# GCSE

## Mathematics C

General Certificate of Secondary Education **J517**

# Mark Schemes for the Units

# March 2010

**J517/MS/10M**

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## GCSE Mathematics C (J517)

## MARK SCHEMES FOR THE UNITS

# Marking Instructions & Abbreviations

**Marking Instructions**

1    Mark strictly to the mark scheme.

2    Make no deduction for omission of units except as indicated on the mark scheme.

3    Work crossed out but not replaced should be marked.

4    M (method) marks are not lost for purely numerical errors.
     A (accuracy) marks depend on preceding M (method) marks.  Therefore M0 A1 cannot be awarded.
     W (workless) marks are independent of M (method) marks and are awarded for a correct final answer or a correct intermediate stage.

5    Subject to 4, two situations may be indicated on the mark scheme conditioning the award of A marks or independent marks:
     (i)    Correct answer correctly obtained
     (ii)   Follows correctly from a previous answer whether correct or not ("ft").

6    As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line.  If two (or more) answers are offered, mark the poorer (poorest).

7    Always mark the greatest number of significant figures seen, even if this is then rounded or truncated on the answer line, unless the question asks for a specific degree of accuracy.

8    If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'.  If the answer is missing, but the correct answer is seen in the body allow full marks.  If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost.  Method marks would normally be given.

9    Where there is clear evidence of a misread, a penalty of 1 mark is generally appropriate. This may be achieved by awarding M marks but not an A mark, or awarding one mark less than the maximum.

10   For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work.

11   For answers scoring no marks, you must either award NR (no response) or 0, as follows:

     Award NR (no response) if:

     •     Nothing is written at all in the answer space
     •     There is any comment which does not in any way relate to the question being asked ("can't do", "don't know", etc.)
     •     There is any sort of mark that is not an attempt at the question (a dash, a question mark, etc.)

Award 0 if:

- There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.

12   Where a follow through (ft) mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question.

13   In cases where there is clear evidence that a calculator has been used in section A, mark the script as normal and then raise an exception (suspected malpractice).

14   Anything in the mark scheme which is in square brackets [ … ] is not required for the mark to be earned, but if present it must be correct.


**Abbreviations**

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- Where you see **oe** in the mark scheme it means **or equivalent.**

- Where you see **isw** in the mark scheme it means **ignore subsequent working.**

- Where you see **www** in the mark scheme it means **without wrong working.**

- Where you see **cao** in the mark scheme it means **correct answer only.**

- Where you see **soi** in the mark scheme it means **seen or implied.**

- Where you see **rot** in the mark scheme it means **rounded or truncated.**

- Where you see **seen** in the mark scheme it means that you should award the mark if that number/expression is seen anywhere in the answer space, including on the answer line, even if it is not in the method leading to the final answer.

- Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2·37, 2·370, 0·00237 would be acceptable but 23070 or 2374 would not.

# B272 Module Test M2

**Section A**

| 1 | (a) | 2[.0 / .00 / .000] or two | 1 | |
|---|-----|---------------------------|---|---|
| | (b) | 2.3 | 1 | |
| | (c) | (£)60 | 2 | **M1** for either of 8 × 5 or 40<br>or "number" + 20 seen |
| | (d) | (i) Bottom right phone indicated with a cross | 1 | |
| | | (ii) Middle left phone circled | 2 | **M1** for middle right phone |
| | (e) | (i) 2 | 1 | |
| | | (ii) 3 | 1 | |
| | (f) | 75 | 2 | **M1** for 160 – 85 soi |
| | (g) | (i) 4 | 1 | |
| | | (ii) F(riday) | 1 | Condone 13 |
| 2 | (a) | A<br>R<br>A<br>O | 2 | **W1** for 2 or 3 correct |
| | (b) | 33° to 37° | 1 | |
| 3 | (a) | E A C F B D | 2 | **W1** for 1 correct pairing CF, FB, BD |
| | (b) | (i) 'Two dominoes have 0.25 on' or similar | 1 | |
| | | (ii) X about 1/6 along | 1 | ± 2mm |
| | | (iii) Y about halfway along | 1 | ± 2mm |
| 4 | | 43 www | 4 | **M2** for 10 seen<br>or **M1** for both 55 and 65 seen<br>AND<br>**M1** for 10 × 4.3 (may be implied by list with correct number of elements) |

**Section A Total: 25**

**Section B**

| 5 | (a) | ✓    ✗ <br> ✗    ✓ <br> ✗ | 2 | **1** for 3 or 4 correct |
|---|-----|---|---|---|
| | (b) | C and E | 2 | **1** for each correct <br> or for both correct and an extra |
| 6 | (a) | (i) 22   24   26 | 1 | Must have all three no extras |
| | | (ii) 24 | 1 | |
| | (b) | 1.55 | 1 | |
| | (c) | **L**eft <br> **L**eft <br> **R**ight <br> **R**ight <br> **L**eft | 4 | **W3** for four correct <br> OR <br> **W2** for three correct <br> OR <br> **W1** for two correct |
| 7 | (a) | 3 to 4 | 1 | |
| | (b) | (i) Correct | 1 | Unambiguous indication |
| | | (ii) -5 (°C) | 1 | |
| 8 | (a) | 19 | 2 | **M1** for ÷ 4 or × 25 soi |
| | (b) | (i) 4 <br> Mention of 'rounding up' oe | 1 <br> 1 | <br> Accept 304 or 228 seen or for "4 over" |
| | | (ii) Option 4 indicated | 1 | Unambiguous indication (may be indicated within the column) |
| | (c) | (i) 49 | 1 | |
| | | (ii) '4 goes into 60 exactly' oe | 1 | |
| | (d) | (i) 50 | 2 | **M1** for 500 ÷ 10 soi |
| | | (ii) 25 seen oe | 2 | **M1** for 20 seen or implied or "(takes longer so) slower" isw |

