# GCSE

## Mathematics B (Linear)

General Certificate of Secondary Education

Component **J567/04:** Mathematics Paper 4 (Higher)

# Mark Scheme for June 2012

Annotations used in the detailed Mark Scheme.

| Annotation | Meaning |
|---|---|
| ✓ | Correct |
| ✗ | Incorrect |
| BOD | Benefit of doubt |
| FT | Follow through |
| ISW | Ignore subsequent working (after correct answer obtained), provided method has been completed |
| M0 | Method mark awarded 0 |
| M1 | Method mark awarded 1 |
| M2 | Method mark awarded 2 |
| A1 | Accuracy mark awarded 1 |
| B1 | Independent mark awarded 1 |
| B2 | Independent mark awarded 2 |
| MR | Misread |
| SC | Special case |
| ∧ | Omission sign |

These should be used whenever appropriate during your marking.

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

**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.
**B** marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.

Subject Specific Marking Instructions

1.    **M** marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
      **A** marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
      **B** marks are <u>independent</u> of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
      **SC** marks are for <u>special cases</u> that are worthy of some credit.

2.     Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is <u>not from wrong working</u> **full marks** should be awarded.

   Do <u>not</u> award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen <u>and</u> the correct answer clearly follows from it.

3.     Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 − √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4.     Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

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

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg
   - 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** (after correct answer obtained).
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line,
   - even if it is not in the method leading to the final answer.
   - **soi** means **seen or implied**.

6.     Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. 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).

8. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

9. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

10. 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'. Place the annotation ✓ next to the correct answer.

   If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

   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 still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

11. Ranges of answers given in the mark scheme are always inclusive.

12. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

13. 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.

