>Alternative method 2</b>                                                                                                     |       |                                                                                                                                            |
|    | $\left(4\frac{1}{5}=\right) \frac{21}{5}$<br>or<br>$(2.5=) \frac{5}{2}$                                                         | M1    | oe improper fraction                                                                                                                       |
|    | $\left(\frac{3}{4}=\right) \frac{15}{20}$<br>and<br>$\left(4\frac{1}{5}=\right) \frac{84}{20}$<br>and<br>$(2.5=) \frac{50}{20}$ | M1dep | oe with common denominators                                                                                                                |
|    | $4\frac{1}{5}$ with 35 and 34 seen<br>or<br>$4\frac{1}{5}$ with $\frac{35}{20}$ and $\frac{34}{20}$ seen                        | A1    | 35 and 34 may be implied by the correct multiples of 35 and 34 dependent on the common denominator used<br><br>oe with common denominators |
|    | <b>Additional Guidance</b>                                                                                                      |       |                                                                                                                                            |
|    | Condone $4\frac{1}{5}$ with $(2.5 - 0.75 =) 1.75$ and $(2.5 - 4.2 =) -1.7$                                                      |       | M1M1A1                                                                                                                                     |

| Q  | Answer                                                                  | Mark  | Comments                                                                         |
|----|-------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------|
| 17 | 750 – 400<br>or 1100 – 750<br>or $(1100 - 400) \div 2$<br>or 350        | M1    | oe                                                                               |
|    | 1100 + their 350 or 1450<br>or<br>1100 + 2 × their 350 or 1800          | M1dep | oe                                                                               |
|    | Addition or correct total of their<br>Level 1 to Level 5 scores         | M1    | their Level 4 and Level 5 scores must not<br>be zero or blank<br>5500 implies M3 |
|    | 4250                                                                    | A1    | SC2 550                                                                          |
|    | <b>Additional Guidance</b>                                              |       |                                                                                  |
|    | SC2 550 is for using Level 5 score 1800 as the highest possible score   |       |                                                                                  |
|    | Embedded answer<br>eg $4250 + 1250 = 5500$ without 4250 as their answer |       | M1M1M1A0                                                                         |

| Q  | Answer                                                                              | Mark | Comments |
|----|-------------------------------------------------------------------------------------|------|----------|
| 18 | 25 in W only                                                                        | B1   |          |
|    | 53 in the intersection                                                              | B1   |          |
|    | 68 in S only                                                                        | B1   |          |
|    | 64 outside the circles                                                              | B1   |          |
|    | <b>Additional Guidance</b>                                                          |      |          |
|    |  |      | B1B1B1B1 |

| Q  | Answer                                             | Mark | Comment                                                                                             |
|----|----------------------------------------------------|------|-----------------------------------------------------------------------------------------------------|
| 19 | $7.5\text{ cm} \leq \text{length} < 8.5\text{ cm}$ | B2   | B1 one length correct in correct position<br>SC1 $8.5\text{ cm} \leq \text{length} < 7.5\text{ cm}$ |
|    | <b>Additional Guidance</b>                         |      |                                                                                                     |
|    | Accept $8.4\dot{9}$ for 8.5                        |      |                                                                                                     |

| Q  | Answer               | Mark | Comments              |
|----|----------------------|------|-----------------------|
| 20 | mean of grouped data | B1   | accept any indication |

