# GCSE

# Mathematics C

General Certificate of Secondary Education **J517**

# Mark Schemes for the Units

# January 2010

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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.

# B271 Module Test M1

**Section A**

| 1 | (a) | 67 | 1 | |
|---|---|---|---|---|
| | (b) | 48 | 1 | |
| | (c) | 35 | 1 | |
| | (d) | 6 | 1 | |
| 2 | (a) | 5 new, correct arrangements | 2 | NIB, IBN, INB, BIN, BNI<br>**W1** three correct arrangements, (not including NBI) |
| | (b) | (i)   certain cao | 1 | |
| | | (ii)  impossible cao | 1 | |
| | | (iii) unlikely ft *their* results table | 1 | |
| | (c) | Column of 3 tiles correctly placed | 2 | Accept with or without I in them<br>Eg I in each of lowest three squares or three lowest squares shaded or tiles clearly drawn in.<br>OR<br>**M1** for 16 or 3 or (19 – *their* 16) seen |
| 3 | (a) | 2 cao | 1 | |
| | (b) | (i) 10 cao | 1 | |
| | | (ii) 6 cao | 1 | |
| | (c) | (i)  (1, 4) | 1 | |
| | | (ii) Point plotted at (3, 4) | 1 | Accept within half square by eye if clearly indicated.<br>Condone omission of C |
| | | (iii) Triangle | 1ft | Lines may not be drawn but mark "triangle" correct.<br>Follow through *their* shape. |

| 4 | (a) | (i) Lines joining 3, 5, 7 and 1 | 1 | Clear intention |
|---|---|---|---|---|
| | | (ii) Square cao | 1 | |
| | (b) | Post 1 joined to two other posts to form isosceles Δ ±2mm by eye. | 2 | Eg (1, 3, 5), (1, 3, 7), (1, 7, 4) etc<br>**M1** for any non-isosceles triangle formed by joining posts<br>or any ruled isosceles (by eye) not formed using posts<br>or any isosceles not including post 1 (eg (3, 5, 8), and (2, 5, 7))<br>or any three correct posts identified<br>or any triangle intended as isosceles and intended to include post 1 but outside 2mm tolerance at any point |
| | (c) | SW | 1 | South west |
| 5 | (a) | 2:25 or 14:25 | 1 | Ignore references to am or pm<br>Accept in words. |
| | (b) | 5 | 2 | **M1** for 2:35 or 14:35 seen but not as answer to part (a)<br>OR<br>**W1** for 15 or 25 |

**Section A Total: 25**

**Section B**

| 6 | (a) | 49(p) or £0·49 | 2 | **M1** for 2·45 ÷ 5 or 245 ÷ 5 oe<br>If 0 then **W1** for figs 49 |
|---|---|---|---|---|
| | (b) | 2014, 2, 20, 14 or 4 | 1 | One of these answers only |
| | (c) | 6 | 1 | |
| 7 | (a) | (i) 18 | 1 | |
| | | (ii) 25 | 2 | **W1** for 75 seen<br>OR<br>**M1** for attempt to add 15 + 2 + 3 + 5 |
| | (b) | 1600 | 1 | |
| | (c) | 125 | 1 | |
| 8 | (a) | (i) 9000 | 1 | Minke (Whale) |
| | | (ii) 9000, 7257, 1954, 275, or Minke (whale), Killer (whale), Walrus, (Giant) squid | 2 | **W1** for reverse order, numbers or names, or first and last correct |
| | (b) | 14 | 2 | **M1** for 19 **and** 5 identified<br>OR<br>**SC1** for 8725 (difference in weights) |
| 9 | (a) | 2 | 1 | Accept in words, eg 'double' and ignore × (×2 or 2×)<br>Condone $\frac{1}{2}$ |
| | (b) | (i) 2·6 - 3·0 **and** cm, or 26 - 30 **and** mm | 1 + 1dep | **W1** for correct length without a unit or 2·5 cm or 3·1 cm, or 25 mm or 31 mm |
| | | (ii) No cao<br>Lines/sides or angles or sectors/areas are different <u>within one spinner</u> | 1<br>1dep | No must be stated to score reason mark<br>Accept angles at the centre (or interior oe) are different sizes (or "the triangles are different sizes").<br><u>Must clearly imply within ONE spinner</u>, not comparing relative sizes of spinners.<br>Eg do not accept "one is bigger (than the other)" |
| 10 | (a) | 14, 17, 20 | 1 | |
| | (b) | (i) -5 oe | 1 | Accept equivalent in words |
| | | (ii) 20 | 1 | **SC1** for 20 seen written on the tile BUT answer 5 in answer space. |
| 11 | (a) | 183 - 185 | 1 | |
| | (b) | 1·83 - 1·85 strict ft | 1ft | Must be *their* (a) ÷ 100 |
| | (c) | 88 cao | 1 | |

**Section B Total: 25**

## 9 (b) (ii)

**Exemplar allowable statements**

| | |
|---|---|
| There are two different sized triangles | *Can only be one spinner as comparison would mean four different triangles* |
| All the pizza slices are not the same size | *Implied area in one spinner* |
| Not all sides are the same length | *Even if comparing, still recognises that sides must be equal on a spinner* |
| The sides are not the same | *Does not imply second spinner* |
| The smaller sides are all 20mm and the larger ones 29mm | *Can only refer to large spinner* |
| Some sides are bigger than other sides | *"Some" gives sufficient doubt about a comparison between spinners* |
| The lines are bigger than other lines | *Implied within one spinner* |

**Not allowed**

| | |
|---|---|
| It's just the same but bigger | *Implies comparison of spinners* |
| They are not the same size | *Could imply comparison between spinners* |
| The measurements are not the same | *Measurement is not specific to length or area or angle* |
| It is 2 times bigger which is even | *Implies comparison between spinners* |
| It has one more no [number] each side | *Unclear and implied comparison between spinners* |

# B272 Module Test M2

**Section A**

| 1 | (a) | $\dfrac{3}{16}$ | 1 | Accept equivalents |
|---|---|---|---|---|
|  | (b) | Any 3 squares shaded | 1 | |
|  | (c) | T  F  F  T  T  T | 3 | **W2** for 5 correct<br>OR<br>**W1** for 3 correct |
|  | (d) | (0)·3<br>(0)·75 | 1<br>1 | |
| 2 | (a) | 1116 | 1 | Accept any recognisable notation in all parts<br>eg 11.16, 11:16, 11 16 |
|  | (b) | 1120 | 1 | |
|  | (c) | 0954 | 1 | |
|  | (d) | Next train (stops at 11 15 and) gets to Alberton at 11 56 | 1 | Allow any correct statement, eg:<br>(She) missed the 1015 (which would have got there in time) or the train has gone<br>There are no trains for those times<br>The (next) train(s) do/does not stop (at H)<br>The first train (to stop) is the 1115 (which gets there too late) |
| 3 | (a) | ⁻18  ⁻10  ⁻5   3   30 | 2 | **W1** for one error<br>or for correct reversed order<br>or for negative numbers in the correct order |
|  | (b) | 21 | 1 | condone ⁻21 |
| 4 |  | 180 | 2 | **M1** for a correct method (attempt at 36 × 5)<br>eg 150 or 30 seen together with some attempt at adding<br>or short multiplication with a carry<br>or multiple additions of five lots of 36<br>or single addition with a carry |
| 5 | (a) | (i) 28 | 1 | |
|  |  | (ii) Add 6 | 1 | 6 and correct direction |
|  | (b) | 35 | 1 | |
| 6 |  | 1·80 www | 4 | **M1** for attempt to select 2 × adults and 2 × children or 6(·00) and 10·8(0) seen<br>**M1** for attempting to add *their* 'adults cost' and *their* 'children cost' or 16·8(0)<br>**M1** for *their* '16·8(0)' – 15 soi |

| 7 | (a) | 5 - 7 | 1 | |
|---|-----|-------|---|---|
|   | (b) | 3 - 5 | 1 | |

**Section A Total: 25**

**Section B**

| | | | | |
|---|---|---|---|---|
| **8** | **(a)** | 35 | **1** | |
| | **(b)** | 40 | **1** | |
| **9** | **(a)** | 25 | **2** | **M1** for 20 × 5 or 100 |
| | **(b)** | £140 only ringed AND 175, or two correct € → £ conversions seen (other than 175) eg £90 → €112·50 and £180 → €225 | **2** | **W1** for 140 ringed www or two correct attempts seen eg £90 → €112·50 and £180 → €225 Allow **W2** for the correct inverse method ($\times \frac{4}{5}$ oe) |
| **10** | **(a)** | B | **1** | |
| | **(b)** | Acute | **1** | |
| | **(c)** | 112 - 116 | **1** | |
| **11** | **(a)** | Sphere    Cylinder    Cuboid | **3** | **W1** for each |
| | **(b)** | B    D | **2** | **W1** for each |
| **12** | **(a)** | They are not in order | **1** | Accept any correct equivalent statement |
| | **(b)** | 40 | **1** | |
| **13** | **(a)** | 3500 | **1** | |
| | **(b)** | 6 www | **2** | **M1** for any correct methods eg 32 ÷ 4·75 seen or trial and improvement or 4·75 × 6 or multiple additions / subtractions or for 6·73(….) seen |
| **14** | **(a)** | A : arrow 2 cm along line B : arrow 6 cm along line | **2** | Allow ±5 mm each way **W1** for each correct answer |
| | **(b)** | 5 | **1** | Accept any correct "impossible" statement, including situations not connected with this context eg getting a 7 with a normal die |
| **15** | | Correct reflection | **1** | |
| **16** | **(a)** | Correct route | **1** | East into High Street then south into Ken's Bakers |
| | **(b)** | Our Laptops or Laundry | **1** | |