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 1 | (a) | | 1.1 | 2 | **M1** for ⁻16.4 + 3.5 × 5 or 17.5 seen | |
| | (b) | | $[t =]\ \dfrac{v - u}{5}$ oe | 2 | **M1** for one correct step eg $v – u = 5t$ or $\dfrac{v}{5} = \dfrac{u}{5} + t$ oe <br><br> or as answer: $\dfrac{v + u}{5}$, $v - \dfrac{u}{5}$, $\dfrac{u - v}{5}$ <br><br> $\dfrac{v}{5} - u$ , $v – u – 5$, $v – u ÷ 5$ <br> or $(u - v) ÷ 5$ | |
| 2 | (a) | | 2 × 2 × 2 × 3 × 5 × 5  oe | 3 | **M2** for 2, 2, 2, 3, 5, 5 <br> or one factor missing <br> or one factor replaced by another prime (ignore 1 in the list) <br> OR <br> **M1** for at least one of 2, 3, 5 identified as a factor of 600 nfww | These factors could be on a factor tree or with '+' or ',' instead of '×' for M2. <br><br> allow full marks for correct answer seen in working unless contradicted |
| | (b) | | 16 20 or 4 20 | 3 | **M2** for 80 <br> OR <br> **M1** for any multiple of 80 <br> **M1dep** for *their* '80' added correctly to 1500 to give acceptable time <br> OR <br> **M1** for a list of 3 consecutive times with the correct gap (16 or 20) for one train <br> **M1** for similar list for other train | 15 80 or 3 80 as answer or 1620 in both lists imply **M2** <br><br> ignore any time embellishments eg am/pm, o'clock, h and min and preceding zeros |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 3 | | | 7.216 – 7.224 or 7.2 | 4 | **B3** for 721600 – 722400 seen<br>or 14.432 – 14.448<br>or 3.608 – 3.612 as answer<br>OR<br>**B2** for 205.67 – 205.86<br>   or figs 72[…]<br>OR<br>**M1** for 65.5 × π oe implied by 206<br>**M1** for<br>  (*their* '65.5 × π' or 65.5) × 3509<br>**M1** for *their* '722062' ÷ 100 000 soi | Allow full marks for 7 with supporting working<br><br>Take π as 3.14[2] or $\dfrac{22}{7}$<br><br>The **M**'s can be done in any order eg 65.5 × 3509 or 229839.5 scores **M1** |
| 4 | (a) | | 2050 - 2060 | 2 | **M1** for 185 ÷ 0.09 or 185 × 100 ÷ 9 oe<br>OR<br>**SC1** for 2000 from 185 ÷ 9 = 20 | |
| | (b) | | Salt-what-salt?<br>and<br>20.5 – 20.6 or 21 (%) oe<br>19.2 or 19 (%) oe<br>19.6 – 19.7 or 20 (%) oe<br><br>Accept any figures that can be compared | 3 | **M2** for wrong answer and all decimals/percentages correct rot to at least 2 sf, eg allow:<br>0.205 – 0.206 or 0.21 oe<br>0.192 or 0.19 oe<br>0.196 – 0.197 or 0.2[0]oe<br>or accept division the other way:<br>4.8 – 4.9(486 etc)<br>5.2[…](520[.8…] etc)<br>5.0 – 5.1(508 etc)<br>OR<br>**M1** for 2 of these decimals/percentages correct | Accept any correct comparisons including percentages, decimals or fractions over a common denominator<br><br>Allow an attempt to convert to a 'common amount' eg converting to 1200 so<br>246.8 - 246.9<br>230[.4]<br>236 seen for **M2** or **3** if the answer is correct<br><br>BOD throughout if one decimal point not seen/unclear |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| **5** | (a) | | Two points correctly plotted | 1 | Allow ± 1mm | Use overlay |
| | (b) | | Positive | 1 | Allow equivalent statement | Ignore other comments eg 'weak' |
| | (c) | (i) | Straight line of best fit at least between amount = 20 and amount = 50 | 1 | On 'amount' = 20 allow '27 – 37' and on 'amount' = 50 allow '52 – 67' | Use overlay anchor the red line on (20, 27) |
| | | (ii) | 38 – 50 | 1 | Otherwise FT *their* straight line (tolerance ± 1) | |
| **6** | (a) | | 16.878 or 16.88 or 16.9 nfww | 3 | **B2** for 18.3 or 18.35 or 18.3[4..] OR **B1** for 0.2813 OR **M1** for use of distance ÷ time (the distance is 42.195 (allow MR) and the time could be 2(h) 30(m), 2.5, 2.3, 150, 230 or 9000 for example) **M1** for time used as 2.5 implied by 0.059 | Accept 17 if supported by correct working |
| | (b) | | 1.27 | 2 | **M1** for 1.27[18.....] or 1.3 or 1.6175... or $\frac{351}{217}$ oe or 10.53 and 6.51 | Allow ⁻1.27 and ±1.27 for **2** marks |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 7 | (a) | | There is no "0" or no "16+" boxes/options | 1 | allow any correct answer | Mark the best comment <br> Do not accept 'other', <br> see appendix for exemplars |
| | (b) | | Suitable question and <br> at least **four** boxes/table covering all possibilities (integers 0 – 12) with no overlap | 2 | eg "How many hours do you(the athletes) train at the week[end]?"with boxes for 0 - 3, 4 – 6, 7 – 9, over 9 <br><br> **B1** for a suitable question <u>with</u> 3 boxes which cover all possibilities (integers 0 - 12) and have no overlapping numbers <br> OR <br> **B1** for a suitable question <u>and</u> at least 4 boxes which have one error, either they do not cover all possibilities up to 12 or they contain at least one overlap <br> OR <br> **B1** for no question/unsuitable question with at least **four** boxes/table covering all possibilities (integers 0 – 12) and have no overlapping numbers | We accept 12 as a sufficient maximum (can go over 12) <br><br> The 'boxes' must include 0 and at the end have 'over $t$', '$t$+' or go to at least 12 <br><br> Mark at least the first four boxes and ignore any further boxes if they go over 12 hours <br><br> Accept 10 + or 'more than 10' as including 10 or not ( we BOD it) whichever is in the candidate's interest and be generous in accepting inequality signs, <u>'other'</u> is insufficient but <u>'more'</u> and <u>'less'</u> are acceptable at the appropriate end |
| | (c) | (i) | Strata/classes/groups/age/gender/ section/categories/male/junior seen <br> **and** <br> The number (sampled) in each strata is <u>proportional</u> to the size of that strata | 2 | **B1** for each of the two points <br><br><br> It could be a description of the method | |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| | | (ii) | 5 | 2 | **M1** for $\dfrac{31}{their175} \times 30$ oe or 5.[3...] or 5.4 | 6 with correct working scores **2**, accept 16, 47, 75 or 106 instead of 31 (treat as MR) for **M1** (watch out for 175 ÷ 31 = 5.6… this scores **0** unless they go on to do 30 ÷ 5.6..) |
| | (d) | | 52.75 or 52.7 or 52.8 or 53 | 4 | nfww<br>**B1** for 3 midpoints seen from 43, 49, 55, 61 (condone 42.5, 48.5, 54.5, 60.5) or implied by 3 seen from 172, 588, 1045, 305<br><br>**M1** for attempting to multiply 'their midpoint' by the frequency and adding them up or 2110 if seen (if their midpoints are wrong then check just two of their products)<br><br>**M1 dep** for their '2110'÷ their '40' | If they score **B0** then you can award both **M** marks if at least 3 of their "midpoints" used are from within the groups (including the ends eg 46 ) |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 8 | (a) | | ⁻4  2 | 1 | | |
| | (b) | | Correct straight line (± 2mm of the points) | 2 | **M1** for four points correctly plotted<br>FT *their* table (± 2mm) | Ignore additional parallel lines |
| | (c) | | ✗ where their straight line crosses the *x* - axis | 1 | If there is no line crossing the *x*-axis then accept a cross between *x* = 1 and *x* = 1.5 but not on the ends of this range | If they have drawn a 'curve' treat this as 'no line' so award the mark if there is a cross between *x* = 1 and *x* = 1.5 |
| | (d) | | 3 oe | 1 | eg accept $\frac{6}{2}$ | 3*x* scores **0** |
| | (e) | | $y = 3x + c$ where *c* is any number except ⁻4 | 1 | Condone $y = 3x \pm c$ | $y = 3x$ scores **1** |
| 9 | | | 2.7 and **two** correct trials using **any** two values of *x* in the range 2 < *x* < 3 | 3 | **M2** for two correct trials (some values are in the table), *their* value must be correct rot to 2 sf or rot to 1 sf if given to 1 sf<br>OR<br>**M1** for one correct trial (some values are in the table), *their* value must be correct rot to 2 sf or rot to 1 sf if given to 1 sf so for 2.8 take *their* number and accept it if it is 1.9 or 2 or if it rounds or truncates to 1.9 or 2.0 when written to 2 sf | (see table below) |
| 10 | | | 3930[.4] or 3931 or 3900 | 2 | **M1** for 6400×0.85³ or 4624 or 3340[.84] or 3341, all seen | |