**Section B Total: 25**
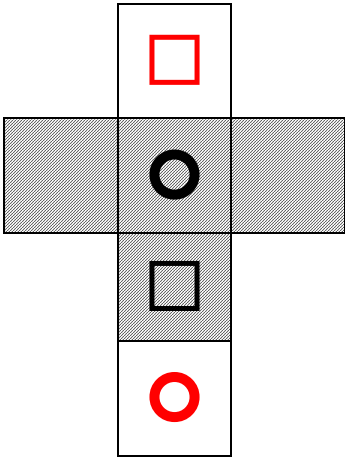
# B273 Module Test M3

**Section A**

| 1 | (a) | 135.6(0) | 1 | |
|---|---|---|---|---|
| | (b) | (0).249(0) | 1 | |
| 2 | (a) | 8 | 1 | |
| | (b) | 5 × (4 − 3) | 1 | |
| 3 | (a) | (i) 36 | 1 | |
| | | (ii) 4 | 1 | Accept -4 |
| | (b) | 7 squares indicated | 1 | **W1** for 7 seen in working space (but squares not shaded) OR **SC1** for 7 squares shaded in more than one large square |
| 4 | (a) | (i) 07:50 oe | 1 | Eg 7:50 or (0)7.50 or (0)7.50 am or (0)7:50 am or (0)750 or "ten to eight (in the morning)". |
| | | (ii) 10:05 oe | 2 | **W1** for (0)9:05 oe or (0)9:20 oe or (0)965 oe seen OR **SC1** for (0)8:05 oe |
| | (b) | 24 | 2 | **W1** for 96 ÷ 4 seen or figs 24 or 32 |
| 5 | (a) | 525 | 2 | **M1** for 1000 − 475 soi by 675 or 535 or figs 525 |
| | (b) | 1 to 2 | 1 | |
| 6 | (a) | Not all lengths have doubled OR An appropriate centre of enlargement comment | 1 | The width(s) of the column/rows have not doubled oe There is no centre of enlargement (If rays drawn) |
| | (b) | Correct shape, any position | 2 | **W1** for one line × 3 with correct orientation or "correct" enlargement, incorrect scale factor If **0** scored, **SC1** for top centred and height 6 squares |
| 7 | (a) | 1 | 1 | Allow "certain" oe. |
| | (b) | $\frac{2}{3}$ , 66 - 67%, (0).66… - (0).67 | 2 | **W1** for 2 seen as numerator or 3 seen as denominator OR **SC1** for 60% or 70% or (0).6 or (0).7 |
| | (c) | (i) 6 www | 3 | **M1** for 30 seen **M1** for attempt to divide *their* 30 by 5 |
| | | (ii) The same (as (c)(i)) or 6 | 1 | |

**Section A Total: 25**

**Section B**

| 8 | (a) | Valid reference to Brian's height and a multiple | 1 | "It's only 2 to 3 times his height" or "It's not 5 to 7 times his height" or "The dinosaur is nearly 3 times his height and Brian is not nearly 4m tall" **W0** for "Brian's under 2m tall" |
|---|---|---|---|---|
|  | (b) | 1.8 | 2 | **W1** for 0.9 or 180 or 18 seen |
| 9 | (a) | 9 | 1 |  |
|  | (b) | 7 | 1 |  |
|  | (c) | 2.5 oe | 1 |  |
| 10 | (a) | 40 | 1 |  |
|  | (b) | 4 | 1 |  |
| 11 | (a) | 3.75 to 4 | 2 | **M1** for (7.5 to 8) ÷ 2 oe isw (attempt at unit conversion eg × 100) OR **W1** for 7.5 to 8 soi by 15 to 16 |
|  | (b) | 3.2 | 2 | **M1** for 1.6 × 2 oe soi by 2.12 isw (attempt at unit conversion eg x 100) |
| 12 | (a) | 70 | 2 | **M1** for 105 ÷ 1.5 or figs 7 |
|  | (b) | 75 | 2 | **M1** for 50 × 1.5 or figs 75 |
| 13 | (a) | (i) B | 1 |  |
|  |  | (ii) 3 | 1 |  |
|  | (b) |  | 2 | **W1** for **one** symbol correctly placed with at most one further error Ignore orientation of the square on the face |

| 14 | (a) | 9<br>5<br>8<br>2<br>6 | 2 | **W1** for 3 correct<br>or 9, 5, 8, 2, 6 seen but not in frequency column isw<br>or sensible attempt to tally with at least one five bar gate correct |
|---|---|---|---|---|
| | (b) | Correct or ft *their* frequencies | 2 | **W1** for 3 "correct" bars<br>or 5 correct heights in correct sequence but not aligned with names. |
| | (c) | "Yes" because highest bar (oe) | 1ft | Eg "That name appeared the most"<br>ft *their* chart<br>**W0** for "Yes" with no reason |

**Section B Total: 25**

# B274 Module Test M4

**Section A**

| 1 | (a) | 0·04  0·3264  0·403  0·43 | 2 | **W1** for three in the correct order or for fully correct reversed order |
|---|-----|---------------------------|---|---|
| | (b) | 20 | 1 | |
| 2 | | 4704 www | 3 | **M1** for a complete and correct method **W1** for 4410 or 294 or 3200 or 1280 or 224 or 4 out of the 6 squares in the Gelosia/lattice method or 4 out of the 6 boxes in the partitioning method **SC0** for 4704 with no working |
| 3 | (a) | 5 | 1 | |
| | (b) | 4 | 1 | |
| | (c) | 20 | 1 | |
| 4 | | 5 | 1 | |
| | | 18 | 1 | |
| | | 30 | 1 | |
| 5 | (a) | $\frac{1}{8}$ oe | 1 | Accept 12·5% or 0·125 |
| | (b) | $\frac{5}{8}$ oe | 1 | Accept 62·5% or 0·625 |
| | (c) | $\frac{8}{8}$ or 1 oe | 1 | Accept 100% |
| 6 | | 4      1      3 | 3 | **W1** for each correct answer Condone 0 instead of 1 |
| 7 | (a) | 40 | 1 | |
| | (b) | It stopped | 1 | Accept any correct interpretation such as "at rest", "stationary" and ignore any extra comments Do not accept "it stays the same distance" |
| | (c) | 10 08 oe | 1 | eg 8 past ten |
| 8 | (a) | (i) $r + p$ | 1 | Or $p + r$ |
| | | (ii) $3p$ | 1 | Allow $p + p + p$ oe and condone $p3$, $3 \times p$ |
| | (b) | Correct drawing: 2'$r$' bricks and 1'$p$' brick in any order | 1 | The '$r$' brick should be shorter than the '$p$' brick (or shaded) No gaps between bricks One line of bricks only Accept rectangles |
| 9 | | Correct reflection | 1 | ±2mm by eye |

**Section A Total: 25**

**Section B**

| 10 | (a) | (⁻2, 5) marked | 1 | |
|---|---|---|---|---|
| | (b) | ⁻2 , 5 | 1 | Correct answer or ft *their* plotted D |
| 11 | (a) | 16 is not a factor of 60 | 1 | Accept any equivalent statement such as "<u>only</u> 5 (of 5 and 16) goes into 60" or "16 does not go into 60" |
| | (b) | 4 and 15<br>or 1 and 12 | 2 | **W1** for any pair that satisfies one of the rules, except 5 and 16 |
| 12 | (a) | 22 | 1 | |
| | (b) | Add 4 | 1 | Condone "up in fours" (4 and direction) |
| | (c) | All the numbers are even<br>or it is an odd (number) | 1 | Allow any correct explanation, eg it will go 62  66  70 |
| 13 | (a) | (i) 23 | 1 | |
| | | (ii) 6 | 1 | |
| | (b) | (i) 10 | 3 | **M1** for adding up the numbers (70)<br>**M1** for dividing by 7 |
| | | (ii) (The temperatures) were lower in August | 1 | ft *their* mean for August<br>Allow any correct interpretation, eg August has a larger spread / inconsistent / variety<br>or July is warmer |
| 14 | (a) | Correct answers, correctly placed<br><br>{table: 25 / 0·47 / 11·75 ; 8 / 0·68 / 5·44} | 4 | **W1** for 11·75<br>**W1** for a correct answer to 17·19 – '*their* 11·75' or 5·44<br>**M1** for an attempt at '*their* 5·44' ÷ 8 or figs 68<br>**A1ft** for 0·68 or 68p or correct follow through from '*their* 5·44' rot |
| | (b) | 12 | 2 | **M1** for 3 soi by 900 ÷ 300 |
| 15 | | 39·01 or 39·0 or 39 www<br>cm² | 2<br>1 | **M1** for 8·3 × 4·7 or figs 3901 or 39 seen |
| 16 | | 52 | 2 | **M1** for 180 – 2 × 64<br>or 64 seen clearly marked on the diagram in the other base angle<br>or 128 seen |

