# Guidelines for marking the MCAT 2020

**As you begin to assess your candidates' answers, you may find it helpful to check the FAQ page link http://bit.ly/MCAT_FAQ20** This will be updated regularly.

The title of the standard requires candidates to use algebraic procedures in solving problems. To fulfill the requirements of explanatory note 2, all questions require the candidates to choose the procedures from explanatory note 4 (EN4) that will lead them towards a solution of the question and apply these correctly. Evidence of algebraic working must be shown.

In order to provide evidence towards any grade, the candidate must demonstrate a level of algebraic thinking consistent with level six of the curriculum and be consistent with the spirit of the New Zealand Curriculum.

If a candidate requires **one** u grade to achieve the standard, the assessor may award **one** grade of **us** anywhere in the paper for where there is evidence of:

- a correct guess and check response or
- a correct answer only or
- a borderline case for an overall award of Achieved where professional judgement has been used.

Likewise, if a candidate is borderline for an overall award of Merit or Excellence, one rs (soft Merit) or one ts (soft Excellence) grade may be used. These grades are only awarded on professional judgement responses where the marker is struggling with the decision.

## Implications

All working must be checked in order to identify evidence of the application of a listed procedure. This may involve a consistent application of an appropriate procedure applied to an incorrect algebraic expression on the condition that the expression does not significantly simplify the application.

## Grading in general

1. In grading a candidate's work, the focus is on evidence required within the achievement standard.
2. Where there is evidence of correct algebraic processing and the answer is incorrect due to a numerical error, the candidate should not be penalised **except** in questions **1a on day 1 and 3a on day 2**. If it cannot be determined if it is a numerical or an algebraic error, the grade should not be awarded. e.g. factorising of a quadratic expression.
3. Units are not required anywhere in the paper.
4. The grade for evidence towards the awarding of **achievement** is coded as **"u" or "us"**.
   For **merit**, the demonstrating of relational thinking is coded as **"r" or "rs"**,
   and for **excellence**, the demonstrating of abstract thinking is coded as **"t" or "ts"**.

## Grading parts of questions

1. Check each part of each question to ensure they have been allocated a grade.
2. When the highest level of performance for a part of a question is demonstrated in the candidate's work, a code is recorded against that evidence. Only the highest grade is recorded for each part of a question.

## Question grade

Each question gains the overall grade indicated below:

| | | | |
|---|---|---|---|
| No **u** or **us** gains **N** | 1**u** gains **1A**<br>2**u** or more gains **2A** | 1**r** gains **1M**<br>2**r** or more gains **2M** | 1**t** gains **1E**<br>2**t** gains **2E** |
| **Note: A us, rs or ts grade may only be used once across the paper.** | | | |

**Minimum requirements of sufficiency across the paper**

**NOTE the requirements for Merit and Excellence have been changed in an attempt to reduce the effect of the Covid pandemic on the candidate's grades.**

**1. For a Not Achieved grade (N)**

2A or lower.

**2. For the award of an Achievement grade (A)**

3A or higher from either:

- 1A or higher in each question
- 1A in one question and 2A in another
- 1A and 1M where the 1M has a u grade awarded in another part of the question that was awarded 1M i.e. 3 parts of questions correct across the paper
- 1A and 1E because the award of a t grade will involve more than one of the procedures.

**3. For the award of a Merit grade (M)**

3M or higher from either:

- 1M in each question
- 1M in one question and 2M in another,

**OR a total of**

- 2E and 1A
- 1E, 1M and a total of 2u or more from any questions
- 2r and 2u across at least two questions.

**4. For the award of an Excellence grade (E)**

At least 2t grades and at least 1r grade across at least two questions.

**Results**

1. When loading school data, ensure you follow the instructions given on the NZQA schools' secure website. (In high security features, Provisional and Final Results Entry, L1 MCAT Instructions – School's PN has access to this).
2. **Please ensure that all registered candidates have a grade recorded on the website before submitting your school's papers for verification; otherwise, this does not allow verification to take place.**
3. Verification reports will not be included in the envelope returned to the school. It can be accessed on the NZQA secure website. You may receive your scripts back to the school before your report is available online. This is because the report is not visible for a week after the final report is loaded to allow for any checking by the National Verifier.

**Verifying**

A reminder that candidates' work submitted for verification **should not be scripts where assessors have allocated final grades by professional judgement or on a holistic basis (i.e. a us, ms or ts grade) or scripts that have been discussed on the help line.** The purpose of verification is to check the school's ability to correctly apply the schedule.