Question 9 table:

| | | | |
|---|---|---|---|
| 2.1 | ⁻7.239 | 2.61 | ⁻1.2704 |
| 2.2 | ⁻6.352 | 2.62 | ⁻1.1153 |
| 2.3 | ⁻5.333 | 2.63 | ⁻0.9586 |
| 2.4 | ⁻4.176 | 2.64 | ⁻0.8003 |
| 2.5 | ⁻2.875 | 2.65 | ⁻0.6404 |
| 2.6 | ⁻1.424 | 2.66 | ⁻0.4789 |
| 2.7 | 0.183 | 2.67 | ⁻0.3158 |
| 2.8 | 1.952 | 2.68 | ⁻0.1512 |
| 2.9 | 3.889 | 2.69 | 0.01511 |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| **11** | (a) | | 53 and alternate, accept z-angle | 2 | **B1** for 53 or alternate (angle) | Accept alternating and alternative not alternate segment and do not Accept if choice of two given |
| | (b) | | 62 | 2 | **M1** for (180 – 124) ÷ 2 or 28 seen or (180 – 56) ÷ 2 or 90° indicated between radius and tangent or used eg 90 – *their* '28' or for (180 – *their APB*) ÷ 2 | Check diagram for 28 or right-angle symbol or 90 or angle P marked<br><br><br>*Their APB* must be identified |
| **12** | (a) | | 21.6[3...] or 22 nfww | 3 | **M2** for $\sqrt{18^2 + 12^2}$<br><br>OR<br><br>**M1** for $18^2 + 12^2$ or $\sqrt{18^2 - 12^2}$ | Accept correct alternative methods if they get 21.6[3...] or 22 correctly and then go on to find AG award **M2** |
| | (b) | | 49 or 49.1 – 49.2 | 3 | **M2** for $\tan^{-1}(25 ÷ their (a))$<br>OR<br>**M1** for a correct trig statement eg tan *a* = 25 ÷ *their* (a)<br>**M1** for any inv trig function soi<br>If **0**, then **SC2** for 48.6[..] or 48.7 from use of 22 or 0.85 – 0.86 or 54.5 – 54.6 from use of radians or grads | Be generous on notation eg accept $\tan^{-1}$ = 25 ÷ 21.6<br><br>Accept 21 for *their* (a) and **M2** for 50 after $\tan^{-1}(25 ÷ 21)$<br><br>Accept correct alternative methods involving sin or cos, the trig statement is from *their* information |