| Q  | Answer                                                                                                                                                                                                                          | Mark  | Comment                                                                                                                                                 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21 | Method to calculate the increase on the salary or the decrease to the bonus<br>or decimal multiplier 1.06 or 0.91                                                                                                               | M1    | eg $26\,000 \times 0.06$ or 1560<br>or $4000 \times 0.09$ or 360<br>oe fraction                                                                         |
|    | Method to calculate the value of the increased salary or the decreased bonus<br>or<br>Method to calculate the difference between the increase on the salary and the decrease to the bonus                                       | M1dep | eg $26\,000 \times 1.06$ or 27 560<br>or $4000 \times 0.91$ or 3640<br><br>eg their 1560 – their 360 or 1200<br>31 200 implies M2                       |
|    | Method to calculate the decimal multiplier or percentage of the total annual pay<br>or<br>1.04 or 104(%)<br>or<br>Method to calculate the decimal multiplier or percentage change in the total annual pay<br>or<br>0.04 or 4(%) | M1    | eg $\frac{31\,200}{30\,000}$<br><br>oe<br><br>eg $\frac{\text{their } 1560 - \text{their } 360}{26\,000 + 4000}$<br>or $\frac{1200}{30\,000}$<br><br>oe |
|    | 4(%) increase                                                                                                                                                                                                                   | A1    |                                                                                                                                                         |
|    | <b>Additional Guidance</b>                                                                                                                                                                                                      |       |                                                                                                                                                         |
|    | For first M mark do not accept a misread of increase for decrease<br>eg 1.09                                                                                                                                                    |       | M0                                                                                                                                                      |
|    | $26\,000 \times 1.06 = 27\,560$ and $4000 \times 1.09 = 4360$<br>$27\,560 + 4360 = 31\,920$ and $\frac{31\,920}{30\,000}$                                                                                                       |       | M1M1M1A0                                                                                                                                                |
|    | $24\,440 + 4360 = 28\,800$ and $\frac{28\,800}{30\,000}$                                                                                                                                                                        |       | M0M0M1                                                                                                                                                  |
|    | $100 + 6 = 106\%$                                                                                                                                                                                                               |       | M0                                                                                                                                                      |
|    | $26\,000 \times 1.06\%$                                                                                                                                                                                                         |       | M1M0                                                                                                                                                    |

| Q  | Answer                                                                      | Mark | Comment                                                                                                                                                                        |
|----|-----------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22 | 27 in the box on the left side of calculation                               | B1   | accept $3^3$ for 27 throughout                                                                                                                                                 |
|    | Three different prime numbers in the boxes on the right side of calculation | M1   |                                                                                                                                                                                |
|    | $27 = 3 + 5 + 19$<br>or<br>$27 = 3 + 7 + 17$<br>or<br>$27 = 3 + 11 + 13$    | A1   | numbers in the boxes on the right side of calculation can be in any order<br>SC2<br>$27 = 2 + 2 + 23$<br>or $27 = 5 + 5 + 17$<br>or $27 = 7 + 7 + 13$<br>or $27 = 5 + 11 + 11$ |
|    | <b>Additional Guidance</b>                                                  |      |                                                                                                                                                                                |
|    | SC2 is for using a repeated prime number                                    |      |                                                                                                                                                                                |
|    | $27 = 3 + 5 + 17$                                                           |      | B1M1A0                                                                                                                                                                         |
|    | $27 = 7 + 11 + 9$                                                           |      | B1M0A0                                                                                                                                                                         |
|    | $27 = 1 + 3 + 23$                                                           |      | B1M0A0                                                                                                                                                                         |
|    | List of prime numbers with right side boxes empty or incorrect              |      | M0                                                                                                                                                                             |
|    |                                                                             |      |                                                                                                                                                                                |