**Section B Total: 25**

# B275 Module Test M5

**Section A**

| 1 | (a) | 1000 | 1 | |
|---|---|---|---|---|
| | (b) | ⁻2 | 1 | |
| | (c) | ⁻20 | 1 | |
| | (d) | $\dfrac{5}{24}$ oe isw (cancelling) | 2 | **M1** for 5 seen as numerator or 24 as denominator in final answer isw (cancelling) |
| 2 | (a) | 180° | 1 | |
| | (b) | Correctly marked | 1 | |
| 3 | (a) | 7*p* | 1 | |
| | (b) | 14*a* + 2*b* + 3*c* | 3 | **W2** for 2 correct terms OR **W1** for 1 correct term OR **SC2** for correct answer followed by 19*abc* OR **SC1** for 2 correct terms followed by 19*abc* |
| 4 | (a) | 600 | 1 | |
| | (b) | 587·68 | 1 | |
| | (c) | 50 000 | 1 | |
| | (d) | (i) 30 × 20 = 600 | 2 | **W1** for 30 and 20 or 600 or 30 and 18 or 540 or 28 and 20 or 560 |
| | | (ii) Bigger: must refer to rounding up | 1 | <u>Examples of candidate responses scoring 1 mark:</u> "I rounded the numbers higher" "You're adding the price up by 1p so it's gonna increase every time you times it" "I added the money and more people on so that would of made it a bit bigger" |
| 5 | (a) | (i) 115° - 119° | 1 | |
| | | (ii) 31 - 33 km | 2 | **W1** for 7·8 - 8·2 seen. OR **M1** for 7 to 9 inclusive × 4 |
| | (b) | Correct position indicated | 2 | **W1** for bearing marked 55-59° **W1** for distance 6·3-6·7 cm marked |
| 6 | (a) | 11 other correct combinations (condone repeat of MA only) | 2 | **W1** for 8 other correct combinations - condone errors/repeats |
| | (b) | $\dfrac{1}{12}$ | 1 | ft *their* total |

**Section A Total: 25**

**Section B**

| 7 | (a) | 45 | 1 | |
|---|---|---|---|---|
| | (b) | 9 | 1 | |
| | (c) | 7 | 2 | **W1** for 56 = 8$x$ or $\dfrac{56}{8}$ or 8 × 7 |
| 8 | | 213·12 | 2 | **M1** for 12·8 × 4·5 × 3·7<br>or 57·6 × 3·7<br>or 16·65 × 12·8<br>or 47·36 × 4·5<br>or figs 2131(2) |
| | | cm$^3$ | 1 | |
| 9 | | A by £30 www | 4 | **W3** for 320 seen for shop A<br>OR<br>**W2** for 80<br>Or **M1** for 400 × 0·2 oe<br>**M1** for 400 – *their* 80 |
| 10 | (a) | (i) 25 | 1 | |
| | | (ii) 10% or 36(°) linked to 72 | 1 | Examples of candidate responses scoring <u>**1** mark</u>:<br>"36° is 10% of pie chart and 10% of 720 is 72"<br>"It is 10% of 720 so it is 72 people"<br>"Because 36 × 2 = 72"<br><u>Examples of candidate responses scoring **0** marks</u>:<br>"As its 10%"<br>"36° is 10% of 360" *(not linked to 720)*<br>"I can tell because its 10% of 720" |
| | | (iii) 252 or 253 or 254 | 3 | **W1** for 34 - 36 or 124 – 128<br>**M1** for 720 × *their* 0·35 or 2 × *their* 126°<br>OR<br>**SC3** for 34% <u>and</u> 244 or 245 cars<br>or 36% <u>and</u> 259 cars |
| | (b) | 0·65 oe | 1 | |
| 11 | | Fully correct triangle with correct arcs | 3 | Arcs must intersect<br>**W2** for fully correct triangle without arcs<br>OR<br>**W1** for AC or BC correct length |
| 12 | (a) | ⁻1   2   5   8 | 1 | |
| | (b) | Points plotted<br>Ruled straight line through correct points | 1<br>1 | ft *their* points ± 2mm by eye |

| 13 | (a) | Correctly refers to one of the bullet points not being a property of a trapezium | 1 | <u>Examples of candidate responses scoring **1** mark:</u><br>"There are 2 sides that are shorter than the other sides" (*implies 4 sides not equal*)<br>"A trapezium has only one pair of parallel sides"<br>"Not all 4 sides are equal on a trapezium"<br>"Not all 4 angles are equal"<br>"All the opposite sides are not parallel" (*borderline acceptable*)<br><u>Examples of candidate responses scoring **0** marks:</u><br>"Because all 4 sides are equal"<br>"A trapezium only has 1 line of symmetry"<br>"All four sides are different" |
|  | (b) | Square | 1 | |

**Section B Total: 25**

# B276 Module Test M6

**Section A**

| 1 | (a) | 5 correct points plotted | 2 | **W1** for 2 correct points plotted |
|---|---|---|---|---|
| | (b) | No correlation | 1 | Accept, eg "It's not a negative or a positive scatter diagram" or "You can't draw a line of best fit" |
| 2 | (a) | 24 cao | 1 | |
| | (b) | 36 cao | 1 | |
| 3 | (a) | $\dfrac{5}{16}$ final answer | 2 | **W1** for $\dfrac{15}{48}$ oe seen |
| | (b) | Any fraction between $\dfrac{2}{3}$ and $\dfrac{3}{4}$ | **W2** | **W1** for $\dfrac{8}{12}$ **and** $\dfrac{9}{12}$ soi <br><br> or other common denominator used <br> OR <br> **SC1** for answer of a decimal between 0.666 and 0.75 |
| 4 | (a) | 6  4  2  0 | 1 | |
| | (b) | Points correctly plotted <br> Ruled line through (0, 6) and (3, 0) | 1 <br> 1 | ft *their* (a) |
| | (c) | 9 (± 0.2) | 1 | Or ft *their* ruled straight line if second mark not given in (b) |
| 5 | | 78·75 www <br> or 67·50 + 11·25 <br><br><br> 'Their 78·75' + 25 + 47·75 <br> 151·5(0) | **W3** <br><br><br> **M1** <br> **A1** | **M1** for attempt at complete method for 22·50 × 3·5 <br> **W1** for figs 675 or 1125 or 175 <br><br> **W2** for answer 151·5(0) www <br><br> OR <br> **SC5** for answer 151·5(0) following correct 5 numbers seen added |
| 6 | | 42 <br> alternate (angles) <br> 80 or ft 122 – '*their* 42' <br> corresponding (angles) <u>and</u> 122 – 42 seen | **M1** <br> **A1** <br> **M1** <br> **A1** | <br><br><br> Accept other complete reason |
| 7 | (a) | $a^4$ | 1 | |
| | (b) | 3 | 2 | **M1** for 9 from $b^2$ or ⁻6 from 2$b$ soi |