| Question | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|
| 13 (a) | 10.5  or  $\dfrac{21}{2}$ oe | 3 | **M1** for $6x - 1 = 4(x + 5)$ or better or for division by 4 eg $1\frac{1}{2}x - \frac{1}{4} = x + 5$ oe<br>**M1** for correctly collecting *their* $x$'s and *their* numbers on separate sides, no simplification necessary<br>**M1** for $x = \frac{b}{a}$ from *their* $ax = b$ ($a$ not 1) to a maximum of **2** marks | Note: $\dfrac{6x}{4} = x + 6$(or 4) followed by<br>$6x = 4x + 24$(or 16)<br>$2x = 24$ (or 16)<br>$x = 12$ (or 8)<br>gets **2** marks – they lose 1 mark for one incorrect stage |
| (b) | $x^2 - 36$ final answer | 2 | **M1** for three correct terms from<br>$x^2$  $^-6x$  (+)$6x$  $^-36$ | $x^2 + 12x - 36$ or $x^2 - 6^2$ implies **M1** the working maybe in a table |
| (c) | $(x - 8)(x + 4)$ | 2 | **M1** for either $(x \pm 8)(x \pm 4)$ or for two numbers which add to give $^-4$ or multiply to give $^-32$ | eg $(x - 10)(x + 6)$ scores **M1** |
|  | 8  (and) $^-4$ | 1 | FT *their* <u>factors</u> or correct from the formula | eg 4 and 9 from $(x - 9)(x - 4)$ |
| (d) | $r = \sqrt{\dfrac{S}{4\pi}}$ | 2 | **M1** for $r^2 = \dfrac{S}{4\pi}$ oe or $r = \sqrt{f(S)}$ or $\sqrt{\dfrac{S}{4\pi}}$ or $r = \dfrac{\sqrt{S}}{4\pi}$ oe ignore + or – in front of the root | $f(S)$ should be a function with $S$, 4 and $\pi$ eg $S - 4\pi$ or $S \times 4\pi$ or $\dfrac{4\pi}{S}$<br><br>$r = \sqrt{S \div \pi \div 4}$ BOD **2** marks |
| 14 | 33.6 | 3 | **M1** for $21 \div 5$ or 4.2 seen<br><br>**M1** for *their* '4.2' × 8<br>OR<br>**SC1** for 34 with no working | accept any correct method eg $(8 \div 5) \times 21$ so **M1** for $8 \div 5$ or 1.6 seen and **M1** for *their* '1.6' × 21 |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 15 | (a) | | B C G | 1 | In any order, no extras | |
| | (b) | | $x + y \leq 8$ or $y \leq 8 - x$ or $y \leq {}^-1x + 8$ or $x + y < 8$ oe as final answer | 2 | **SC2** for $x \leq 8$ or $y \leq 8$ or $x < 8$ or $y < 8$ or $x + y < n$ or $x < n$ or $y < n$ where $n > 8$ OR **SC1** for $x + y = 8$ or $x + y > 8$ or $x + y \geq 8$ or $x \geq 0$ or $y \geq 0$ or $x > 0$ or $y > 0$ or $y < x + 8$ oe or $x + y \leq n$ or $x \leq n$ or $y \leq n$ where $n > 8$ oe | If you see an expression with more than one inequality award **0** |
| 16 | (a) | | 56.6[..] or 56.7 or 57 | 3 | **M2** for $\frac{47}{30}$ - 1 or [0].56[6..] or [0].57 or [0].567 OR **B1** for $\frac{47}{30}$ or 1.56[6…] or 1.57 or 1.567 seen OR **M1** for 47 – 30 or 17 seen **M1** for $\frac{their\,'17'}{30}$ | For percentage equivalents 156.6[…] or 157 or 156.7 score **2** marks |
| | (b) | (i) | 9.1 – 9.9 | 2 | **M1** for 26 or 16.1 – 16.9 seen | |
| | | (ii) | Australia are more spread out/greater range/greater IQR or similar median/average | 1 | Allow GB to have a higher median/average<br><br>Accept any correct comparison e.g. Australia has a higher maximum | Choose best comment if more than one even if one is incorrect See appendix for exemplars |