| Q  | Answer                                                                                                                                                                                                                    | Mark  | Comment                                                                                                                      |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------|
| 23 | <b>Alternative method 1</b>                                                                                                                                                                                               |       |                                                                                                                              |
|    | cos chosen or used                                                                                                                                                                                                        | M1    |                                                                                                                              |
|    | $\cos w = \frac{6.7}{8.3}$ or $\cos^{-1} \frac{6.7}{8.3}$                                                                                                                                                                 | M1dep | any letter or symbol for $w$<br>accept 0.807(...) or 0.81 for $\frac{6.7}{8.3}$                                              |
|    | [35.9, 36.2]                                                                                                                                                                                                              | A1    |                                                                                                                              |
|    | <b>Alternative method 2</b>                                                                                                                                                                                               |       |                                                                                                                              |
|    | $\sin x = \frac{6.7}{8.3}$ or $\sin^{-1} \frac{6.7}{8.3}$<br>or [53.8, 54.1]                                                                                                                                              | M1    | any letter or symbol other than $w$<br>accept 0.807(...) or 0.81 for $\frac{6.7}{8.3}$                                       |
|    | 90 – their [53.8, 54.1]                                                                                                                                                                                                   | M1dep |                                                                                                                              |
|    | [35.9, 36.2]                                                                                                                                                                                                              | A1    |                                                                                                                              |
|    | <b>Alternative method 3</b>                                                                                                                                                                                               |       |                                                                                                                              |
|    | $\sqrt{8.3^2 - 6.7^2}$ or $\sqrt{68.89 - 44.89}$<br>or $\sqrt{24}$ or $2\sqrt{6}$ or [4.89, 4.9]<br><b>and</b><br>$\sin^{-1} \frac{\text{their [4.89, 4.9]}}{8.3}$<br>or $\tan^{-1} \frac{\text{their [4.89, 4.9]}}{6.7}$ | M2    | full method to work out the missing length and use it correctly to work out the value of $w$<br>any letter or symbol for $w$ |
|    | [35.9, 36.2]                                                                                                                                                                                                              | A1    |                                                                                                                              |
|    | <b>Additional Guidance</b>                                                                                                                                                                                                |       |                                                                                                                              |
|    | Use of sine rule follows Alt method 2                                                                                                                                                                                     |       |                                                                                                                              |
|    | $\sin w = \frac{6.7}{8.3}$ without $\sin^{-1} \frac{6.7}{8.3}$ or [53.8, 54.1]                                                                                                                                            |       | M0                                                                                                                           |
|    | $\cos w = 0.807$                                                                                                                                                                                                          |       | M1M1                                                                                                                         |
|    | $\cos^{-1} w = \frac{6.7}{8.3}$ or $\cos = \frac{6.7}{8.3}$ unless recovered                                                                                                                                              |       | M1M0                                                                                                                         |

| Q            | Answer                                                                           | Mark | Comment                               |
|--------------|----------------------------------------------------------------------------------|------|---------------------------------------|
| <b>24(a)</b> | $\frac{1}{5}$ (Green) and $\frac{4}{5}$ (Yellow)<br>for Bag A                    | B1   | oe fractions, decimals or percentages |
|              | $\frac{3}{10}$ (Green) and $\frac{7}{10}$ (Yellow)<br>on both sections for Bag B | B1   | oe fractions, decimals or percentages |

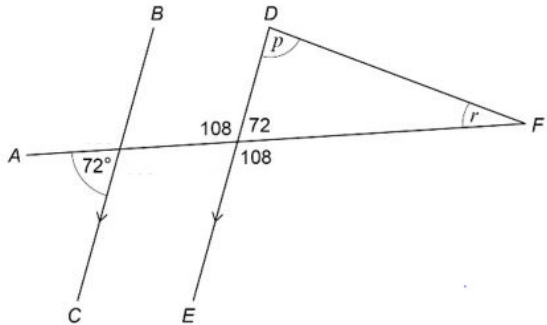
| Q            | Answer                                                                  | Mark | Comment                                                                                                 |
|--------------|-------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------|
| <b>24(b)</b> | their $\frac{1}{5} \times$ their $\frac{3}{10}$                         | M1   | oe fractions or decimals<br>ft their tree diagram with<br>$0 < \text{both probabilities for Green} < 1$ |
|              | $\frac{3}{50}$ or 0.06 or 6%                                            | A1ft | oe<br>ft their tree diagram with<br>$0 < \text{both probabilities for Green} < 1$                       |
|              | <b>Additional Guidance</b>                                              |      |                                                                                                         |
|              | Ignore incorrect simplification or conversion after correct answer seen |      |                                                                                                         |
|              | 3 out of 50 or 3:50 without working for M1                              |      | M0A0                                                                                                    |