**Section A Total: 25**

**Section B**

| 8 | (a) | 17 cao | 1 | |
|---|---|---|---|---|
| | (b) | 65 cao | 1 | |
| | (c) | 6 cao | 1 | |
| | (d) | 42 cao | 1 | |
| 9 | (a) | Angle of 116°<br>AC drawn 6·5 cm <u>and</u> Δ complete | 1<br>1 | ± 2°<br>± 2 mm |
| | (b) | 30·4 – 30·8 [after 2 in (a)]<br>Otherwise ft 16.5 + 'length of BC' [after 0 or 1 in (a)] | 2 | **W1** for (BC =) 13·9 – 14·3 seen or ft '*their* measured BC'<br>± 2 mm for ft measurement<br>OR<br>**M1** for clear addition of 3 sides |
| 10 | | 13·57 | 2 | **W1** for 13·56 or 13·6 as answer<br>or 13·569(23…) seen<br>OR<br>**SC1** for answer of –0·34 or $13\frac{37}{65}$ |
| 11 | (a) | 2·5 or $2\frac{1}{2}$ or $2\frac{2}{4}$ or $\frac{5}{2}$ | 3 | **M1** for 4$p$ + 12 seen<br><br>**M1** for 4$p$ = 22 – 12 or better<br>or 4$p$ = 22 – $k$ <u>and</u> correct ft solution<br><br>Alternatively:<br>**M1** for $p$ + 3 = $\frac{22}{4}$<br><br>**M1** for $p$ = $\frac{22}{4}$ – 3 or better |
| | (b) | $r^2 – 2r$ final answer | 1 | |
| | (c) | 5($q$ + 2) final answer | 1 | |
| 12 | (a) | 3 : 2 or $1\frac{1}{2}$ : 1 or 1 : $\frac{2}{3}$ | 2 | **M1** for 24 : 16 or simpler seen<br>OR<br>**SC1** for 2 : 3 or 1 : $1\frac{1}{2}$ or $\frac{2}{3}$ : 1 |
| | (b) | ( 0 )·35 | 2 | **M1** for 1 – (0·3 + 0·1 + 0·25)<br>OR<br>**SC1** for 0·9 or 0·75 as answer |
| 13 | | 452 – 452.5<br>cm$^2$ | 2<br>1 | **M1** for π × 12$^2$ |
| 14 | (a) | Correct translation | 2 | **W1** for move 3 squares right<br>or 2 squares up |
| | (b) | 'Anticlockwise' or 'direction' | 1 | Accept "Which way" |

**Section B Total: 25**

# B277 Module Test M7

**Section A**

| 1 | (a) | 12 | 2 | **M1** for 18 ÷ 3 or 6 |
|---|---|---|---|---|
| | (b) | 16 | 2 | **M1** for 24 ÷ 3 or 8 |
| 2 | (a) | $6^2$ | 1 | |
| | (b) | $2^2 \times 3 \times 5 \times 7$ | 2 | or for 2 × 2 × 3 × 5 × 7<br>**M1** for at least two of 2, 3, 5 and 7 seen as factors |
| 3 | (a) | Negative + moderate | 1 | Condone negative + strong |
| | (b) | Ruled line of best fit between (24, 100) and (29, 100)<br>and between (10, 300) and (17, 300) | 1 | |
| | (c) | ft from *their* line of best fit | 1 | Tolerance: for reading within a square accept up to either border gridline (eg for reading of about 250 accept 240 to 260 inclusive); for reading on gridline apply tolerance ±10 inclusive (eg for reading of 260 allow 250 to 270 inclusive) |
| 4 | (a) | 3·5 oe www | 3 | **M1** for correct expansion or division [2$x$ + 14 seen  or $x$ + 7 = 3$x$]<br>**M1** for correctly collecting $x$s on one side and numbers on other, ft *their* expansion/ division, dep on $x$s on both sides after first step<br>**M1** for [$x$ = ] *b/a* oe isw, ft *their* $ax$ = $b$ ($a \neq$ 1)<br>If **0** scored, **SC1** for 3·5 oe seen embedded in original equation:<br>2(3·5 + 7) = 6 × 3·5 |
| | (b) | [$x$] ≤ −3 cao | 2 | **M1** for correct constructive first step, condoning < instead of ≤:<br>eg 2$x$ ≤ −6 or 2$x$ < −6 or $x$ + 3 ≤ 0<br>OR<br>**M1** for $x$ = −3 or for −3 found with other wrong inequality or −3 identified on number line<br>OR<br>**SC1** for $x$ ≤ *b/a* ft their $ax$ ≤ $b$ with $a$ > 0 but $a \neq$ 1 and $b \neq$ 0,  eg $x$ ≤ 3 following 2$x$ ≤ 6 |
| | | Closed circle at −3 and line to left of −3 | 1 | Correct or ft *their* inequality<br>Condone open circle |
| 5 | (a) | $0·\dot{6}$ | 1 | Or $0·6\dot{6}$; accept 0·6$^r$; condone 0·666 (or with more sixes) or '0·666…' |
| | (b) | 16/125 | 2 | **M1** for 128/1000 or 64/500 or 32/250 |

| 6 | (a) | 210 | 2 | **M1** for $\dfrac{20 \times 21}{2}$ or $\dfrac{20 \times (20 + 1)}{2}$ oe <br><br> or for 10, 15, 21 ….. 171, 190, 210, (231) <br> OR <br> **SC1** for answer 190 or 231 |
|---|---|---|---|---|
|   | (b) | $2n - 1$ oe | 2 | Accept unsimplified <br> **M1** for $2n$ oe seen |
| 7 |   | Perpendicular bisector of AB constructed with construction arcs seen | 2 | For **2** marks, must extend to within 1 cm of sides of field <br> Allow dashed line <br> Condone path extending beyond field <br> **M1** for perpendicular bisector of AB constructed with construction arcs but not extending far enough <br> or for perpendicular bisector drawn without correct compass-drawn arcs and extending to at least 1 cm from one edge of field |