**Section B Total: 25**

# B273 Module Test M3

**Section A**

| 1 | (a) | 7 | 1 | Accept 7 or 7·00 but not 7·0 |
|---|---|---|---|---|
| | (b) | 10 | 1 | |
| | (c) | 25 | 1 | |
| | (d) | 10 | 1 | |
| | (e) | 27·5 oe | 1 | |
| | (f) | (0)·49 oe | 1 | |
| | (g) | 3 www | 2 | **M1** for "6" or "2" seen |
| 2 | (a) | (i)  4·9 to 5·1 | 1 | |
| | | (ii)  1·7 to 1·9 | 1 | |
| | | (iii) 17 to 19<br>Explanation | 1<br>1 | ft 10 × *their* (ii)<br>**W1** for 17 to 19 as answer plus "double" the 9 in part (i) or "× 10" answer to (ii)<br>or ft awarded (ie 10 × *their* (ii)) and "× 10" seen |
| | (b) | 6(g) | 2 | Condone 6·0 or 6·00<br>**M1**  for 4 × 1·5 soi |
| | (c) | Correct height of vertical<br>Top slanted line<br>Bottom slanted line | 1<br>1<br>1 | <br>Correct length and position<br>Correct length and position<br>Mark intent<br>Condone reflections |
| 3 | | C<br>D<br>A<br>B | 3 | **W2** for 3 correct<br>OR<br>**W1** for 2 correct |

| 4 | (a) | £96 www | 3 | **Maximum M2** for the below:<br>**M1** for sight of (£)38 or 2 × 19<br>**M1** for sight of (£)48 or 19 + 29<br>**M1** for sight of (£)58 or 2 × 29<br>**M1** for sight of 19 + 19 + 29 + 29 |
|---|---|---|---|---|
| | (b) | Yes oe <u>and</u> (96 – 59) = 37, or<br>No oe <u>and</u> (74 – 59) = 15 | 2 | Decision must be seen to gain any credit<br>**M1** for yes <u>and</u> '96' – 59 soi<br>or for no <u>and</u> 74 – 59 seen |

**Section A Total: 25**
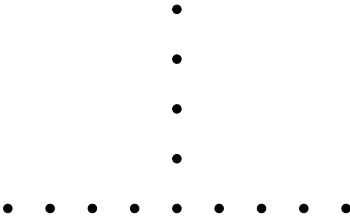
**Section B**

| 5 | (a) | (i) 5·5 | 1 | |
|---|---|---|---|---|
| | | (ii) 1996 | 1 | |
| | | (iii) Increased […] oe | 1 | Allow 'increase/change/went/difference' of 0·8 (m)<br>or 'changed' from 4·7 to 5·5 |
| | (b) | 2 | 1 | |
| | (c) | 4·0 - 6·0 | 1 | |
| | | Evidence of using size of people, eg mention of (height) (1·8 to 2·2 m)<br>or "body width", implied by 0·3 m to 0·6 m | 1 | |
| | (d) | 3·2 (m) | 2 | **M1** for sight of "64" or 8 × 8 or figs 32 |
| | (e) | (i) 2·85 | 3 | **M1** for sight of 11·4<br>**M1** for sight of "a number" ÷ 4<br>OR<br>**M2** can be implied by figs "285"<br>OR<br>**M1** for 9·3 |
| | | (ii) 0·12 | 1 | Allow 12 only if 'cm' written with answer |
| | (f) | (i) 4·4 to 4·6 oe | 2 | **M1** for sight of correct measurement (8·8 - 9·2 or 88 - 92)<br>or "number" ÷ 2 seen |
| | | (ii) C | 1 | |
| 6 | (a) | 9 | 1 | |
| | (b) | 4 | 1 | |
| | (c) | 19 | 1 | |
| 7 | (a) | (i) $\frac{3}{16}$ oe | 2 | **M1** for correct numerator or denominator |
| | | (ii) $\frac{13}{16}$ oe | 1 | cao |
| | (b) | 3:20 | 1 | Accept all common time formats including words |
| | (c) | 100 (ml) www | 3 | **M1** for 500 or 600 seen<br>or for 500 – 400 seen<br>**0** for 1000 – 400 seen |

**Section B Total: 25**

# B274 Module Test M4

**Section A**

| 1 | | All 4 correct<br>($\frac{1}{4}$   $\frac{2}{5}$   0·1   0·75) | 3 | **W2** for 3 correct<br>OR<br>**W1** for 2 correct |
|---|---|---|---|---|
| 2 | (a) | (¯2, 6) | 1 | |
| | (b) | (i) C correctly plotted | 1 | **SC1** for (3, ¯2) plotted only if (6, ¯2) given in (a) |
| | | (ii) Right angle(d) or scalene cao | 1 | |
| | (c) | Correct reflection | 1 | Ft '*their*' triangle |
| 3 | (a) | (i) Correct pattern | 1 |  |
| | | (ii) 19<br>Up by/adds/plus 3 each time oe | 1<br>1 | <br>See exemplars |
| | (b) | 11   15   19 | 2 | **W1** for 2 correct |
| 4 | | Danny AND correct method shown cao | 2 | **W1** for some evidence of relevant working and attempt at answer but Danny not named<br>OR<br>**SC1** for Danny named and method correct without evidence of working seen |
| 5 | (a) | 9 cao | 1 | |
| | (b) | 13 cao | 1 | |

| 6 | (a) | £2025 with complete correct working | 4 | **W1** for identifying 135 <br> **M1** for a complete attempt at valid method, ft *their* 135 <br> **W1** for figs 675, 1350, 75, 450, 1500 seen or 405 from 3 × 135 as first stage of multiplying by 3 then by 5 <br> or 4 correct boxes in grid method <br> or one numerical error only in any method <br> **A1** for 2025 <br> If **0** scored, **SC1** for 2025 with no working |
|---|---|---|---|---|
| | (b) | $\dfrac{40}{200}$ oe <br><br> (isw incorrect cancelling or conversion to a decimal) | 2 | **W1** for $\dfrac{40}{n}$ |
| 7 | | 4      2 <br> 3      6 | 3 | **W2** for 3 correct <br> OR <br> **W1** for 2 correct |

**Section A Total: 25**

**Exemplar responses: 3 (a) (ii)**

| You have to add 3 | **0** |
|---|---|
| You have to add 3 each time | **1** |
| Add 3, 13+3=16, 16+3=19 (implies each time) | **1** |
| 3 | **0** |
| Goes up in threes | **1** |
| Goes up in 3 times table | **0** |
| +3 | **0** |
| You miss 3 more numbers then count on | **0** |
| You keep adding 3 dots | **1** |
| I added 1 and 2 to it until I reached 19 | **1** |
| The vertical line add 1 dot and the bottom line adds 2 dots | **0** |
| Going up in threes | **1** |
| Along the bottom line you plus 2 every time and the upper line you add one every time | **1** |
| Take away one from the number you use to make the other numbers smallest every time | **0** |
| Add 3 as you go along | **1** |

**Section B**

| 8 | | P = *a* + *a* + 2*a* + 3*a* oe, or P= 7*a* | 2 | **W1** for *a* + *a* + 2*a* + 3*a* oe, or 7*a*, or P = |
|---|---|---|---|---|
| 9 | | Vertical scale does not start at zero<br>Bars not same width etc | 1<br>1 | See exemplars |
| 10 | (a) | 3·45 | 2 | **M1** for 2·3 × 1·5 |
| | (b) | (i) 4680 | 2 | **M1** for 156 × 30 |
| | | (ii) £8·25 | 3 | **M1** for 4·68(kg) or 2·34("bags") seen, or attempt to divide *their* 4680 by 1000 or by 2000<br>**M1dep** for 3 × £2·75 (ft *their* 3 bags) |
| | (c) | 9 | 1 | |
| | (d) | 12·5 - 14 | 1 | |
| | (e) | (i) 81 | 1 | |
| | | (ii) 56·75 | 3 | **M1** for attempt to add all weights<br>**M1** for attempt to divide *their* total by 12 (implied by figs 567)<br>If **0** scored, **SC2** for 654·4 |
| | | (iii) Valid comparison | 1 | See exemplars |
| 11 | (a) | 55° | 1 | |
| | (b) | 62° | 2 | **M1** for 180 − (90 − 28) oe |
| 12 | (a) | 100 | 1 | |
| | (b) | 6 | 1 | |
| 13 | (a) | 15 | 1 | |
| | (b) | Correct reason given | 1 | See exemplars |

**Section B Total: 25**

**Exemplar responses: Question 9**

| | |
|---|---|
| The bars are different sizes [*Could imply height*] | 0 |
| Some blocks are smaller | 0 |
| Because the blocks are different | 0 |
| Science is fatter | 1 |
| The results bars are different sizes | 0 |
| The science column has 4 squares and the other two have 3 [*Implies width*] | 1 |
| The blocks have different thicknesses | 1 |
| Different widths | 1 |
| Goes up in 10's | 0 |
| They haven't got 10 or 20 [*Implies vertical scale incomplete*] | 1 |
| It doesn't start 10 | 0 |
| It starts at 30 | 1 |
| The scale is wrong | 0 |
| It doesn't start at 0 | 1 |

**Exemplar responses: 10 (e) (ii)**
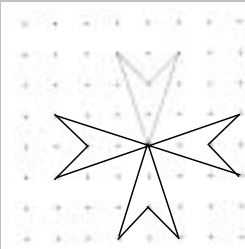
| | Paul | | Emma | | |
|---|---|---|---|---|---|
| | Mean | Range | Mean | Range | |
| Emma had a higher mean | 56·75 | 81 | 59 | 74 | 0 |
| Paul has more tomatoes | 56·75 | 81 | 59 | 74 | 0 |
| Emma's tomatoes weigh more | 53 | 81 | 59 | 74 | 1 |
| Paul's are heavier | 81 | 56·75 | 59 | 74 | 1 |
| Emma's tomatoes are less spread out | 56·75 | 81 | 59 | 74 | 1 |
| Paul's are more varied | 27 | 81 | 59 | 74 | 1 |
| Paul's are heavier because the range is bigger | - | 81 | 59 | 74 | 0 |
| Emma's are heavier because the range and mean are bigger | 56·75 | 81 | 59 | 74 | 0 |

**Exemplar responses: 13 (b)**

| | |
|---|---|
| You decrease the number you subtract by one | 1 |
| Its going down like 5 4 3 2 | 1 |
| Its going backwards in 1's | 0 |
| Subtract 2 | 1 |
| You do 17 take 2 | 1 |
| 17 – 15 = 2 | 0 |
| The number goes down by 1 less each time | 1 |
| -5 -4 -3   [*Does not state how to get 15*] | 0 |
| You are taking away 1 less each time | 1 |