A holistic decision is when a candidate's work provides significant evidence towards the award of a higher grade across the paper and the assessor believes it would be appropriate to award such a grade. The assessor should review the entire script and determine if it is a minor error or omission that is preventing the award of the higher grade. The question then needs to be asked: "Is this minor error preventing demonstration of the requirements of the standard?" The final grade should then be determined on the basis of the response to this question.

For assistance with marking please use:
Email: mcat.help@xtra.co.nz
FAQ page link (this will be updated regularly): http://bit.ly/MCAT_FAQ20
You may wish to include a contact phone number as in some cases it can be easier to discuss the response.
The final date for entering provisional results and sending verification submission to NZQA is **24th October.**
The completed verification report will be posted on the NZQA schools' secure site.

# Assessment Schedule – 2020

## Mathematics and Statistics: Apply algebraic procedures in solving problems (91027A) Day 1

Candidates must show algebraic working.
Solutions in a multi-part question may be found in **any** part and awarded credit.
Equivalent solutions are accepted on condition that the candidate is demonstrating algebraic solutions at curriculum level 6 which may include algebraic thinking at curriculum level 6.
Once a student has made an error, for any consistent working to provide evidence towards a grade, the procedure must be performed at curriculum level 6.

### Evidence

| Q<br>ONE | Evidence | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $= 3 \times 2^2 + 8 + 2 \times (-3)^2 + 2^2 - 2$<br>$= 12 + 8 + 18 + 4 - 2$<br>$= 40$ | For award of u:<br>• correct solution (No alternative – numerical errors not allowed). |
| (b) | $6 - 3x - 6x - 2 \geq 14 - 14x$<br>$4 - 9x \geq 14 - 14x$<br>$-9x + 14x \geq 14 - 4$<br>$5x \geq 10$<br>$x \geq \frac{10}{5}$ or $x \geq 2$ or $2 \leq x$<br>or equivalent<br>(Accept $x > 2$) | For award of u:<br>ONE of:<br>• expansion of all brackets<br>• consistently solved from inequality containing one incorrect expansion.<br>For award of r:<br>• inequality solved. |
| (c) | $\frac{3(x-4)+5(x+2)}{(x+2)(x-4)} = 2$<br>$\frac{3x-12+5x+10}{x^2-2x-8} = 2$<br>$8x - 2 = 2(x^2 - 2x - 8)$<br>$8x - 2 = 2x^2 - 4x - 16$<br>$0 = 2x^2 - 12x - 14$<br>$0 = x^2 - 6x - 7$<br>$0 = (x - 7)(x + 1)$<br>$x = 7$ or $x = -1$<br>Both solutions required. | For award of u:<br>• correct arrangement for numerator and denominator (does not need to be simplified).<br>For award of r:<br>ONE of:<br>• simplification of equation to a single quadratic<br>• consistent solutions from their quadratic equation.<br>For award of t:<br>• equation solved for both values. |

<table>
<tr>
<td>(d)</td>
<td>Area = $x^2 + xy + xz$<br>$= x(x + y + z)$<br>$= 6 \times 12$<br>$= 72$ cm²<br>or<br>Area = $36 + 6y + 6z$<br>$= 36 + 6(6 - z) + 6z$<br>$= 36 + 36 - 6z + 6z$<br>$= 72$ cm²<br>Units not required.</td>
<td>For award of u:<br>ONE of:<br>• forming an expression for the total area<br>• consistent factorisation of the total area expression<br>• uses algebraic procedures to state $y$ in terms of $z$ or $z$ in terms of $y$.<br><br>For award of r:<br>• correct solution, showing algebraic procedures.</td>
</tr>
<tr>
<td>(e)</td>
<td>$(2^3)^x \times (2^2)^{x^2-6} = 2^2$<br>$2^{3x} \times 2^{2x^2-12} = 2^2$<br><br>$3x + 2x^2 - 12 = 2$<br>$2x^2 + 3x - 14 = 0$<br>$(2x + 7)(x - 2) = 0$<br>Either $x = \frac{-7}{2}$ or $x = 2$<br>Both solutions required.</td>
<td>For award of u:<br>ONE of:<br>• writes at least two original numbers as correct powers of 2<br>• writes all three original numbers in base 2, even if the powers are incorrect<br>• consistently simplifies indices on the LHS<br>• consistently generates the quadratic equation from their powers.<br><br>For award of r:<br>ONE of:<br>• forms a simplified quadratic equation<br>• consistently solves their quadratic equation.<br><br>For award of t:<br>• equation solved for both values.</td>
</tr>
</table>