**Section A Total: 25**

**Section B**

| 8 | | 244·21 or 244·22 www | 3 | **M2** for 235·5(0) × 1·037 or 244·2135 or rot to 3dp <br> OR <br> **M1** for 235·5(0) × 3·7 [÷ 100] oe or for digits 871[35] or 872 <br> **M1dep** for *their* % increase added to 235·5(0) <br> OR <br> **SC2** for digits 24421(35) with wrong decimal point <br> or for 322·63 or 322·64 [from 37% increase] <br> If **M0** scored, **SC1** for 244 as answer |
|---|---|---|---|---|
| 9 | (a) | 0·12 and 0·13 | 1 | |
| | (b) | Less than theoretical model <br><br> Mention of 1/6 or 0·16 to 0·17 or for 16·6 to 17[%] | 1 <br><br> 1 | For a clear comparison with theoretical model <br><br> Or other explicit numerical comparison <br><br> If **0** earned in this part, **SC1** for 'may be biased as the table doesn't show results for other numbers' / only shows results for 6 oe |
| 10 | (a) | 36 (accept answer in range 35·7 to 36·1) www | 3 | **M2** for 15/25 × 60 <br> OR <br> **M1** for 15/25 or 0·6 <br> **M1dep** for result × 60 <br> OR <br> **M1** for 25/60 (= 0·416…rot to 2 or more dp) <br> **M1** for 15 / *their* 0·416… |
| | (b) | 26 www | 4 | **M1** for at least 3 midpoints 15, 25, 35, 45 soi <br> **M1** for (freq. × *their* midpoints) seen or implied (105, 375, 210, 90 or total 780) <br> **M1** for *their* total ÷ 30 (= 780 ÷ 30) <br> or for *their* total ÷ *their* sum of freqs <br> OR <br> **SC3** for answers 21 or 31 (www apart from using endpoints) |
| | (c) | 8·5 and 9·5 | 2 | **1** each; accept either order; accept 9·499(…) or better instead of 9·5 |
| 11 | | $[n =] \dfrac{W + 7}{5}$ oe | 2 | **M1** for a correct constructive first step in rearrangement or for answer of other <br> $[n =] \dfrac{\pm W \pm 7}{\pm 5}$ |

| 12 | | Use of $\pi r^2$ or ½ $\pi r^2$ | **M1** | With $r$ = 10, 3 or 7 |
|---|---|---|---|---|
| | | *Their* area of 10 cm [semi]circle − sum of *their* area of smaller [semi]circles | **M1** | Allow 2nd **M1** independently of first (may work with complete circles instead) but must have used $\pi$ |
| | | Answer 65·9 - 66·1 or 21$\pi$ | **A2** | If incorrect, **A1** for area of one circle or semicircle evaluated correctly |
| | | | | If **M2** earned, allow **A1** for area of at least two circles or semicircles expressed as multiple of $\pi$ in simplified form |
| | | **W4** for correct answer in range www but NB answer can be obtained from wrong method, eg **M0M0A0** for $\pi$ × 7 × 3 = 65·9 or 21$\pi$ | | |
| 13 | | $\angle$ of T = 60 seen or used | **M1** | May be on diagram; or **M1** for 180/3 |
| | | [Interior] $\angle$ of P = 150 | **A1** | Or ext $\angle$ of P = 60/2 or symmetry stated or shown on diagram |
| | | Ext $\angle$ of P = 30 | **1** | Or **1** for [sum of int $\angle$s =] 150 ×12 =1800 |
| | | 360/30 [=12] | **1** | and **1** for use of int $\angle$ formula to verify 1800 (eg (12 – 2 ) × 180 = 1800) |
| | | <u>Alternative method:</u> | **OR** | |
| | | 360/12 = 30 | **1** | or **M1** for [sum of int $\angle$ = ] 1800 (1800 must be seen) |
| | | 30 identified as ext $\angle$ of P | **1** | **M1** for 1800/12 (may be implied by 150 found if 1800 seen) = 150 |
| | | 150 = int $\angle$ of P | **1** | eg allow **1** for 360 – 2 × 150 = 60 |
| | | 2 × 150 + 60 = 360 oe | **1** | |

**Section B Total: 25**

# B278 Module Test M8

**Section A**

| 1 | | ⁻4, ⁻3, ⁻2, ⁻1, 0, 1, 2 | 3 | **M2** for ⁻4 ≤ $x$ < 2·4 or ⁻4 ≤ $x$ ≤ 2 OR<br>**M1** for $x$ < 2·4 or $x$ ≥ ⁻4 or ⁻4 ≤ $x$ or $x$ ≤ 2 OR<br>**W2** for 4 or more correct values and no extras<br>or 7 correct values and one extra OR<br>**W1** for 4 or more correct values and 1 or 2 extras |
|---|---|---|---|---|
| 2 | | $2\frac{7}{12}$ oe mixed number www | 3 | **M2** $3 - \frac{5}{12}$ or $2\frac{16}{12} - \frac{9}{12}$ or $\frac{31}{12}$ o.e.<br><br>OR<br>**M1** for conversion of both fractions to a common denominator eg $\frac{4}{12}, \frac{9}{12}$ or $\frac{52}{12}, \frac{21}{12}$ oe at least one correct |
| 3 | (a) | $6x - 7 = 14$ or $\frac{6x}{7} = 3$<br><br>$6x = 21$<br><br>$(x =) \frac{21}{6}$ o.e.  isw | M1<br><br>M1<br><br>M1 | <br><br>Correct or ft *their* first step. Also implies first M1<br>Correct or ft from *their ax = b, a ≠ 1*<br>Ignore incorrect cancelling after a correct answer seen<br>$(x =) \frac{21}{6}$ oe www scores all **3** marks |
| | (b) | $4x - 8y (= x + 3)$<br>$4x - x = 3 + 8y$ oe<br><br>$(x =) \frac{3 + 8y}{3}$ oe; mark final answer | M1<br>M1<br><br>M1 | <br>Correct or ft *their* first step<br><br>Correct or ft *their* second step<br><br>$x$ must be a function of $y$<br><br>Do not ignore further attempts to simplify final answer<br>Accept $\frac{8}{3}$ rot to 2dp or more<br>Accept reversed signs throughout |
| 4 | (a) | $6·2 \times 10^{-4}$ | 1 | |
| | (b) | $1·84 \times 10^{3}$ | 2 | **M1** for $0·24 \times 10^{3}$ or $16 \times 10^{2}$ |

| | | | | |
|---|---|---|---|---|
| **5** | **(a)** | All three angles are equal | **1** | It must be clear that all three angles are equal. 'Equal angles' is insufficient but would score if accompanied by 23 or 37 given on diagram or calculated. Look for numerical evidence or the keywords, all or three. See exemplars |
| | **(b)** | 14 | **2** | **M1** for $\frac{10}{15}$ or $\frac{2}{3}$ or $\frac{15}{10}$ or 1·5 seen <br> or $\frac{x}{10} = \frac{21}{15}$ |
| **6** | **(a)** | 35 | **2** | **M1** for 54 or 52 – 18, 19 or 19·5 or 42 (town A) |
| | **(b)** | Agree: higher median <br> Disagree: over 25% of town A is over 60, but less than 25% in town B | **1** <br> **1** | Accept "average" if both quantified <br> Accept statement referring to UQs: eg A's UQ is above 60, B's is less than 60 or A's UQ is 64, B's is 54 <br> See exemplars |
| **7** | | $y = x - x^2$       $y = 2x + 1$ <br> $y = x^3 - x$     $y = \dfrac{1}{x}$ | **3** | **W2** for three correct <br> OR <br> **W1** for any two correct |

**Section A Total: 25**

**Exemplar responses: 5 (a)**

Example responses scoring **1** mark:
All the angles are equal to each other.
The angles ABC are the same. (With both triangles labelled ABC)
Both have identical angles in identical places.