# B275 Module Test M5

**Section A**

| 1 | (a) | 64 | 1 | cao |
|---|---|---|---|---|
|   | (b) | 8 | 1 | cao |
| 2 | (a) | $1\frac{1}{5}$ | 1 | Final answer |
|   | (b) | $\frac{3}{20}$ oe | 1 | Final answer |
| 3 | (a) | (i) Dingli | 1 | |
|   |     | (ii) 2630 | 1 | |
|   |     | (iii) 9 to 10 | 2 | **M1** for figs 45 to 5(0) seen<br>or for '*their* 4·8' × 2 seen |
|   | (b) | 402 000 | 1 | cao |
|   | (c) | 200 | 1 | cao |
|   | (d) |  | 2 | **W1** for pattern with rotation symmetry order 2<br>or for two shapes drawn and positioned correctly<br>or for three congruent 'arrowhead' shapes correctly positioned but wrong size |
| 4 | (a) | $^-4 - \mathbf{2} = {}^-6$ | 1 | |
|   |     | $^-\mathbf{2} + \mathbf{3} = 1$ | 1 | Or reversed order |
|   | (b) | $^-4 \times {}^-3 = 12$ | 2 | **W1** for $^-4$, ±3 and ±12 seen in correct positions in boxes or in working<br>or for a multiplication (using given values) with at least one negative with correct answer in given boxes |
| 5 | (a) | 9   5   1 | 1 | Both correct |
|   | (b) | Correct ruled line between (0, 9) and (4, 1) | 2 | **W1** for 3 points correctly plotted ft (a) |
|   | (c) | 1·4 – 1·6 | 1 | Or ft (±0·1) *their* ruled straight line |
| 6 | (a) | (i) Guitar | 1 | |
|   |     | (ii) 60 | 2 | **M1** for 15 × 4<br>or for $\frac{1}{4}$ or 25% seen |
|   | (b) | (i) Yes - mean/median higher for wind | 1 | See exemplars |
|   |     | (ii) String - higher range | 1 | See exemplars |

**Section A Total: 25**

**Exemplar responses: 6 (b) (i)**

| | |
|---|---|
| Yes, the median is bigger meaning the wind players would have higher numbers [*comparison*] | **1** |
| Wind, their mean and median is a lot higher than the string players [*condone wind instead of yes/true, both correct*] | **1** |
| Yes, all together there were higher figures than strings except for range but that did not matter [*mentions range, but only to discount it*] | **1** |
| Yes, the wind players got a higher median and mean score than the string players, they were also more consistent as their range is lower [*statement about range is clearly correct and in addition to their correct statement*] | **1** |
| Yes, the wind players can hold their breath for approximately 5 seconds longer [*comparison of means implied*] | **1** |
| Yes, the median states that the person who has the longest breath is 47 [*no comparison*] | **0** |
| True, wind players results turned out better [*doesn't refer to table*] | **0** |
| Yes, the mean and the median are greater on the wind than the string and the range is smaller so it means there is a large amount that can hold it [*mention of range will generally score 0 unless statement similar to 3 above*] | **0** |
| Yes, the average number of seconds they can hold their breath is more than the string players [*need to use results from table or refer to mean/median not just average*] | **0** |
| Yes, there is more evidence to support this with the mean and the median [*needs to imply higher*] | **0** |
| Yes, By looking at the mean and the median this shows that they are more consistent at holding their breath than string players [*statement about consistency is wrong*] | **0** |
| Yes, the mean and the median show that wind players held their breath longer [*no comparison, just repeat of breath longer from question rather than mean longer*] | **0** |

**Exemplar responses: 6 (b) (ii)**

| | |
|---|---|
| String, they have a higher range | **1** |
| String, their range is quite high which means their scores were not very consistent. [*not a clear comparison, but implied*] | **1** |
| String, more range of numbers [*use of more and range implies correct*] | **1** |
| String, 31 is more than 28 [*numbers imply comparison of range*] | **1** |
| String, the range is the difference and for string it is 31[*number implies use of range*] | **1** |
| String, it is 3 more spread out [*implies comparison of ranges*] | **1** |
| String, the range measures the distance between the largest and smallest numbers [*borderline, but definition of range so scores*] | **1** |
| Strings, in the wind the mean is one less than the median and in the string the mean is two less than the median [*range not used*] | **0** |

| | |
|---|---|
| String, their records don't drop as low as the string players [*no mention of range*] | **0** |
| Wind, the range is lower making there be a wider difference [*0 for wind seen*] | **0** |
| String, when playing a string you don't have to hold your breath so it means people don't try to work on it [*no mention of range*] | **0** |
| String, the timings for mean, median and range are all different and they are much more spread out compared to the wind players [*mention of mean/median will generally score 0*] | **0** |
| String, there is more variety in numbers [*doesn't refer to table/range specifically*] | **0** |

**Section B**

| 7 | (a) | Rhombus | 1 | |
|---|---|---|---|---|
| | (b) | (i) Kite drawn | 1 | Accept clear intention |
| | | (ii) 1 | 1 | After **0** in both (i) and (ii), **SC1** for rhombus drawn in (i) <u>and</u> answer 2 in (ii) <br> or square drawn in (i) <u>and</u> answer 4 in (ii) |
| 8 | (a) | (i) 3, 2, 5 | 1 | Accept any order |
| | | (ii) 30 | 2 | Or ft *their* (i) <br> **M1** for attempt at 3 × 2 × 5, ft *their* (i) |
| | | $cm^3$ | 1 | |
| | (b) | 46 | 2 | **M1** for 20 and 10 and 16 seen www <br> or for 2 × 10 + 2 × 5 + 2 × 8 |
| 9 | (a) | 75 | 2 | Condone £0·75p <br> **M1** for 0·05 × 15 oe <br> OR <br> **W1** for figs 75 as answer <br> OR <br> **SC1** for figs 1575 as answer |
| | (b) | $\frac{2}{3}$ final answer | 2 | **W1** for $\frac{30}{45}$ or better seen |
| 10 | (a) | 5 | 2 | **M1** for 4$x$ = 17 + 3 or better |
| | (b) | 5·5 or $5\frac{1}{2}$ or $\frac{11}{2}$ isw | 2 | **M1** for 19 − 8 = 2$x$ or better |
| 11 | (a) | All 22 values correct | 2 | **W1** for 16 further values correct |
| | (b) | $\frac{1}{25}$ isw or 0·04 or 4% | 1 | Or ft incorrect table |
| | (c) | $\frac{8}{25}$ isw or 0·32 or 32% | 2 | Or ft incorrect table <br> **W1** for fraction with numerator 8 ft <br> OR <br> **SC1** for $\frac{10}{25}$ oe <br> After **0** in both (b) and (c), **W1** for fractions with denominator of 25 in both (b) and (c) |
| 12 | | 4$a$ + 14 | 3 | **M1** for 6$a$ + 14 + 4$a$ <br> or 10$a$ and 14 seen <br> **M1** for 6$a$ seen (unless part of 6$a$ + 14 + 4$a$) <br> After **M0**, award **M1** for 3$a$ + 7 + 3$a$ + 7 + 2$a$ + 2$a$ = 2$a$ + 4$a$ + ? oe |

**Section B Total: 25**

# B276 Module Test M6
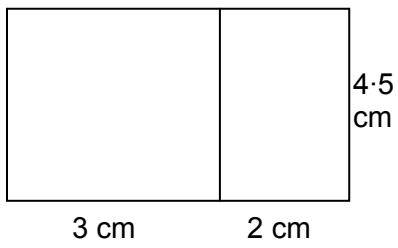
**Section A**

| 1 | (a) | (i) $a^4$ | 1 | |
|---|---|---|---|---|
| | | (ii) $6c^2$ | 1 | Condone $6 \times c^2$ |
| | (b) | $3\frac{1}{2}$ or 3·5 | 2 | **M1** for $2x = 7$ oe <br> or $[x =] \dfrac{7}{2}$ |
| | (c) | $15 - 6x$ as final answer | 2 | **M1** for 15 or ⁻$6x$ seen |
| 2 | (a) | 5 : 12 | 2 | **M1** for any correct simplification <br> OR <br> **SC1** for 12 : 5 as final answer |
| | (b) | 0·6 | 2 | **M1** for attempt at $1 - (0·1 + 0·3)$ |
| | (c) | 42·50 | 2 | **M1** for $17 \div 2$ [× 5] oe or for 8·5(0) <br> or $17 \times 5$ or 85 |
| 3 | (a) | Triangle with vertices at (2, 2), (2, 6) and (5, 2) | 2 | **M1** for triangle with two vertices correct <br> or for three vertices correct but not joined <br> or for enlargement with sf 2 but wrong position |
| | (b) | 24 | 1 | Accept 23·8 to 24·2 |
| 4 | (a) | 120 | 1 | |
| | (b) | 2·3 | 1 | Accept 2·25 to 2·35 <br> or ft from reading off at (*their* (a) ÷ 2) |
| | (c) | When graph was steepest oe | 1 | **W1** for mention of a specific value in the range 2·5 to 2·9 s or 68 to 88 ml with acceptable reason <br> **0** for mention of just values 3 and/or 90 even with otherwise acceptable reason <br> or a range outside 2·5 to 3 s or 68 to 90 ml stated or implied |

| 5 | (a) | (i) ⁻4 | 1 | |
| | | (ii) 36 | 1 | |
| | (b) | 0·35 | 2 | **M1** for 35/100 or 3·5/10 for attempt to divide 7 by 20 eg 0·3(..) seen<br>or digits 35 with wrong dp |
| | (c) | $\frac{9}{14}$ as final answer | 3 | **W2** for $\frac{18}{28}$ oe<br><br>OR<br><br>**M1** for $\frac{6}{7} \times \frac{3}{4}$<br><br>or $\frac{18}{21} \div \frac{28}{21}$ |