| Question | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|
| **17** | 1852.7 to 1854.42 or 1850 | 4 | **B1** for 8.5 or 24.5 soi<br>**M1** for $\frac{1}{3}\pi r^2 h$ soi (BOD use of 0.3 for $\frac{1}{3}$)<br><br>**M1** for $\frac{1}{3}\times\pi\times$ '7.5 to 8.5'$^2$ ×'23.5 to 24.5' (BOD use of 0.3 for 1/3) | Allow 8.499.... or 24.499... instead of 8.5 and 24.5 resp. so answer will be 1853[.1...] or 1853 for **4** marks<br><br>If they use 8 and 24 or lower bounds they can score **2** marks so 1608[. ...] or 1384[. ....] seen are evidence for **2** marks |
| **18** | $y = (x + 3)^2 + 2$ oe | 2 | **B1** for $y = (x + 3)^2 + c$ ($c \neq 2$)<br>**B1** for $y = $ *their* '$(x + 3)^2$' + 2<br>If **0**, then **SC1** $y = x^2 + 11$ | You are most likely to see<br>$y = {}^-3x +2$ scores **1** ie $y =$ anything + 2 for **1** mark |

| Question | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|
| **19** | ($x$ =) 1.88    ($y$ =) 2.77<br>and<br>($x$ =) ⁻0.13   ($y$ =) ⁻1.27 | 6 | **M1** for any correct <u>start</u> to eliminate one variable<br>**M1dep** for the variable to be eliminated correctly allowing for one error at each stage (the equation does NOT have to be simplified)<br>**A1** for $4x^2 - 7x - 1 = 0$ or equivalent three term quadratic equation<br>or $2y^2 - 3y - 7 = 0$ or equivalent three term quadratic equation<br><br>**M1** for an attempt to use the quadratic formula on *their* three term quadratic equation<br>**M1dep** for substitution, using *their* quadratic equation, into the quadratic formula with at most two errors eg<br><br>$(x =) \dfrac{-\,^{-}7 \pm \sqrt{(^{-}7)^2 - 4 \times 4 \times\, ^{-}1}}{2 \times 4}$   or<br><br>$(y =) \dfrac{-\,^{-}3 \pm \sqrt{(^{-}3)^2 - 4 \times 2 \times\, ^{-}7}}{2 \times 2}$<br><br>                             or better<br>**A1** for a <u>pair</u> of values from,<br> ($x$ =) ⁻0.13 and  1.88<br>or for ($y$ =) ⁻1.27 and 2.77<br>or ($x$ =) ⁻0.13 and  ($y$ =) ⁻1.27<br>or ($x$ =) 1.88 and  ($y$ =) 2.77 | Mark the best working do not try to see what is their final working<br><br><br><br>Either of these scores **3** marks allow $4x^2 - 7x = 1$ etc<br><br><br>Allow the formula to be quoted for the mark(dep on there being a quadratic equation)<br><br>If *their* three term quadratic equation can be factorised then **SC2** for factorising their quadratic equation correctly and finding two values of *x* or *y* ( if errors then award **SC1** if factors correct) |