Example responses scoring **0**:
Both have the two angles 120° and their lines are within ratio and both add up to 180°.
Both of them have a 120° angle and one is an enlargement of the other.
The angles are the same making the lines parallel.
One is just an enlarged version of the other - you can see this because of the same angle.
They have the same angles (120°).
Their angles are equal.
The angles in a triangle add to 180° (120, 23, 37). *(Does not refer to equal angles. Listing them alone is not sufficient to earn the mark.)*

**Exemplar responses: 6 (b) first comment**

Agree because …

Example responses scoring **1** mark:
The median for town A is higher than for town B
The average for town A is 43 and for town B is 34

Example responses scoring **0**:
There are more people between 43 and 62 than town B.
The mean on town A is greater than town B. *(Needs to refer to the median)*
The average is higher. *(A statement about 'average' needs to be quantified)*
Town A's medium is 43 and town B is 30 and also town A upper quartile is 64 and town B is 54 so it proves town As people are older. *(Condone 'medium' for median. The mark is lost for one of two reasons; the median of B is not within given range and comment refers to another statistic.)*
The average in the box plot is higher. *(A statement about 'average' needs to be quantified )*
The interquartile range is larger as well as the median. *(Refers to interquartile range)*
The median of town A starts older and carries on further.

**Exemplar responses: 6 (b) second comment**

Disagree because …

Example response scoring **1** mark:
Box plot A has the ¾ mark 62 and B's only goes up to 52 so the statement is wrong. *(Accept ¾ mark for UQ and condone misread of the scale as the intent is clear.)*

Example responses scoring **0**:
The upper quartile is 54 and is not more than 60. *(Only refers to B)*
Town A shows a greater proportion of people as it is at the higher end of the average age group, town B is a younger town on average making the amount of 60+ citizens less common. *(Does not refer to UQ values for the two towns)*
In town A there are more people over 60 because of where the upper quartile is. *(Condone more people over 60 but mark not earned since no reference to values of the UQs).*
Town A has a higher upper quartile range which suggests that more people are over 60 in town A. *(Refers incorrectly to upper quartile range as well as no mention of B)*
The interquartile range is between 19 and 54 but town A's interquartile range is over 60. *(Refers incorrectly to interquartile range.)*

**Section B**

| | | | | |
|---|---|---|---|---|
| **8** | **(a)** | Correct rotation giving Δ with vertices (2, 0), (2, -1), (4, -1) | 2 | **M1** for 180° rotation |
| | **(b)** | Correct translation $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$ | 1 | ft *their* rotation |
| | **(c)** | Rotation 180°<br>about (centre) (0, ) | 1<br>1 | strict ft of *their* rotation and translation<br>MUST be a single transformation |
| **9** | | 18·5 - 18·6<br><br>Ignore further rounding | 3 | **M2** for $\dfrac{91}{490}$ or 0·185 to 0·186 or 0·814 to<br>0·815 or 81·4 to 81·5 or $100 - \dfrac{399}{490} \times 100$<br>oe seen<br>OR<br>**M1** for 91 or $\dfrac{399}{490}$ seen |
| **10** | | Multiplication by 2: $4x + 6y = 12$<br>or multiplication by 3: $12x - 3y = {}^{-}27$<br><br>$14x = {}^{-}21$ or $7y = 21$<br><br><br>$x = {}^{-}1½$ and $y = 3$ | M1<br><br><br>M1<br><br><br>A1 | Condone 1 error; if both equations are multiplied, condone only one error in total<br><br>ft adding or subtracting appropriately to eliminate *x* or *y* from *their* equations<br>Condone 1 error<br><br>**3** for completely correct algebraic method<br>Correct *x*, *y* with no algebra - **W1** only |
| **11** | **(a)** | $\dfrac{2}{5}$, $\dfrac{3}{5}$, $\dfrac{2}{5}$ oe | 1 | |
| | **(b)** | $\dfrac{3}{10}$ oe correct or ft *their* tree provided answer > 1 | 2 | **M1ft** for $\dfrac{3}{4} \times$ *their* $\dfrac{2}{5}$ |
| **12** | | 2977·54 or 2978 | 3 | **M2** for 2500 × 1·06³, 2809 × 1·06, 2977<br>OR<br>**M1** for 2500 × 1·06 oe or 2650 |
| **13** | | 67·3 | 2 | **M1** for (68·5 + 60·2 + 73·2) ÷ 3 |
| **14** | | 46·9 - 47·1 www | 6 | **M2** for (PQ = ) 60tan65 or $\dfrac{60}{\tan 25}$<br>OR<br>**M1** for $\dfrac{PQ}{60} = \tan 65$ or $\dfrac{60}{PQ} = \tan 25$<br>**A1** for 128·6 - 128·7 or 129<br>**M2** for $\tan^{-1}\left(\dfrac{\text{their PQ}}{120}\right)$<br>OR<br>**M1** for $\tan B = \dfrac{\text{their PQ}}{120}$ or $\tan^{-1}\left(\dfrac{120}{\text{their PQ}}\right)$ |

**Section B Total: 25**

# B279 Module Test M9

**Section A**

| 1 | (a) | 1 | 1 | |
|---|-----|---|---|---|
| | (b) | 9 | 2 | **M1** for $\left(\sqrt[3]{27}\right)^2$ soi or $\sqrt[3]{27}$ = 3 soi |
| 2 | | $7 \cdot 5 \times 10^{11}$ or $9 \cdot 0 \times 10^{11}$ | 3 | **W2** for answer with figs 75 or figs 90 <br> OR <br> **W1** for figs 3 <u>and</u> 25 seen or figs 3 <u>and</u> 30 seen <br> or answer of $k \times 10^{11}$ where $1 \le k < 10$ |
| 3 | | Enlargement <u>only</u> <br> [scale factor] -2 <br> [Centre] (-2, -1) | **W1** <br> **1dep** <br> **W1** | dep on a <u>single</u> transformation given |
| 4 | (a) | 4 bars of <u>correct width</u> at heights 12, 9, 6·5, 2·5 | 3 | **W2** for 3 correct bars on graph <br> OR <br> **W1** for 2 correct on graph or 2 correct freq densities seen |
| | (b) | <u>No</u> and reasons with 80 being the upper limit but not necessarily a length of call (ignore extra/incorrect comments alongside acceptable comment) | 1 | Eg "The longest call time could be less than 80" <br> "We don't know the individual times only the groups" |
| 5 | (a) | $2x^2 - 7x - 15$ final answer | 3 | **M2** for any 3 of $2x^2$, $-10x$, $3x$, $-15$ seen or any 2 correct of simplified 3 term final answer <br> OR <br> **M1** for any 2 correct of $2x^2$, $-10x$, $3x$, $-15$ |
| | (b) | $(5x - 7)(x - 1)$ [=0] <br><br> $\dfrac{7}{5}$ isw oe <u>and</u> 1 | 2 <br><br> 1ft | **M1** for $(5x \pm 7)(x \pm 1)$ [ =0 ] <br><br> ft *their* factors dep. on two brackets of linear form |