**Section A Total: 25**

**Section B**

| 6 | | 4·42 | 2 | **1** for 4·419[…] seen or rot versions of this other than 4·42 |
|---|---|---|---|---|
| 7 | (a) | 25 | 1 | |
| | (b) | 100 | 1 | |
| 8 | (a) |  | 2 | **M1** for correct rectangle with missing or incorrect vertical line<br><br>or for rectangle with line but one measurement wrong or consistently wrong scale used |
| | (b) | Clearly showing roof split into two or three rectangles eg relevant line(s) drawn on diagram<br>or attempt at area of the relevant rectangles | **M1** | Following no line(s) on diagram, allow first **M1** for areas attempted, condoning one error in measurements:<br>15 × 8 and 12 × 50<br>or 15 × 20 and 35 × 12<br>or 20 × 50 and 'missing' 8 × 35<br>or 15 × 12 and 15 × 8 and 12 × 35 |
| | | Correct area of one relevant rectangle www | **M1** | 120 or 600 or 420 or 1000 or 280 or 180 or 300 (but not from 12 × 25) |
| | | 720 | **A1** | Allow **W3** for 720 www<br><br>Alternative method:<br>Split into two trapezia<br>or rectangles and triangles:<br>Allow first **M1** for lines drawn only if attempt at calculating one of the relevant areas seen<br>Second **M1** for at least one of 210 and 510 seen for trapezia (and equivalently for triangles and rectangles) |
| 9 | (a) | Ruled line of best fit passing between (460, 120) and (460,123) and between (520, 135) and (520, 138) | 1 | |
| | (b) | ft *their* line of best fit | 1 | Condone un-ruled<br>Tolerance one full small square |
| 10 | | *a* = 50<br>Angles in triangle add to 180 | 1<br>1 | Condone omission of 'add to 180' if angle is correct |
| | | *b* = 68<br>Corresponding angles [are equal] | 1<br>1 | **0** if extra spurious reasons |

| 11 | (a) | 2·4(3…) www isw wrong rounding | 3 | **M1** for at least 3 of 0 × 5, 1 × 4, 2 × 6 etc soi<br>or 73 seen<br>AND<br>**M1** for ÷ 30 (independent of first **M1**)<br>Allow **A1** for final answer of 2 if **M2** earned<br>OR<br>**SC2** for 67·2 |
|----|-----|-------------------------------|---|---|
|    | (b) | (i) 3 | 1 | |
|    |     | (ii) 40 to 60 oe | 1 | |
|    |     | (iii) It is between 100 and 120 oe | 1 | **0** for just 'they cycled 110 miles' |
| 12 | (a) | 21 | 1 | |
|    | (b) | 122 to 123 www | 3 | **M2** for $\pi$ × 0·65 × 60 or figs 1224(…) to 123(0…)<br>OR<br>**M1** for $\pi$ × 65 or $\pi$ × 0·65 or figs 204(…) seen<br>Allow **A1** for 120 if **M2** scored<br>OR<br>**SC1** for 244 to 246 |

**Section B Total: 25**

# B277 Module Test M7

**Section A**

| 1 | (a) | Positive | 1 | Condone positive with comment on strength |
|---|---|---|---|---|
| | (b) | Ruled line of best fit between (10, 20) to (10, 27) and (60, 43) to (60, 50). | 1 | Must be evident between reading marks of 15 and 55 |
| | | Reading from *their* straight line | 1 | ±1 of correct ft reading |
| 2 | (a) | 12  3  0  3  12 | 1 | |
| | (b) | Axes scaled | 1 | Consistent equal divisions. Condone 0 omitted |
| | | Points plotted (correct or ft) | 1 | ft *their* 12 and 12 |
| | | Curve through *their* points forming a U shape | 1 | Any straight line segments score **0** |
| 3 | | 68° www | 3 | **W1** for ∠ABG = 62° **W1** for ∠AGB = 50° evidenced by 50° correctly on diagram or 50, 62 and *y* total 180 in working **A1** for *y* = 68° |
| 4 | | 30 | 2 | **M1** for 300 or 50 × 6 or 294 or 49 × 6 or 20 − 10 **A1** for 29, 30 or 29·4 www |
| 5 | (a) | Correct shaded region | 2 | **M1** for arc of circle drawn, radius 6 cm with centre P **W1** for clear intention to shade outside an arc |
| | (b) | 87·5 | 1 | |
| 6 | (a) | 6, 9, 14 | 2 | **W1** for 1 correct term in correct position or 9, 14 … |
| | (b) | Yes and connection between 174, 169 and 13 or square number | 2 | **W1** for 169 or 13$^2$ seen |
| 7 | | 12 | 2 | **M1** for 20 ÷ 5 (= 4) or 8 (plain) www |
| 8 | | 150 or 2 × 3 × 5² | 2 | **M1** for 2 correct multiples of 25 and 2 correct multiples of 30 listed or 25 = 5 (×) 5 and 30 = 2 (×) 3 (×) 5 (may be on factor tree or repeated division or equivalent) |
| 9 | | $(y =) \dfrac{x-1}{4}$ oe as final answer | 2 | **M1** for 4$y$ = $x$ − 1 oe OR **W1** for $x$ − 1 ÷ 4 |

**Section A Total: 25**

**Section B**

| | | | | |
|---|---|---|---|---|
| 10 | (a) | ‾1 | 3 | **M1** for $6x + 21 = 15$<br>**M1** for $6x = {}^-6$ ft *their* first step<br>**M1** for $x = {}^-1$ ft *their* second step |
| | (b) | $x^2 + 5x - 3x - 15$ isw<br>or $x^2 + 2x - 15$ | 2 | **M1** for 2 terms from $x^2 + 5x - 3x - 15$ correct (may be in grid) |
| 11 | | £5·2(0) | 3 | **M2** for 2·8(0) or 0·65 × 8<br>OR<br>**M1** for 0·35 × 8 or 0·65 seen |
| | | 12·5% | 3 | **W2** for 87·5, 87, 88, 12, 13<br>OR<br>**M2** for 87·5(%) or 1 − 0·875, (0)·75/6<br>OR<br>**M1** for 5·25/6 or 0·875 or (0)·75 or 75(p) |
| 12 | (a) | 7·6[...] | 3 | **M2** for $\sqrt{58 \cdot 3}$<br>OR<br>**M1** for $5·4^2 + 5·4^2$ |
| | (b) | 174 to 175·2 www | 3 | **M1** for (5·4 × 5·4)/2 or 14·58<br>AND<br>**M1** for *their* area of BCD × 12 |
| 13 | (a) | $\dfrac{25}{75}$ oe isw for wrong cancelling | 1 | |
| | (b) | 10 | 2 | **M1** for $\dfrac{25}{75}$ × 30<br>**A1** for 10 or ft *their* (a) |
| 14 | (a) | 8·75 www isw | 4 | **M1** for 2·5, 7·5, 12·5, 7·5, 22·5<br>**M1** for 2·5 × 16 + 7·5 × 38 + etc<br>**M1** for 700 ÷ 80 ft *their* ∑fm<br>**A1** for 8·7 or 8·8 only after **M3**<br>OR<br>**SC3** for 6·25 from 0, 5, …<br>or 11·25 from 5,10…<br>or 8·25 from 2, 7 …<br>or 9·25 from 3, 8 … |
| | (b) | Middle person is in this group oe | 1 | |

**Section B Total: 25**

# B278 Module Test M8

**Section A**

| 1 | (a) | Correct rotation with vertices at (2, 2), (5, 2), (4, -1) and (2, 0) | 2 | **W1** for 180° rotation around any point or 90° (in any direction) about (2, 2) |
|---|---|---|---|---|
| | (b) | Correct translation with vertices at, (-4, 2), (-1, 2), (-2, -1) and (-4, 0) | 2ft | ft *their* (a) <br> **W1** for a translation of $\begin{pmatrix} 0 \\ 6 \end{pmatrix}, \begin{pmatrix} 6 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ -6 \end{pmatrix}$ <br> or for correct translation of shape **A** |
| | (c) | Rotation by 180° oe | 1 | Spoiled if extras <br> Accept ½ turn <br> Ignore references to shape B <br> Allow even if shapes on grid are incorrect |
| | | [Centre] (-1, 2) | 1ft | Independent <br> Also ft *their* centre of rotation for shape C provided it is a rotation of 180° from A on the grid |
| 2 | | 70 | 3 | **W2** for 1·7 or 170(%) or 0·7 as answer <br> OR <br> **M1** for 8·5/5 oe or $\dfrac{8.5 - 5}{5}$ oe seen |
| 3 | | $4\dfrac{1}{3}$ cao www | 3 | **W2** for $\dfrac{52}{12}$ oe ignore cancelling <br><br> OR <br><br> **M1** for $\dfrac{13}{4} \times \dfrac{4}{3}$ seen, or ft product of *their* improper fractions correctly evaluated |
| 4 | (a) | $\dfrac{5}{8}$ for reds and $\dfrac{3}{8}$ for blues on tree | 2 | **W1** for 3 correct probabilities |
| | (b) | $\dfrac{15}{32}$ oe isw cancelling | 3ft | ft *their* probabilities from tree diagram <br> **M2** for $2\left(\dfrac{3}{8} \times \dfrac{5}{8}\right)$ ft oe <br> OR <br> **M1** for $\dfrac{3}{8} \times \dfrac{5}{8}$ ft seen |

| 5 | (a) | Should be $x^2 + 3x$ (not spoilt by further incorrect algebra) <br> or "there should be an $x^2$" term | 1 | Accept $x \times x$ is not $2x$ <br> Do not accept $x$ times $x$ <u>alone</u> |
|---|-----|------|---|------|
|   | (b) | $[x^2]$ - $3x + 4x$ $[-12]$ seen isw <br> or $x^2 + x - 12$ o.e. seen isw <br> or explains/shows that $-3x$ and $4x$ are missing isw oe <br> or that the $x$-terms are not present | 1 | Accept "the inside and outside terms have not been multiplied" <br> or algebra correct in grid (with $-3x$) isw |
|   | (c) | $(x + 6)(x - 6)$ <br> or states brackets = $x^2 - 6x - 6x + 36$ or better <br> or explains that one of the signs should be positive oe <br> or that the product of 2 negatives is not negative oe | 1 | Accept a negative $\times$ a negative = a positive <br> or "the signs in the brackets should be a plus and a minus" |
| 6 | (a) | $(x - 7)(x + 2)$ | M2 | **M1** for $(x \pm 7)(x \pm 2)$ <br> or $(x + a)(x + b)$ where $ab$ = -14 or $a + b$ = -5 |
|   |     | 7 and -2 www | A1 | **W3** for correct answer with no working <br> After **M1**, allow **A1ft** from *their* factors |
|   | (b) | $\dfrac{p}{7} = m^2$ | M1 | After **M0** allow **SC1** for correct ft step(s) to *their p* |
|   |     | ($p$=) $7m^2$ oe final answer | A1 | **W2** for correct answer with no working |