| Q<br>TWO | Expected Coverage | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $160 = 3F + 100$<br>$60 = 3F$<br>$F = 20$ cm<br>Units not required. | For award of u:<br>• correct solution with evidence of algebra. |
| (b) | Area $= (4x + 2)(6x + 3)$<br>$= 24x^2 + 24x + 6$<br>or<br>$= 6(4x^2 + 4x + 1)$<br><br>*See FAQ for examples of incorrect areas which may be awarded u.* | For award of u:<br>ONE of:<br>• forming a correct expression for the area of the picture<br>• expansion and simplification for the area of the frame or the total area.<br><br>For award of r:<br>• expanding and simplifying the expression for the area of the picture. |
| (c) | $9x^2 - 15x - 15x + 25 \le 3x^2 + 1$<br>$9x^2 - 30x + 25 - 3x^2 - 1 \le 0$<br>$6x^2 - 30x + 24 \le 0$<br>$x^2 - 5x + 4 \le 0$<br>$(x - 1)(x - 4) \le 0$<br>$1 \le x \le 4$<br>or<br>$x \ge 1$ and $x \le 4$ or equivalent<br>(Accept $1 < x < 4$) | For award of u:<br>ONE of:<br>• correct expansion and simplification of LHS<br>• consistent simplification to a quadratic equation or inequation.<br><br>For award of r:<br>ONE of:<br>• correct solving of quadratic equation<br>• consistent solving of their quadratic equation or inequation.<br><br>For award of t:<br>• correct inequality found. |
| (d)(i) | $P = 2x - 5 + x + 3 + 2x - 8 + 3 + 2 + x + 1$<br>$= 6x - 4$<br><br>or<br><br>$P = 2(2x - 5) + 2(x + 3)$<br>$= 6x - 4$ | For award of u:<br>ONE of:<br>• establishing the expression for the perimeter<br>• consistent simplification of their perimeter expression.<br><br>For award of r:<br>• correct simplified expression for the perimeter. |
| (d)(ii) | $(2x - 5)(x + 3) - 6 = 24$<br>$2x^2 + 6x - 5x - 15 - 6 - 24 = 0$<br>$2x^2 + x - 45 = 0$<br>$(2x - 9)(x + 5) = 0$<br>Either $2x - 9 = 0$ or $x + 5 = 0$<br>$x = \frac{9}{2}$ or $x = -5$<br><br>so $x = \frac{9}{2}$ or 4.5 cm<br><br>Units not required. | For award of u:<br>ONE of:<br>• forms the expression for the area<br>• consistent simplifying of equation to a quadratic<br>• consistent factorising of their quadratic equation.<br><br>For award of r:<br>ONE of:<br>• simplification of the equation to a quadratic<br>• consistent solving of their quadratic equation.<br><br>For award of t:<br>• correct positive solution found for question. |

| Q THREE | Expected Coverage | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $9x - 40 + 11x + 40 + 6(x + 5) + 10(x - 3) = 360$<br>$9x - 40 + 11x + 40 + 6x + 30 + 10x - 30 = 360$<br>$36x = 360$<br>$x = \frac{360}{36}$<br>$x = 10$ | For award of u:<br>• form and solve linear equation. |
| (b) | Substituting values from point Q giving<br>$13 = a(-1)^2 + b(-1) + 2$<br>$13 = a - b + 2$<br>$a - b = 11$<br>Substituting values from point R giving<br>$18 = a(4)^2 + b(4) + 2$<br>$18 = 16a + 4b + 2$<br>$16a + 4b = 16$<br>$4a + b = 4$<br><br>Use of simultaneous equations:<br>Adding equations gives<br>$5a = 15$<br>$a = 3$<br>So $b = -8$ | For award of u:<br>ONE of:<br>• forms both equations<br>• consistent combining of their equations in one variable<br>• consistent solution for one variable.<br><br>For award of r:<br>ONE of:<br>• correctly combining of their equations in one variable<br>• consistently finds the values of both $a$ and $b$.<br><br>For award of t:<br>• correct solutions for both $a$ and $b$. |
| (c) | Let $y$ be the number of years required.<br>$(5 + y)(9 + y) = 77$<br>$45 + 5y + 9y + y^2 = 77$<br>$y^2 + 14y - 32 = 0$<br>$(y + 16)(y - 2) = 0$<br>Either $y + 16 = 0$ or $y - 2 = 0$<br>$y = -16$ or $y = 2$<br>so it will take 2 years<br><br>or<br>Let Teri's age be $x$, then Mari's will be $x + 4$.<br>$x(x + 4) = 77$<br>$x^2 + 4x = 77$<br>$x^2 + 4x - 77 = 0$<br>$(x + 11)(x - 7) = 0$<br>Either $x = -11$ or $x = 7$<br>So if $x$ = Teri = 7, then it must be in 2 years' time. | For award of u:<br>ONE of:<br>• forms valid equation in one variable<br>• consistent factorisation of quadratic<br>• consistent solving of quadratic equation.<br><br>For award of r:<br>• correct positive solution found for question. Units not required. |