| 6 | (a) | 13 www | 3 | **M2** for $\sqrt{(17-5)^2 + (3--2)^2}$ oe or better <br> OR <br> **M1** for $(17-5)^2 \pm (3--2)^2$ oe <br> or for attempt at Pythagoras with <u>one of</u> 12 or 5 correct |
|---|-----|--------|---|----|
| | (b) | $y = -\dfrac{1}{4}x + 5$ oe www, isw (attempts to simplify) | 3 | **W2** for $y = -\dfrac{1}{4}x + k$ (any intercept) oe seen <br> or $-\dfrac{1}{4}x + 5$ seen <br> OR <br> **W1** for $y = mx + 5$ oe (any gradient, inc 0) <br> or gradient $= -\dfrac{1}{4}$ soi |

**Section A Total: 25**

**Exemplar responses: 4 (b)**

No because …

<u>Example response scoring **1** mark:</u>

The maximum time was between 50 and 80 minutes
The time could have been greater than 50 minutes and less than 80 minutes
No call may have taken 80 minutes
The last group is 50 to 80 – this does not mean that one of the calls could have been 80 minutes
We do not know how long each call actually took - the time could be as low as 50.01
End values may not be included
Times range from 0 to 80 but the class widths do not show every individual minute
50 to 80 means it could be any value in that range
It could have equal to 80 or less than 80 – we don't know
The longest call could have been 51 minutes
There is no individual data
We don't know the exact values
The largest time might be 79 or 78 etc

**Section B**

| 7 | (a) | (i) $(x + 5)(x - 5)$ | 1 | |
|---|---|---|---|---|
| | | (ii) $\dfrac{x - 5}{2x + 1}$ final answer www | 3 | **M2** for $(2x + 1)(x + 5)$ or correct answer seen www then spoilt<br>OR<br>**M1** for $(2x \pm 1)(x \pm 5)$ |
| | (b) | $(r =) \sqrt{\dfrac{A}{4\pi}}$ or $(r =) \dfrac{1}{2}\sqrt{\dfrac{A}{\pi}}$ final ans<br><br>Condone numerical value for $\pi$ used after correct expression seen; condone ÷ sign used | 2 | **M1** for $[r^2 =] \dfrac{A}{4\pi}$ or answer $\dfrac{\sqrt{A}}{4\pi}$ ww<br><br>or for correct ft step[s] to get $r$ after an incorrect first step is shown<br><br>Fully correct reverse flowchart scores **M1** |
| 8 | (a) | $2 \times \sin^{-1}(6/20)$ o.e. | M3 | **M2** for $\sin^{-1}(6/20)$ soi oe [if 17.45 to 17.5 obtained and final answer = 34.9 to 35 then allow **M3** to be implied]<br>OR<br>**M1** for splitting triangle into two right-angled triangles with a trig attempt (even if incorrect)<br>eg a trig statement using 6 and 20<br>If **M0** scored, **SC3** only for statement $2 \times 20 \times \sin 17.5 = 12$<br>OR<br>**SC2** only for $20 \times \sin 17.5 = 6$<br>OR<br>**SC1** only for $\sin 17.5 = 6/20$ |
| | | 34.9 to 35 | A1 | 34.91 to 34.92 implies **W4** |
| | (b) | 3034 to 3035.2 or 3030 or $966\pi$<br><br>www | 4 | **M3** for $\dfrac{35}{360} \times \pi(100^2 - 8^2)$ oe eg 2 stages<br>OR<br>**M1** for $\dfrac{35}{360}$ oe (0.097..) or $\div \dfrac{360}{35}$ soi<br>**M1** for $\pi 100^2$ (31410 to 31420) or $\pi 8^2$ (201 to 201.1) seen |
| 9 | (a) | $\dfrac{1}{64}$ oe isw cancelling (0.015625) | 2 | **M1** for $\left(\dfrac{1}{8}\right)^2$ oe |
| | (b) | $\dfrac{14}{64}$ oe $\left(\dfrac{7}{32}\right)$ isw cancelling (0.21875) | 3 | **M2** for $2\left(\dfrac{1}{8} \times \dfrac{7}{8}\right)$ oe<br><br>OR<br><br>**M1** for $\left(\dfrac{1}{8} \times \dfrac{7}{8}\right)$ oe seen |

| 10 | | 6235 <u>or</u> 107.5 seen | M1 | Allow 6234·9 or better for 6235 |
|----|---|---------------------------|----|--------------------------------|
| | | *their* UB for area ÷ *their* LB for length | M1 | Accept *their* UB in range 6230.5 to 6240 and *their* LB in range 107 to 107.9 |
| | | 58 cao | A1 | Allow **W3** www |
| 11 | | 144 www | 3 | **M2** for $d = 0.09\,s^2$ oe or $0.09 \times 40^2$ or $\left(\dfrac{40}{30}\right)^2 \times 81$ oe <br><br>OR <br>**M1** for $d = ks^2$ soi or $0.09$ oe seen or $\left(\dfrac{4}{3}\right)^2$ oe seen |