**Section A Total: 25**

**Section B**

| 7 | | 8·25 oe www | 3 | **M1** for $4x/3 = 12 - 1$ or better<br>**M1**ft for $4x = 3(12 - 1)$<br>**M1**ft from *their ax = b*, with $a \neq 1$. |
|---|---|---|---|---|
| 8 | (a) | (0, 6) cao | 1 | |
| | (b) | (3, 0) cao | 1 | |
| | (c) | $y = k - 2x$ oe final answer | 1 | Allow any real number (but not 6) for *k* (or could be algebraic) |
| 9 | | 6165 or 6165·39 or 6165·40 | 3 | **M2** for $4500 \times 1\cdot065^5$ soi oe<br>OR<br>**W2** for answer 1665 or 1665·39 or 1665·40<br>OR<br>**M1** for $4500 \times 1\cdot065^n$ oe (where $n \neq 1$ or 5)<br>or for figs 1065 seen<br>After **M0,** allow **SC1** for $4500 \times 1\cdot65^5$ or answer 55034(…)<br>or for answer 5962·50 or 23962·50 only |
| 10 | (a) | 28(·0) to 28·1www | 3 | **M1** for $\tan (B) = \dfrac{11.2}{21}$ oe<br><br>(if correct AB found first (23·7 to 23·9) and used must be a correct trigonometric statement)<br><br>**M1** for $\tan^{-1}\left(\dfrac{11.2}{21}\right)$ ft *their* trigonometric ratio soi provided some previous trigonometry shown |
| | (b) | 55·9 to 56·1 www | 4 | **M3** for $11\cdot2 + 21 + \sqrt{21^2 + 11\cdot2^2}$ oe<br>OR<br>**W3** for (AB =) 23·7 to 23·9 seen<br>OR<br>**M2** for $\sqrt{21^2 + 11\cdot2^2}$<br>or complete trigonometric method ft *their* (a)<br>OR<br>**M1** for $21^2 \pm 11\cdot2^2$<br>or correct trigonometric statement with AB ft *their* (a) |

| 11 | (a) | 140·25 and 210·75 | 3 | Accept 140 and 211 only if more accurate value is seen, or correct method is shown<br>**W2** for either correct<br>OR<br>**M1** for (130 + 91+ 143 +197)/4<br>or (131 + 205 + 282 + 225)/ 4 |
|---|---|---|---|---|
|  | (b) | Trend/cost/price/it is increasing oe | 1 | Accept for **1** mark:<br>   Rising overall/each year<br>   Costs getting higher<br>   Paid more each month<br>   Spending more<br><br>The following score **0** unless accompanied by a correct answer:<br>   It goes up and down<br>   They are using more gas<br>   Positive (correlation) |
| 12 | (a) | 46 or 46·4 to 46·43 www | 4 | **W3** for 0·46 to 0·4643….<br>OR<br>**M2** for $\dfrac{1.56 \times 10^8}{3.36 \times 10^8}$ oe<br>OR<br>**W1** for $3\cdot36 \times 10^8$ oe<br>After 0 scored allow **SC1** for answer 7·98% (from $1\cdot56 \times 10^7$ used) |
|  | (b) | 79 000 000 oe | 1 | isw conversion to standard form |

**Section B Total: 25**

# B279 Module Test M9

**Section A**

| 1 | (a) | 1 | 1 | |
|---|---|---|---|---|
| | (b) | 81 | 2 | **M1** for $3^4$ or $3 \times 3 \times 3 \times 3$ or $\frac{1}{9} \times 729$ |
| | (c) | 6 | 1 | Accept $^-6$ |
| | (d) | $3(\cdot 0) \times 10^9$ | 2 | **M1** for $30 \times 10^8$ or $3 \times 10^k$ |
| 2 | (a) | $\frac{2}{3}$ , $\frac{2}{5}$ , $\frac{3}{5}$ , $\frac{2}{5}$   o.e. | 1 | |
| | (b) | $\frac{8}{15}$   oe   www | 3 | **M2** for $\frac{1}{3} \times \frac{2}{5} + \frac{2}{3} \times \frac{3}{5}$ oe or better <br> or $1 - \frac{1}{3} \times \frac{3}{5} - \frac{2}{3} \times \frac{2}{5}$ <br> OR <br> **M1** for $\frac{1}{3} \times \frac{2}{5}$ or $\frac{2}{3} \times \frac{3}{5}$ or better seen |
| 3 | (a) | 98 <br><br> (opposite $\angle$'s of a) cyclic quadrilateral (add up to 180°) | 1 <br><br> 1 | <br><br> Must mention cyclic quadrilateral (or opposite angles of quadrilateral with vertices on circumference of circle) with no incorrect reason seen |
| | (b) | $\angle$BDA = 27 <br> Reason | 1 <br> 2 | <br> **W1** for identifying any one of: <br> $\angle$ABD = 55 <br> $\angle$EDB = 82 <br> $\angle$BDF = 98 or ft *their* (a) <br> angles may be identified on diagram or implied by $\angle$BDA = 27 <br> **1dep** for alternate segment theorem (dependent on first W1) |

| 4 | (a) | $4x^2 - 5xy - 6y^2$ | 3 | **M2** for any 2 correct of 3 term final answer or any 3 of $4x^2$, $-8xy$, $3xy$, $-6y^2$ (allow in grid)<br>OR<br>**M1** for any 2 of $4x^2$, $-8xy$, $3xy$, $-6y^2$ |
|---|---|---|---|---|
|   | (b) | (i)   $(x + 4)(x - 5)$ | 2 | **M1** for $(x \pm 4)(x \pm 5)$ |
|   |   | (ii)   $\dfrac{x + 5}{x + 4}$ final answer | 2 | **M1** for $(x - 5)(x + 5)$ seen<br>**W1** for correctly cancelling $(x \pm 5)(x \pm 5)$ with *their* $(x \pm 4)(x \pm 5)$ and not spoilt |
|   | (c) | $(x - 4)(2x + 1)$  $(= 0)$ | 2 | Accept $(x - 4) = 0$ and $(2x + 1) = 0$<br>**M1** for $(x \pm 4)(2x \pm 1)$ seen<br>or $2x(x - 4) + 1(x - 4) (= 0)$ |
|   |   | $-\dfrac{1}{2}$ ,  4 | 1 | ft *their* factors dep on **M1** earned<br>Trial and improvement scores **3** for both correct answers, otherwise scores **0** |

**Section A Total: 25**

**Section B**

| 5 | (a) | $^-2$ cao | 1 | |
|---|---|---|---|---|
| | (b) | $y = {}^-2x + 1$ or ft from (a) | 2 | **W1** for $^-2x + 1$ <br> or $y = {}^-2x + c$ ft *their* (a) ($c \neq 1$) <br> or $y = mx + 1$ ($m \neq {}^-2$ or *their* (a)) |
| 6 | (a) | Correct histogram | 3 | **W3** for all bars correct <br> OR <br> **W2** for any 3 bars correct <br> OR <br> **W1** for frequency densities: 1·4, 2·8, 2, 4·6 7·8 (at least 4 correct) soi <br> or 2 bars correct |
| | (b) | A greater range/spread of times in 2007 | 1 | |
| | | (On average) runners ran slower in 2007 | 1 | |
| 7 | (a) | $r = \sqrt[3]{\dfrac{3V}{4\pi}}$ www | 3 | **W1** for correctly multiplying by 3 <br> **W1** for correctly transposing $4\pi$ <br> **W1** for correctly taking the cube root <br> All marks independent and can be applied in any order |
| | (b) | 571·8 - 572·2 | 2 | **M1** for $\dfrac{4\pi \times 5 \cdot 15^3}{3}$ or better |

| | | | | |
|---|---|---|---|---|
| 8 | (a) | $(AC^2 =) 12^2 + 12^2$ <br><br> $(AP =) \sqrt{288} \div 2$ | 1 <br><br> 1 | Also $6^2 + 6^2$ or $2AP^2 = 12^2$ leading to $(AP =) \sqrt{72}$ <br><br> <u>Alternative method using trigonometry</u> <br> **W1** for $\dfrac{x}{12} = \sin 45$ or $\dfrac{x}{12} = \cos 45$ <br> **W1** for $(x =) 12 \sin 45$ or $12 \cos 45$ |
| | (b) | $66 \cdot 9(\ldots)$ or $67(\cdot 0 \ldots)$ | 3 | **M2** for $\tan^{-1}\left(\dfrac{20}{8 \cdot 49}\right)$ <br><br> or $\sin^{-1}\left(\dfrac{20}{\sqrt{472(\cdot \cdot)}}\right)$ <br><br> or $\cos^{-1}\left(\dfrac{8 \cdot 49}{\sqrt{472(\cdot \cdot)}}\right)$ <br><br> OR <br><br> **M1** for $\tan (=) \dfrac{20}{8 \cdot 49}$ <br><br> or $\sin (=) \dfrac{20}{\sqrt{472(\cdot \cdot)}}$ <br><br> or $\cos (=) \dfrac{8 \cdot 49}{\sqrt{472(\cdot \cdot)}}$ |
| 9 | | $52 \cdot 2(7 \ldots)$ or $52 \cdot 2(8 \ldots)$ or $52 \cdot 3$ | 3 | **M1** for $\dfrac{135}{360} \times 2 \times \pi \times 12$ oe <br><br> **A1** for $28 \cdot 2(7 \ldots)$ or $28 \cdot 2(8 \ldots)$ or $28 \cdot 3$ <br> **W1** for $24 +$ *their* arc |
| 10 | (a) | $d = 3 \cdot 2 t^2$ | 3 | **M2** for $6 \cdot 25k = 20$ or $k = 3 \cdot 2$ <br> or $d \propto 3 \cdot 2 t^2$ or $3 \cdot 2 t^2$ as final answer <br> OR <br> **M1** for $d \propto t^2$ or $d = kt^2$ or $t^2 = kd$ oe <br> or $20 = k \times 2 \cdot 5^2$ or $20k = 2 \cdot 5^2$ <br> or $20 \propto k \times 2 \cdot 5^2$ or $20k \propto 2 \cdot 5^2$ <br> or $3 \cdot 2$ or $0 \cdot 3125$ |
| | (b) | B | 1 | |