| | | |
|---|---|---|
| (d) | $\frac{(2x+5)(2x-5)}{(2x-5)(x+2)}$<br>$=\frac{2x+5}{x+2}$<br>($x \neq -2$ not required) | For award of u:<br>ONE of:<br>• factorising of numerator or denominator<br>• consistently simplified from their factorisation.<br>For award of r:<br>• simplification of expression. |
| (e) | $(y+3)^2=\frac{c(x^2-7)}{p}$<br>$p(y+3)^2 = c(x^2-7)$<br>$\frac{p(y+3)^2}{c}=x^2-7$<br>$\frac{p(y+3)^2}{c}+7=x^2$<br>$x=\pm\sqrt{\frac{p(y+3)^2+7c}{c}}$<br>or<br>$x=\pm\sqrt{\frac{p(y+3)^2}{c}+7}$<br>( $\pm$ not required) | For award of u:<br>ONE of:<br>• consistently rearranging square root<br>• consistently rearranging the squared<br>• consistently rearranging the $p$ and $c$<br>• consistently rearranging the –7.<br>For award of r:<br>TWO of:<br>• consistently rearranging square root<br>• consistently rearranging the squared<br>• consistently rearranging the $p$ and $c$<br>• consistently rearranging the –7.<br>For award of t:<br>• correct rearrangement. |

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## Implications

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## Grading in general

1. In grading a candidate's work, the focus is on evidence required within the achievement standard.
2. Where there is evidence of correct algebraic processing and the answer is incorrect due to a numerical error, the candidate should not be penalised **except** in questions **1a on day 1 and 3a on day 2**. If it cannot be determined if it is a numerical or an algebraic error, the grade should not be awarded. e.g. factorising of a quadratic expression.
3. Units are not required anywhere in the paper.
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## Grading parts of questions

1. Check each part of each question to ensure they have been allocated a grade.
2. When the highest level of performance for a part of a question is demonstrated in the candidate's work, a code is recorded against that evidence. Only the highest grade is recorded for each part of a question.

## Question grade

Each question gains the overall grade indicated below:

| | | | |
|---|---|---|---|
| No **u** or **us** gains **N** | 1**u** gains **1A**<br>2**u** or more gains **2A** | 1**r** gains **1M**<br>2**r** or more gains **2M** | 1**t** gains **1E**<br>2**t** gains **2E** |
| **Note: A us, rs or ts grade may only be used once across the paper.** | | | |

**Minimum requirements of sufficiency across the paper**

**NOTE the requirements for Merit and Excellence have been changed in an attempt to reduce the effect of the Covid pandemic on the candidate's grades.**

**1. For a Not Achieved grade (N)**

2A or lower.

**2. For the award of an Achievement grade (A)**

3A or higher from either:

- 1A or higher in each question
- 1A in one question and 2A in another
- 1A and 1M where the 1M has a u grade awarded in another part of the question that was awarded 1M i.e. 3 parts of questions correct across the paper
- 1A and 1E because the award of a t grade will involve more than one of the procedures.

**3. For the award of a Merit grade (M)**

3M or higher from either:

- 1M in each question
- 1M in one question and 2M in another,

**OR a total of**

- 2E and 1A
- 1E, 1M and a total of 2u or more from any questions
- 2r and 2u across at least two questions.

**4. For the award of an Excellence grade (E)**

At least 2t grades and at least 1r grade across at least two questions.

**Results**

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2. **Please ensure that all registered candidates have a grade recorded on the website before submitting your school's papers for verification; otherwise, this does not allow verification to take place.**
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**Verifying**

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# Assessment Schedule – 2020
# Mathematics and Statistics: Apply algebraic procedures in solving problems (91027B)
# Day 2

Candidates must show algebraic working.
Solutions in a multi-part question may be found in **any** part and awarded credit.
Equivalent solutions are accepted on condition that the candidate is demonstrating algebraic solutions at curriculum level 6 which may include algebraic thinking at curriculum level 6.
Once a student has made an error, for any consistent working to provide evidence towards a grade, the procedure must be performed at curriculum level 6.