**Section B Total: 25**

# B280 Module Test M10

**Section A**

| 1 | (a) | Circle: radius 3cm, centre (0, 0) | 2 | **M1** for a circle with wrong radius or curve through (3, 0) (0, 3) (¯3, 0) (0, ¯3) (points not joined by ruled line) |
|---|-----|-----------------------------------|---|----------------------------------------------------------------------------------------------------------------------|
| | (b) | $y = 4 - 2x$ drawn | 1 | Straight line attempted |
| | | $x = 2·7$, $y = ¯1·4$ (±0·1) | 1 | Correct (from $y = 4 - 2x$) or ft *their* circle/curve and straight line |
| | | $x = 0·5$, $y = 3$ (±0·1) | 1 | Allow 1 for both $x$ values |
| 2 | | Four statements: 1) AC = NL 'diameters same' or 'both lengths 12cm' (AC = NL and 12 cm marked on diagram sufficient) 2) BC = MN 'given' or 'both lengths 5cm' (BC = MN and 5cm marked on diagram sufficient) 3) ∠ABC = ∠LMN = 90º angles in semi-circle (90º alone not sufficient) 4) [Triangles congruent] RHS | 3 | **M2** for 3 correct statements OR **M1** for 2 correct statements |
| 3 | (a) | $AC^2 = 50$ soi $\sqrt{50} = \sqrt{2} \times \sqrt{25} = 5\sqrt{2}$ | **M1** **A1** | $5^2 + 5^2$ or $AC = \sqrt{50}$ Or $\sqrt{50} = \sqrt{5}\sqrt{5}\sqrt{2} = 5\sqrt{2}$ or $\sqrt{50} = \sqrt{(25 \times 2)} = 5\sqrt{2}$ |
| | (b) | $[CD^2 =] (7\sqrt{2})^2 - (5\sqrt{2})^2$ $= 98 - 50 [= 48]$ $CD = 4\sqrt{3}$ | **M1** **M1** **A1** | Accept alternative form of Pythagoras' theorem statement **W3** for $4\sqrt{3}$ www or **W2** for $CD^2 = 48$ www |
| 4 | | $\dfrac{71}{333}$ | 3 | **W2** for $\dfrac{213}{999}$ OR **M1** for 1000r = 213·213… |
| 5 | | Correct graph | 3 | **1** for going through (0, 2) **1** for amplitude 2 (±0·2) **1** for period 120 |
| 6 | (a) | $4x^2 + 27x + 35$ as final answer | 2 | **M1** for 3 terms correct from $4x^2 + 7x + 20x + 35$ |
| | (b) | $4x^2 + 27x + 35 = x - 5$ $4x^2 + 26x + 40 = 0$ or $2x^2 + 13x + 20 = 0$ $(2x + 5)(x + 4) = 0$ oe $x = ¯2.5, ¯4$ | **M1** **M1** **M1** **A1** | or ft *their* (a) or ft *their* (a) ft *their* $2x^2 + 13x + 20 = 0$ Allow **W4** for ¯2.5 and ¯4 www |

**Section A Total: 25**

### Section B

| | | | | |
|---|---|---|---|---|
| **7** | | 3.8 billion  www | 2 | **M1** for × $1.02^{10}$ (or 3.77 or 3.78) <br> OR <br> **W1** for digits 38 |
| **8** | **(a)** | $a$ = 3 <br> $b$ = 5 | 2 <br> 1 | **M1** for $a$ = -3 or $(x - 3)^2$ seen <br> For $b$, ft *their* 14 - $a^2$ <br> Allow **W2** for $(x - 3)^2 + 5$ seen |
| | **(b)** | 5 | 1 | Or ft *their* 5 |
| **9** | | 32.9... cm www | 3 | **M2** for $\dfrac{27\sin their106}{\sin 52}$ <br> OR <br> **M1** for $\dfrac{b}{\sin their106} = \dfrac{27}{\sin 52}$ <br> **A1** for 32.8 to 33.2 dependent on M1 or M2 earned |
| **10** | | 2.39 <u>and</u> 0.28 | 3 | **M2** for $\dfrac{8 \pm \sqrt{40}}{6}$ oe <br> OR <br> **M1** for substitution in quadratic formula <br> OR <br> **W2** for 2.39 <u>or</u> 0.28 |
| **11** | **(a)** | Tree diagram <br> $\dfrac{3}{13}$  $\dfrac{10}{13}$  oe <br><br> $\dfrac{2}{12}$  $\dfrac{10}{12}$  $\dfrac{3}{12}$  $\dfrac{9}{12}$  oe | 2 | **M1** for 2 correct |
| | **(b)** | $\dfrac{66}{156}$ $\left(\text{or } \dfrac{33}{78} \text{ or } \dfrac{11}{26}\right)$ oe 0.42[...] | 3 | **M1** for NN selected with $\dfrac{10}{13} \times \dfrac{9}{12}$ ft <br><br> **M1** for 1 − *their* 'NN' |
| **12** | **(a)** | (67 + 64 + 70)/3 [= 201/3] | 1 | |
| | **(b)** | 61 www | 3 | **M2** for (73 + 79 + $n$)/3 = 71 oe <br> OR <br> **M1** for 71 used (or 213 seen) <br> or (73 + 79 + n)/3 |
| **13** | | 5.55... or 5.56 www | 4 | **M2** for $\dfrac{250}{360} \times \pi \times 16$ = (34.9..) <br> OR <br> **M1** for $\pi$ x 16 (or 50.26...) <br> AND <br> **M1** for *their* 34.9... = $\pi$d <br> **A1** for 5.5... to 5.6 |

**Section B Total: 25**

# Grade Thresholds

**General Certificate of Secondary Education**
**Mathematics C (J517)**
**March 2010 Examination Series**

**Unit Threshold Marks (Module Tests)**

| Unit | | Maximum Mark | a* | a | b | c | d | e | f | g | p | u |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| B272 | Raw | 50 | | | | | | | 37 | 24 | 15 | 0 |
|      | UMS | 70 | | | | | | | 60 | 40 | 30 | 0 |
| B273 | Raw | 50 | | | | | | | 27 | 13 | | 0 |
|      | UMS | 79 | | | | | | | 60 | 40 | | 0 |
| B274 | Raw | 50 | | | | | | 37 | 24 | 14 | | 0 |
|      | UMS | 90 | | | | | | 80 | 60 | 50 | | 0 |
| B275 | Raw | 50 | | | | | | 30 | 14 | | | 0 |
|      | UMS | 99 | | | | | | 80 | 60 | | | 0 |
| B276 | Raw | 50 | | | | | 31 | 16 | | | | 0 |
|      | UMS | 119 | | | | | 100 | 80 | | | | 0 |
| B277 | Raw | 50 | | | | 24 | 12 | | | | | 0 |
|      | UMS | 139 | | | | 120 | 100 | | | | | 0 |
| B278 | Raw | 50 | | | 29 | 15 | | | | | | 0 |
|      | UMS | 159 | | | 140 | 120 | | | | | | 0 |
| B279 | Raw | 50 | | 29 | 14 | | | | | | | 0 |
|      | UMS | 179 | | 160 | 140 | | | | | | | 0 |
| B280 | Raw | 50 | 31 | 15 | | | | | | | | 0 |
|      | UMS | 200 | 180 | 160 | | | | | | | | 0 |

**Notes**

The tables above show the raw mark thresholds and the corresponding UMS for each unit entered in this series.  Raw marks in between grade thresholds are converted to UMS by a linear map.

For a description of how UMS are calculated see:
http://www.ocr.org.uk/learners/ums/index.html

For a spreadsheet designed to calculate UMS for this specification, please visit the e-community at http://community.ocr.org.uk/community/maths-gcse-ga/home .

The grade shown in the first table as 'p' indicates that a candidate has achieved at least the minimum mark necessary to access the UMS scale for the unit but insufficient raw marks to merit a grade 'g'.  This avoids awarding such candidates a 'u'.  Grade 'p' can be awarded only for units B271 (Module Test M1) and B272 (Module Test M2).  It is not a valid grade within GCSE Mathematics and will not be awarded to candidates when they aggregate for the full GCSE (J517)

Statistics are correct at the time of publication.

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