**Section B Total: 25**

# B280 Module Test M10

**Section A**

| 1 | | Any two correct angles with corresponding reasons from<br>$\angle$XBY = XCD  alternate $\angle$<br>$\angle$BYX = CDX  alternate $\angle$<br>$\angle$BXY = CXD  opposite $\angle$ | 2 | Angles need to be clearly identified<br>**W1** for:<br>2 correct pairs given without correct reasons<br>or 1 correct pair of angles with correct reason |
| --- | --- | --- | --- | --- |
| | | AAS  or ASA | 1 | dep on 2 correct pairs of angles above |
| 2 | (a) | Correct line drawn | 1 | Ruled line through (2, 0) & (0, 2) and at least one intersection with curve |
| | | $x$ = -1·4 to -1·2 and 2·2 to 2·4 | 2 | **W1** for each answer not as coordinate ft *their* attempt at a straight line<br>OR<br>**SC1** for both correct $x$ values seen in answer as coordinates |
| | (b) | $x^2 + x - 2 = 0$ ringed | 1 | |
| 3 | (a) | $7 - 4\sqrt{3}$ | 2 | **M1** for 3 or more terms correct soi of<br>$4 - 2\sqrt{3} - 2\sqrt{3} + \sqrt{9}$ or 3<br>OR<br>**SC1** for answer $7 + 4\sqrt{3}$ |
| | (b) | $\dfrac{1}{27}$ | 3 | **M2** for 2 steps attempted from reciprocal, square root or cube<br>OR<br>**M1** for 1 step attempted from reciprocal, square root or cube |
| 4 | | $\dfrac{5x-7}{(2x-1)(x-2)}$ or $\dfrac{5x-7}{2x^2-5x+2}$ cao | 3 | **W1** for 3$x$ - 6 + 2$x$ - 1 or better seen<br>**W1** for correct common denominator seen |
| 5 | | 253 | 1 | |

| 6 | | $\dfrac{42}{90}$ oe www (but ignore wrong cancelling after correct answer obtained) | 4 | **W3** for $\dfrac{7}{10} \times \dfrac{3}{9} + \dfrac{3}{10} \times \dfrac{7}{9}$ oe <br> OR <br> **W2** for $\dfrac{7}{10} \times \dfrac{3}{9}$ and $\dfrac{3}{10} \times \dfrac{7}{9}$ <br> OR <br> **W1** for $\dfrac{7}{10} \times \dfrac{3}{9}$ or $\dfrac{3}{10} \times \dfrac{7}{9}$ <br><br> or for $\dfrac{7}{10}, \dfrac{3}{9}, \dfrac{3}{10}, \dfrac{7}{9}$ seen <br><br> OR <br> **SC1** for $\dfrac{42}{100}$ oe as answer |
| 7 | (a) | $4\mathbf{b} - 4\mathbf{a}$ oe | 1 | |
| | (b) | $\overrightarrow{PO} = -2\mathbf{a}$ & $\overrightarrow{OQ} = 2\mathbf{b}$ oe <br><br> or ($\overrightarrow{PQ} =$) $\overrightarrow{PO} + \overrightarrow{OQ}$ oe <br><br><br> ($\overrightarrow{PQ} =$) $2\mathbf{b} - 2\mathbf{a}$ or $-2\mathbf{a} + 2\mathbf{b}$ <br> or $2(\mathbf{b}-\mathbf{a})$ or $2(-\mathbf{a}+\mathbf{b})$ | M1 <br><br><br><br><br> A1 | $\overrightarrow{PA} = 2\mathbf{a}$ and $\overrightarrow{BQ} = -2\mathbf{b}$ oe <br> or $\overrightarrow{PQ} = \overrightarrow{PA} + \overrightarrow{AB} + \overrightarrow{BQ}$ oe <br> or $\overrightarrow{PQ} = 2\mathbf{a} + 4\mathbf{b} - 4\mathbf{a} - 2\mathbf{b}$ |
| | (c) | Parallel <br> AB is twice as long as PQ oe | 1dep <br> 1 | Dep on (a) correct or $4(\mathbf{a} - \mathbf{b})$ oe <br> No indication of vectors with reference to length |

**Section A Total: 25**

**Section B**

| 8 | | One correct trial with $t \geq 4$ (condone $t$ not an integer) | **M1** | Accept decimal populations |
|---|---|---|---|---|
| | | A second trial with $t = 7 - 8$ inclusive ie $(8200 \times 0\cdot98^7 =) 7118$ to $(8200 \times 0\cdot98^8 =) 6976$ | **M1** | |
| | | 2013 www | **A1** | After **M0**, allow **SC1** for 2013 or 1997 or 8 with no trials |
| 9 | | 38 | **3** | **M2** for 10 + 9 (=19) or 50 − (8 + 8 + 15) OR **M1** for 10 or 9 or two of 8, 8, 15 OR **SC2** for 62% OR **SC1** for $\frac{9}{50} = 18\%$ or $\frac{10}{50} = 20\%$ |
| 10 | (a) | $(x + 6)^2 - 46$ | **3** | **M2** for $(x + 6)^2 - 36$ (-10) or $x^2 + 6x + 6x + 36 - 36$ (-10) OR **M1** for $(x + 6)^2$ or -46 seen OR **SC2** for $(x - 6)^2 - 46$ |
| | (b) | ⁻46 | **1** | or ft *their* constant term |
| 11 | (a) | Evens out seasonal changes or shows trend | **1** | |
| | (b) | 294 | **2** | **M1** for 286 = (265 + 279 + 306 + $x$)/4 or better |
| 12 | | Sector: $\frac{120}{360} \times \pi \times 7^2$ | **M1** | Allow alternative equivalent methods. |
| | | 51·28 – 51·32 or (49/3) $\pi$ isw | **A1** | |
| | | Triangle ½ × $7^2$ sin120 oe | **M1** | |
| | | 21 or 21·2(…) | **A1** | |
| | | *their* sector – *their* triangle soi | **M1** | |
| | | 30·09(…) or 30·1 or 30 | **A1** | |

| 13 | $x^2 + (x + 3)^2 = 17$ oe | M1 | Or equivalent working in $y$ |
|---|---|---|---|
| | $x^2 + 3x + 3x + 9$ or better | W1 | For expanding brackets |
| | $x^2 + x^2 + 3x + 3x + 9 - 17 (= 0)$ or better | M1 | Collecting *their* two $x^2$ expressions = 0 $x^2 + x^2 + 3x + 3x + 9 = 17$ scores M0 unless completing the square used. |
| | $(x + 4)(x - 1)$ oe | A1 | Or correct substitution in formula to get $\dfrac{-6 \pm 10}{4}$ or better soi |
| | $x = -4, \quad y = -1$ | W1 | |
| | $x = 1, \quad y = 4$ | W1 | **SC1** for both $x$ values, or both $y$ values |

**Section B Total: 25**

# B281 Terminal Paper (Foundation Tier)

**Section A**

| 1 | (a) | 155 | 2 | **M1** for eg 3 + 50 + 100 + 2 <br> OR <br> **W1** for 145, 165 or 255 |
|---|-----|-----|---|---|
| | (b) | 340 | 1 | |
| | (c) | 204 | 1 | |
| | (d) | 27 | 2 | **M1** for 9 or 135 soi |
| | (e) | 17 | 1 | |
| 2 | (a) | 3·7 to 3·9 | 1 | Accept 4 |
| | (b) | Horizontal line of symmetry joining BA and CD | 1 | |
| 3 | (a) | (i) 5 | 1 | |
| | | (ii) ☺ ☺ www | 3 | **W2** for 50 – 46 (or 4) seen www <br> OR <br> **W1** for 12, 16, 5, 7, 6 implied by 46 <br> OR <br> **M1** for 50 – ( 44 or 45 or 47 or 48 or *their* '12 + 16 + 5 + 7 + 6' min 3 correct) soi <br> <u>Alternative method:</u> <br> **W2** for 25 – 23 <br> OR <br> **M1** for 25 (faces) used |
| | (b) | (i) 15, 17, 9, 7, 2 | 1 | |
| | | (ii) Vertical axis: consistent scale | 1 | |
| | | Horizontal axis labelled | 1 | Condone bars labelled |
| | | 5 correct bars same width ft *their* table | 2 | **W1** for 3 or 4 correct bars same width ft *their* table |
| 4 | (a) | grams or g | 1 | |
| | (b) | 2·5 m  to 4·5 m | 2 | **W1** for 2·5 to 4·5 <br> **W1** for m providing *their* height ≤ 20 <br> or for cm providing *their* height ≥ 100 <br> Allow **1** for 2 ≤ $h$ < 2·5 or 4·5< $h$ ≤ 5 if justified by explanation |
| | | the tree is (just over) double the girl's height | 1 | Or treble |

| 5 | (a) | $\frac{1}{4}$ oe | 1 | |
|---|---|---|---|---|
| | (b) | (i) 7 more outcomes listed | 2 | **W1** for 6 more correct outcomes listed (condone repeats or errors) |
| | | (ii) $\frac{2}{8}$ oe | 2 | **M1** for fraction with denominator 8 OR **W1** for fraction 'including' repeats from (i) ft *their* (b)(i) for 2 marks if repeats ignored |
| 6 | (a) | $x + 8y$ | 2 | **M1** for $x$ or $8y$ seen leading to *their* final answer |
| | (b) | (i) 13 | 1 | |
| | | (ii) 15 | 1 | |
| | | (iii) $x > 6$ | 2 | **M1** for 2x > 12 OR **SC1** for $x = 6$ or $x < 6$ or 6 on answer line |
| 7 | (a) | × 40 <br> 32 × 80 <br> 16 × 160 | 2 | **W1** for either column correct |
| | (b) | 15 <br> - 6² = 13 <br> 6² - 5² = 11 | 1 <br> 1 <br> 1 | If **0** scored, allow **M1** for at least 3 of 64, 49, 36, 25 seen |
| 8 | (a) | 25 | 1 | Accept 24 to 26 |
| | (b) | (i) 13  45  85 | 1 | |
| | | (ii) At least 2 points plotted <br> Ruled straight line through correct points | 1 <br> 1 | ft from *their* table; tolerance ±2 mm <br> Tolerance ±2 mm <br> Ignore $n < 1$ |
| | (c) | *Spickandspan* by £11 | 2 | Accept £10-12; allow correct or ft from wrong line <br> **M1** for evidence of reading off at 8 hours |
| 9 | (a) | 6 and 25 respectively | 2 | **W1** for each |
| | (b) | (i) $2\frac{3}{5}$ | 1 | |
| | | (ii) $6\frac{1}{15}$ or equivalent mixed number www | 3 | **M2** for $\frac{16}{15}$ or $\frac{91}{15}$ OR **M1** for evidence of equivalent fractions attempted with same denominator and with one correct: <br> $\frac{10}{15}$ or $\frac{6}{15}$ or $\frac{40}{15}$ or $\frac{51}{15}$ oe |