| Question | Answer | Marks | Answer |
|---|---|---|---|
| **20*** | The correct answer is obtained (5) with full supportive working that clearly shows an angle (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) and the area of the field (22 208[.84..] or rounding/truncating to 22 000), correctly worked out. Clear annotation and explanation of reasoning. Correct spelling, punctuation and grammar. | 6 | For all marks condone the supplementary angles, eg allow 146.54, 93.89 or 119.58 rot to at least 2 sf |
| | Full supportive working leading to the number of horses as 5.4[879...] or 5.4 -5.5 or 6, shows an angle (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) and the area of the field (22 208[.84..] or rounding to 22 000) **or** 5 as the answer but with some working missing but sufficient to be able to follow the line of argument and at least one of the angle and area clearly stated | 5–4 | One of the angles of the triangle is correctly obtained (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) **and** the formula for the area ($A =$) ½$ab$sin$C$ clearly stated and with suitable values substituted in **or** one of the angles of the triangle is correctly obtained (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) **and** the formula for the area ($A =$) ½$ab$sin$C$ clearly stated but with no suitable values substituted in and their 'area' divided by 4046.856 but not truncating the answer |
| | One of the angles of the triangle is correctly obtained (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) **and** the formula for the area ($A=$) ½$ab$sin$C$ stated formally **or** stating both the cosine rule and the formula for the area ($A =$) ½$ab$sin$C$ and then substituting in suitable values or dividing their 'area' by 4046.856 **or** stating the formula for the area ($A =$) ½$ab$sin$C$ and then substituting in suitable values and dividing their 'area' by 4046.856 but not truncating their answer | 3–2 | One of the angles of the triangle is correctly obtained (eg 33.46, 86.11 or 60.42 and rot to at least 2 sf) **or** stating both the cosine rule and the formula for the area ($A =$) ½$ab$sin$C$ **or** stating the formula for the area ($A =$) ½$ab$sin$C$ and then substituting in suitable values **or** dividing their 'area' by 4046.856 and truncating the answer correctly |
| | Stating the cosine rule **or** the formula for the area ($A =$) ½$ab$sin$C$ **or** dividing their 'area' by 4046.856 **or** correct answer of 5 and no working or no relevant working | 1–0 | No worthwhile work attempted or 5 from 4046.856 ÷ 737 |

**APPENDIX 1**

Exemplar responses for question 7a

| Response | Mark awarded |
|---|---|
| Might have competed more than 16 times. | 1 |
| It only shows a maximum of 16 | 1 |
| They should start from 0 and go past 16 | 1 |
| There is only enough for 4 people to tick a box, **someone may have been in more than 16 competitions** | 1 - mark best comment |
| She doesn't have a box saying 'more' | 1 |
| It doesn't have a plus sign at the end because someone might have entered more competitions | 1 |
| There isn't a more or less option | 1 |
| A person might not have entered any competitions | 1 |
| There isn't one saying non | 1 |
| There is no 0 option | 1 |
| There isn't competition every single month | 0 |
| The numbers on the box start going up in 4s then change to 3s | 0 |
| Her survey has got a box for entering more than 16 | 0 |
| There is no 'other' box | 0 |
| Ticking one of the boxes if you for example had done 14 competitions, Jenny would know actually how many had been done | 0 |
| It does have a none box | 0 |
| Needs more variety of options | 0 |
| There are not enough ticky boxes | 0 |
| By using the answers 1–4, 5–8 you don't know if it is 1,2,3,4 so the results are not accurate | 0 |
| It is not telling her the exact amount of competitions entered | 0 |
| The groups are too big the options should be in smaller groups | 0 |
| It is hard to judge how many competitions she has entered | 0 |
| Somebody could have done 4 to 5 competitions, but you can only tick one box | 0 |
| Not telling you what different athletes there is | 0 |
| People might not know…12 month range too long, should be 6 months | 0 |
| The question is biased | 0 |
| The ranges are too big | 0 |
| The last box 13–16 (it says 12 months) | 0 |
| It does not state what sport the competition is in | 0 |

Exemplar responses for question 16bii

| Response | Mark awarded |
|---|---|
| Australia are more spread out/greater range/wider spread/greater IQR | **1** |
| GB have higher median | **1** |
| On average GB have won more medals | **1** |
| Australia has a lower average …. | **1** |
| Australia won more medals <u>as there is a larger range</u>       (mark the best comment) | **1** |
| Australia have a higher increase of medals through the years …. | **0** |
| GB mean is higher .. | **0** |
| Australia won more medals ….. | **0** |

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