| Q  | Answer                                                                         | Mark | Comment                                                                                                                                                                                                                                                                                                                     |
|----|--------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25 | Any correct method that would lead to an equation in $x$ or an equation in $y$ | M1   | eg $7x - 3x = 100 - 48$<br>or $100 - 7x = 48 - 3x$<br>or $7x + 2\left(\frac{48 - 3x}{2}\right) = 100$<br>or $3x + 2\left(\frac{100 - 7x}{2}\right) = 48$<br>or $4x = 52$<br>or $14y - 6y = 336 - 300$<br>or $7\left(\frac{48 - 2y}{3}\right) + 2y = 100$<br>or $3\left(\frac{100 - 2y}{7}\right) + 2y = 48$<br>or $8y = 36$ |
|    | $x = 13$<br>or<br>$y = 4.5$ or $y = 4\frac{1}{2}$ or $y = \frac{9}{2}$         | A1   |                                                                                                                                                                                                                                                                                                                             |
|    | $x = 13$<br>and<br>$y = 4.5$ or $y = 4\frac{1}{2}$ or $y = \frac{9}{2}$        | A1   |                                                                                                                                                                                                                                                                                                                             |
|    | <b>Additional Guidance</b>                                                     |      |                                                                                                                                                                                                                                                                                                                             |
|    | $(7x + 2y) - (3x + 2y) = 100 - 48$                                             |      | M1                                                                                                                                                                                                                                                                                                                          |
|    | One correct value with one incorrect value (or no second value)                |      | M1A1A0                                                                                                                                                                                                                                                                                                                      |
|    | Embedded correct values in both equations                                      |      | M1A1A0                                                                                                                                                                                                                                                                                                                      |
|    | Embedded correct values in one equation only                                   |      | M1A0A0                                                                                                                                                                                                                                                                                                                      |

| Q     | Answer                                                                                                         | Mark  | Comments       |
|-------|----------------------------------------------------------------------------------------------------------------|-------|----------------|
| 26(a) | $2 \times 1.9 \times \pi$ or $3.8\pi$<br>or [11.9, 11.94]                                                      | M1    | oe             |
|       | $2 \times 1.9 \times \pi \times 10.2$<br>or<br>$3.8\pi \times 10.2$<br>or<br>their [11.9, 11.94] $\times 10.2$ | M1dep | oe             |
|       | [121, 122]                                                                                                     | A1    | SC1 [115, 116] |
|       | <b>Additional Guidance</b>                                                                                     |       |                |
|       | SC1 [115, 116] is from using the area of the circle                                                            |       |                |

| Q     | Answer                                   | Mark | Comments              |
|-------|------------------------------------------|------|-----------------------|
| 26(b) | It is equal to the area of the rectangle | B1   | accept any indication |

| Q     | Answer                                         | Mark | Comments              |
|-------|------------------------------------------------|------|-----------------------|
| 26(c) | It is more than the perimeter of the rectangle | B1   | accept any indication |

| Q  | Answer                                                                                                                                                                                                                    | Mark  | Comment                                                                                  |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------|
| 27 | Angle labelled as 72 for the correct interior angle of the triangle<br>or<br>angle labelled as 108 for a correct exterior angle of the triangle<br>or<br>$3r + r + 72 = 180$<br>or<br>$4r = 180 - 72$<br>or<br>$4r = 108$ | M1    | oe<br> |
|    | $\frac{180 - 72}{3 + 1}$ or $\frac{108}{4}$ or 27<br>or<br>$108 \times \frac{3}{4}$<br>or<br>$\frac{4p}{3} = 108$                                                                                                         | M1dep | oe                                                                                       |
|    | 81                                                                                                                                                                                                                        | A1    |                                                                                          |