**Section A Total: 50**

**Section B**

| 10 | (a) | 30 only | 1 | |
|---|---|---|---|---|
| | (b) | 25 only | 1 | |
| | (c) | 5 or 10 or 20 | 1 | |
| 11 | | 11 | 2 | **M1** for 50/4·25 or 11·7... <br> or 11 × 4·25 or 12 × 4.25 |
| 12 | (a) | Q | 1 | |
| | (b) | 113 to 117 | 1 | |
| 13 | (a) | 6  ...  ...  15  18 | 2 | **M1** for 2 correct |
| | (b) | 27 <br> add 3 (3 times) or 3$p$ - 3 | 1 <br> 1 | **1** for either 27 or explanation |
| 14 | (a) | (4, 1) | 1 | |
| | (b) | C plotted at (-1, -1) | 1 | |
| | (c) | Isosceles | 1 | ft *their* C |
| 15 | (a) | 2·2 | 1 | Condone 11/5 |
| | (b) | 6·4 | 2 | **M1** for 6·43...  or 25·1 seen |
| 16 | (a) | Drawing (8 × 6 × 4) | 2 | **M1** for 2 dimensions incorrect |
| | (b) | 192 <br> cm³ | W2 <br> W1 | **M1** for 8 × 6 × 4 |
| | (c) | (i) £6·30 | 2 | **M1** for 0·35 × 18 <br> (or other % method that would lead to correct answer if no errors made) |
| | | (ii) £11·70 | 1 | or ft 18 - *their* (c)(i) |
| 17 | | Suitable question <br> At least 4 response boxes <br> Non-overlapping categories <br> Covering all eventualities | 2 | **1** for suitable question (condone suitable instruction) with 3 appropriate response boxes <br> or for 4 or more with an overlap or not covering all eventualities <br> or, if no suitable question, **1** for at least 4 response boxes with non-overlapping categories covering all eventualities |
| 18 | (a) | (i) 131 www | 3 | **M2** for 1048/8 <br> OR <br> **M1** for 1048 <br> or *their* 1048/8 |
| | | (ii) 98 | 1 | |
| | (b) | Chris: smallest range | 1 | ft *their* (a)(ii) if *their* range <46 |

| 19 | (a) | 13·3 | 2 | **M1** for 3·8 × 3.5 |
|---|---|---|---|---|
| | (b) | 1·1(3...) | 2 | **M1** for $\pi$ × 0·6 × 0·6 |
| | (c) | No: 10% of 13·3 is 1·33 and 1·13 is smaller | 2 | ft *their* (a) and (b) for **2** marks<br>**M1** for 1·33 seen or *their* (a) ÷ 10 |
| 20 | (a) | 410 × 60 × 60 x 24<br><br>354(24)000 oe | M1<br><br>A1 | Accept implied by 35 424 (000) or by 24600 and 147600 and figs 354 seen<br>At least 3 sig figs required |
| | (b) | 7 : 3 | 2 | **M1** for any correct partial simplification<br>Allow **2** for 2·33(…) : 1<br>or for 1 : 0·42857 rot to 2dp or more |
| 21 | | Circle, centre O radius 2 cm<br>Line parallel to CD, 5 cm from it<br>Perpendicular bisector of AB<br>Correct region shaded | 1<br>1<br>1<br>1 | At least relevant part of circle drawn<br><br>Extending at least to position of circle/arc<br>Region must be well defined; follow through *their* attempt at 2 lines and arc of circle |
| 22 | | $7·8^2 = x^2 + 2·5^2$<br><br>$(x =) \sqrt{(7·8^2 - 2·5^2)}$ [$= \sqrt{54·59}$]<br><br>7·4 or 7·39 | M1<br><br>M1<br><br>A2 | Allow for a correct Pythagoras statement; *x* not necessarily subject<br>Allow **M0M1** for $(x) = \sqrt{(7·8^2 + 2·5^2)}$ soi by $\sqrt{67·09}$ or 8·1 or 8·2 or better<br>**A1** for other rot versions of 7·388… or 7·40<br>Allow **W4** or **W3** as appropriate for acceptable answers www |

**Section B Total: 50**

# B282 Terminal Paper (Higher Tier)

**Section A**

| 1 | (a) | 23·6 | 3 | **M1** for 212·4 ÷ 9 or 2124 ÷ 90 or for 0·2124 ÷ 9 followed by × 1000 oe<br>**M1** for digits 236<br>Allow **3** for answer of 23·6 |
|---|---|---|---|---|
| | (b) | At least two of 3, 6 and 5 seen<br>90<br>cm³ | 1<br>1<br>1 | |
| 2 | (a) | 25 | 1 | Accept 24 to 26 |
| | (b) | (i) 13   45   85 | 1 | |
| | | (ii) At least 2 points plotted<br>Ruled straight line through correct points | 1<br>1 | ft from *their* table; tolerance ±2 mm<br>Tolerance ±2 mm<br>Ignore $n < 1$ |
| | (c) | *Spickandspan* by £11 | 2 | Accept £10-12; allow correct or ft from wrong line<br>**M1** for evidence of reading off at 8 hours |
| 3 | | 57<br>Alternate angles [are equal]<br><br><br>52 or ft 109 – their 57<br><br>Angles in a triangle add to 180° | 1<br>1<br><br><br>1<br><br>1 | For *y* obtained in more than one step, accept full equivalent explanations<br>eg [vertically] opposite + corresponding<br><br><br>Condone omission of 180° if angle is correct; or condone omission of 'angles'<br>For *z* obtained in more than one step, give the mark for the angles in a triangle, condoning poor or no additional explanations |
| 4 | (a) | $\frac{14}{15}$ www | 2 | **M1** for $\frac{9}{15}$ or $\frac{5}{15}$ or other evidence of common denominator used correctly eg $\frac{18}{30}$ |
| | (b) | $\frac{1}{2}$ www | 3 | **W2** for $\frac{15}{30}$ oe unsimplified fraction<br>OR<br>**M1** for $\frac{5}{3} \times \frac{3}{10}$ oe |

| 5 | (a) | 3 cao | 2 | **M1** for evidence of $\dfrac{y \text{ difference}}{x \text{ difference}}$ used<br><br>or for $3x$ |
|---|-----|-------|---|---|
| | (b) | $y = 3x + 2$ | 2 | or for $y = $ *their* (a) $\times x + 2$<br>OR<br>**M1** for $y = 3x + c,\ c \neq 2$<br>or for $y = $ *their* (a) $\times x + c,\ c \neq 2$<br>or for $y = mx + 2,\ m \neq 3$<br>OR<br>**W1** for $3x + 2$ or *their* (a) $\times x + 2$ but no '$y =$' |
| 6 | (a) | 93 | 1 | Accept 92 to 96 |
| | (b) | 830 | 1 | Accept 820 to 840 |
| | (c) | 450 | 2 | Accept 430 to 470<br>**M1** for at least one of 580 and 1030 (tolerance £10) |
| 7 | (a) | $[x =] \sqrt[3]{y - 5}$ | 2 | **M1** for first complete and constructive step correct or for a cube root seen<br>Allow **M1** for answer of $3 \times \sqrt{y - 5}$ |
| | (b) | $2an + a$ or $a(2n + 1)$ | 2 | **M1** for $(n + 1)^2 = n^2 + 2n + 1$ soi<br>or $(n + 1)^2 - n^2 = [1 \times] (2n + 1)$ soi |
| | (c) | $y = \dfrac{5}{x}$<br><br>$y = x^3 + 5$<br>$y = 5^x$ | 1<br><br>1<br>1 | |
| 8 | (a) | 12 | 1 | |
| | (b) | Freq densities: 0·3, 0·75, 0·9, 0·7, 0·3<br>Bars all correct width<br>Bars all correct height cao | 1<br><br>1<br>1 | Seen or plotted; condone two errors |
| | (c) | Valid, worthwhile comparison | 1 | **0** if only comment about one type of tree |
| 9 | (a) | $\dfrac{17}{33}$ | 3 | **2** for $\dfrac{51}{99}$<br>OR<br>**M1** for $100a = 51 \cdot 5151\ldots$ oe |
| | (b) | $8\sqrt{2}$ | 2 | **M1** for $\sqrt{18} = 3\sqrt{2}$ |
| | (c) | $3x^3 y^{-2}$ or $\dfrac{3x^3}{y^2}$ | 2 | **M1** for two 'terms' correct |
| | (d) | $\dfrac{1}{16}$ isw or 0·0625 | 2 | **M1** for $64^{\frac{1}{3}} = 4$ soi or for $64^{-\frac{2}{3}} = \dfrac{1}{64^{\frac{2}{3}}}$ soi |

**Section A Total: 50**

**Section B**

| 10 | (a) | Suitable question<br>At least 4 response boxes<br>Non-overlapping categories<br>Covering all eventualities | 2 | **1** for suitable question (condone suitable instruction) with 3 appropriate response boxes<br>or for 4 or more with an overlap or not covering all eventualities<br>or, if no suitable question, **1** for at least 4 response boxes with non-overlapping categories covering all eventualities |
|---|---|---|---|---|
| | (b) | Plan: two concentric circles | 1 | Accept freehand sketches – mark intent<br>3D drawings score **0** |
| | | Elevation : straight lines across top and bottom, with top longer than bottom | 1 | |
| | | Curved sides and approx. symmetrical and correct way up | 1 | **SC2** for correct plan and elevation reversed [and similarly deduct 1 mark from poorer answers if reversed] |
| 11 | (a) | 410 × 60 × 60 x 24 | M1 | Accept implied by 35 424 (000) or by 24600 and 147600 and figs 354 seen |
| | | 354(24)000 oe | A1 | At least 3 sig figs required |
| | (b) | 7 : 3 | 2 | **M1** for any correct partial simplification<br>Allow **2** for 2·33(…) : 1<br>or for 1 : 0·42857 rot to 2dp or more |
| | (c) | Midpoints 4·5, 14·5 etc soi | M1 | Condone 5, 15 etc |
| | | Attempt at $\sum fx$ [745] soi [or at least 3 correct values seen of f$x$ : 81, 232, 294, 138]] | M1 | Allow second and third **M1**s with other consistent values of $x$ in each class |
| | | *Their* $\sum fx$ ÷ their $\sum f$ [745 ÷ 50] | M1 | |
| | | 14·9 | A1 | or **W4** for 14·9 www; allow **A1** for 15 if **M3** earned<br>OR<br>**SC3** for 15·4<br>OR<br>**SC2** for 19·9, 9·9 |

| 12 | (a) | Turning through these angles is the same as a complete turn round a point | 1 | oe comment, eg showing pentagon divides into 3 triangles so sum of interior angles = 540° hence sum of exterior angles = 5 × 180 − 540 = 360° |
|---|---|---|---|---|
| | (b) | Sum of given angles attempted [=466°]<br><br>Angles in pentagon add to 540° seen or used<br><br>74 | M1<br><br>M1<br><br>A1 | <u>Alternative method:</u><br>**M1** for finding the exterior angles<br>**M1** for using 360° and known exterior angles to find exterior angle to $x$ [=106°]<br><br><br>Allow **W3** for 74 www |
| 13 | | Circle, centre O radius 2 cm<br>Line parallel to CD, 5 cm from it<br>Perpendicular bisector of AB<br>Correct region shaded | 1<br>1<br>1<br>1 | At least relevant part of circle drawn<br><br>Extending at least to position of circle/arc<br>Region must be well defined; follow through *their* attempt at 2 lines and arc of circle |
| 14 | (a) | 3·8 oe www | 3 | **M1** for correct equation after multiplying out brackets:<br>$5x - 15 = 4$<br>**M1** for collecting number terms, ft from previous error<br>**M1** for division by $x$ coefficient, ft<br>OR<br>**M2** for $x - 3 = 0·8$ oe<br>**M1** ft for adding *their* 3 |
| | (b) | $(x + 4)(x - 2)$<br><br><br>$x = -4$ and 2 ft *their* factors | M2<br><br><br>W1 | **M1** for other versions of $(x \pm 4)(x \pm 2)$<br>or for other versions of $(x \pm a)(x \pm b)$ giving two correct terms when expanded<br>Allow **W1** for −4 and 2 without factors |

| 15 | (a) | $7 \cdot 8^2 = x^2 + 2 \cdot 5^2$ | M1 | for a correct Pythagoras statement, $x$ not necessarily subject |
| | | $[x =] \sqrt{7 \cdot 8^2 - 2 \cdot 5^2}$  $[= \sqrt{54 \cdot 59}\,]$ | M1 | allow **M0M1** for $[x =] \sqrt{7 \cdot 8^2 + 2 \cdot 5^2}$ soi |
| | | $7 \cdot 4$ or $7 \cdot 39$ | A2 | **A1** for other rounded or truncated versions of $7 \cdot 388\ldots$ to 2 dp or more or for $7 \cdot 40$<br><br>allow **W4** or **W3** as appropriate for acceptable answers www |
| | (b) | $\sin y = \dfrac{7 \cdot 2}{7 \cdot 8}$ | M1 | |
| | | Use of inverse trig function soi | M1 | ft from wrong trig function used |
| | | $67(\cdot38\ldots)$ and comment unsafe /ladder should be further up wall/ is $7 \cdot 6°$ out oe | A1 | Accept 67 or $67 \cdot 3$ - $67 \cdot 4$ with suitable comment |
| | | <u>Alternative method:</u> | <u>OR</u> | |
| | | $\sin 75 = \dfrac{h}{7 \cdot 8}$ or $h = 7 \cdot 8 \times \sin 75$ | M1 | or for $\cos z = \dfrac{2 \cdot 5}{7 \cdot 8}$ |
| | | $h = 7 \cdot 5(3\ldots)$ | M1 | or for $z = 71 \cdot 3..$ |
| | | Comment unsafe /ladder should be further up wall oe | A1 | **A1** for $y < z$ since ladder moved down wall so unsafe |
| 16 | (a) | $0 \cdot 95$ on first set of branches and 'good' or 'no fault' o.e. throughout, consistent with probs.<br>$0 \cdot 02$ and $0 \cdot 98$ on both pairs of second set | 1<br><br>1 | |
| | (b) | $0 \cdot 931$ www or ft | 2 | **M1** for their $0 \cdot 95 \times$ their $0 \cdot 98$<br>allow **A1** for $0 \cdot 93$ only if correct method seen |

| 17 | | $2x + 4y = 4$ or $4x − 2y = 10$ | **M1** | Condone one error |
|---|---|---|---|---|
| | | Subtraction or addition as appropriate | **M1** | Must be attempt at correct operation to eliminate variable; condone one error |
| | | $x = 2·4$ and $y = −0·2$ o.e. | **A1** | if **M0**, allow **W1** for both values correct |
| | | <u>Alternative method:</u><br>One variable substituted for in other equation | **OR**<br>**M1** | Condone one error |
| | | Dealing with brackets and collecting terms to form 3 term equation (isw) | **M1** | Condone one error |
| | | $x = 2·4$ and $y = −0·2$ oe | **A1** | |
| 18 | (a) | $y = \dfrac{k}{x^2}$ oe | **M1** | **M0** for $y = \dfrac{1}{x^2}$ or $y \propto \dfrac{k}{x^2}$ but allow **SC1** if $k = 36$ subsequently found |
| | | $9 = \dfrac{k}{2^2}$ oe | **M1** | **dep** on first **M1**<br>May be implied by correct $k$ |
| | | $y = \dfrac{36}{x^2}$ or $yx^2 = 36$ oe | **A1** | Allow **A1** for $k = 36$<br>**W3** for $y = \dfrac{36}{x^2}$ or $yx^2 = 36$ oe www |
| | (b) | 3 cao | 1 | |
| 19 | | $½ × 4·7 × 5·6 × \sin 110°$ soi | **M1** | $[=12·366…]$ |
| | | $\dfrac{110}{360} × \pi r^2$ | **M1** | $[=0·9599…r^2$ or $0·3055... × \pi r^2]$ |
| | | *Their* areas of sector and triangle equated | **M1** | |
| | | rearrangement to make $r$ or $r^2$ subject | **M1** | eg $r^2 = \dfrac{1}{2} × 4·7 × 5·6 × \sin 110 × \dfrac{360}{110\pi}$<br>or $r^2 = 12·4 ÷ 0·96$<br>or $r^2 = \dfrac{\text{their area}}{0·9599...}$ or $\dfrac{\text{their area}}{\pi × 0·3055...}$ |
| | | $r = 3·58…$or $3·59$ or $3·6$ | **A1** | <u>Alternative method:</u><br>**M1** for area of triangle $[=12·366…]$<br>**M2** [ie 2$^{nd}$ and 3$^{rd}$ M1s] for area of circle = *their* area of triangle × 360/110<br>or *their* area of triangle ÷ 0·3055... $[=40·47...]$<br>**M1** for $r^2 = $ *their* area of whole circle ÷ π $[=12·88...]$<br>or $r^2 = $ area of *their* triangle ÷ π |
| | | Allow **W5** for answer of $3·58…$or $3·59$ www | | or $\sqrt{\text{area of }\textit{their}\text{ triangle} ÷ \pi}$ seen<br>**A1** for $r = 3·58…$or $3·59$ or $3·6$<br>**M0 M0** for area of triangle = $\pi r^2$ soi |

**Section B Total: 50**

# Grade Thresholds

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

**Unit Threshold Marks (Module Tests)**

| Unit | | Maximum Mark | a* | a | b | c | d | e | f | g | p | u |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| B271 | Raw | 50 | | | | | | | | 30 | 15 | 0 |
| | UMS | 59 | | | | | | | | 40 | 20 | 0 |
| B272 | Raw | 50 | | | | | | | 38 | 24 | 13 | 0 |
| | UMS | 70 | | | | | | | 60 | 40 | 30 | 0 |
| B273 | Raw | 50 | | | | | | | 31 | 16 | | 0 |
| | UMS | 79 | | | | | | | 60 | 40 | | 0 |
| B274 | Raw | 50 | | | | | | 37 | 21 | 13 | | 0 |
| | UMS | 90 | | | | | | 80 | 60 | 50 | | 0 |
| B275 | Raw | 50 | | | | | | 31 | 16 | | | 0 |
| | UMS | 99 | | | | | | 80 | 60 | | | 0 |
| B276 | Raw | 50 | | | | | 25 | 12 | | | | 0 |
| | UMS | 119 | | | | | 100 | 80 | | | | 0 |
| B277 | Raw | 50 | | | | 31 | 16 | | | | | 0 |
| | UMS | 139 | | | | 120 | 100 | | | | | 0 |
| B278 | Raw | 50 | | | 32 | 16 | | | | | | 0 |
| | UMS | 159 | | | 140 | 120 | | | | | | 0 |
| B279 | Raw | 50 | | 31 | 16 | | | | | | | 0 |
| | UMS | 179 | | 160 | 140 | | | | | | | 0 |
| B280 | Raw | 50 | 30 | 15 | | | | | | | | 0 |
| | UMS | 200 | 180 | 160 | | | | | | | | 0 |

**Unit Threshold Marks (Terminal Papers)**

| Unit | | Maximum Mark | a* | a | b | c | d | e | f | g | u |
|------|------|------|------|------|------|------|------|------|------|------|------|
| B281 | Raw | 100 | | | | 68 | 56 | 44 | 32 | 20 | 0 |
| | UMS | 279 | | | | 240 | 200 | 160 | 120 | 80 | 0 |
| B282 | Raw | 100 | 80 | 64 | 48 | 32 | 19 | 12 | | | 0 |
| | UMS | 400 | 360 | 320 | 280 | 240 | 200 | 180 | | | 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_results.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' indicated 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)

**Specification Aggregation Results**

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks):

|  | A* | A | B | C | D | E | F | G | U |
|---|---|---|---|---|---|---|---|---|---|
| J517 | 700 | 620 | 540 | 460 | 380 | 300 | 220 | 140 | 0 |

The cumulative percentage of candidates awarded each grade was as follows:

|  | A* | A | B | C | D | E | F | G | U | Total No. of Cands |
|---|---|---|---|---|---|---|---|---|---|---|
| J517F |  |  |  | 42.1 | 67.3 | 79.1 | 91.2 | 98.1 | 100 | 1811 |
| J517H | 14.4 | 29.8 | 52.8 | 81.5 | 95.2 | 98.6 |  |  | 100 | 1247 |
| J517 | 5.9 | 12.1 | 21.5 | 58.2 | 78.7 | 87.1 | 94.2 | 98.3 | 100 | 3058 |

3058 candidates were entered for aggregation this series.

Statistics are correct at the time of publication.