## Evidence

| Q<br>ONE | Evidence | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $78 = 5W - 22$<br>$100 = 5W$<br>$W = 20$ kg<br>Units not required. | For award of u:<br>• correct solution with evidence of algebra. |
| (b) | Area $= (7x + 2)(3x + 3)$<br>$= 21x^2 + 27x + 6$<br>or<br>$= 3(7x^2 + 9x + 2)$<br><br>*See FAQ for examples of incorrect areas which may be awarded u.* | For award of u:<br>ONE of:<br>• forming a correct expression for the area of the picture<br>• expansion and simplification for the area of the frame or the total area. |
| | | For award of r:<br>• expanding and simplifying the expression for the area of the picture. |
| (c) | $4y^2 - 6y - 6y + 9 \le 2y^2 - 7$<br>$4y^2 - 12y + 9 - 2y^2 + 7 \le 0$<br>$2y^2 - 12y + 16 \le 0$<br>$y^2 - 6y + 8 \le 0$<br>$(y - 2)(y - 4) \le 0$<br>$2 \le y \le 4$<br>or<br>$y \ge 2$ and $y \le 4$ or equivalent<br>(accept $2 < y < 4$) | For award of u:<br>ONE of:<br>• correct expansion and simplification of LHS<br>• consistent simplification to a quadratic equation or inequation. |
| | | For award of r:<br>ONE of:<br>• correct solving of quadratic equation<br>• consistent solving of their quadratic equation or inequation. |
| | | For award of t:<br>• correct inequality found. |

| | | |
|---|---|---|
| (d)(i) | $2y + 3 + y + 5 + 2y - 1 + 4 + 1 + y + 4$<br>$= 6y + 16$<br>or<br>$2(2y + 3) + 2(y + 5)$<br>$= 6y + 16$ | For award of u:<br>ONE of:<br>• establishing the expression for the perimeter<br>• consistent simplification of their perimeter expression.<br>For award of r:<br>• correct simplified expression for the perimeter. |
| (d)(ii) | $(2y + 3)(y + 5) - 4 = 81$<br>$2y^2 + 10y + 3y + 15 - 4 - 81 = 0$<br>$2y^2 + 13y - 70 = 0$<br>$(2y - 7)(y + 10) = 0$<br>Either $2y - 7 = 0$ or $y + 10 = 0$<br>$x = \frac{7}{2} = 3.5$ or $y = -10$<br>so $x = \frac{7}{2}$ or 3.5 cm<br>Units not required. | For award of u:<br>ONE of:<br>• forms the expression for the area<br>• consistent simplifying of equation to a quadratic<br>• consistent factorising of their quadratic equation.<br>For award of r:<br>ONE of:<br>• simplification of the equation to a quadratic<br>• consistent solving of their quadratic equation.<br>For award of t:<br>• correct positive solution found for question. |

| Q<br>TWO | Expected Coverage | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $10(w + 3) + 12w + 20 + 10w – 30 + 4(w – 5) = 360$<br>$10w + 30 + 12w + 20 + 10w – 30 + 4w – 20 = 360$<br>$36w = 360$<br>$w = \frac{360}{36}$<br>$w = 10$ | For award of u:<br>• form and solve linear equation. |
| (b) | Substituting values from point V giving<br>$10 = a(–1)^2 + b(–1) + 3$<br>$10 = a – b + 3$<br>$a – b = 7$<br>Substituting values from point W giving<br>$13 = a\,(2)^2 + b(2) + 3$<br>$13 = 4a + 2b + 3$<br>$4a + 2b = 10$<br>$2a + b = 5$<br>Use of simultaneous equations:<br>Adding equations gives<br>$3a = 12$<br>$a = 4$<br>So $b = – 3$ | For award of u:<br>ONE of:<br>• forms both equations<br>• consistent combining of their equations in one variable<br>• consistent solution for one variable.<br><br>For award of r:<br>ONE of:<br>• correctly combining of their equations in one variable<br>• consistently finds the values of both $a$ and $b$.<br><br>For award of t:<br>• correct solutions for both $a$ and $b$. |
| (c) | Let $d$ be the number of days required.<br>$(4 + d)(9 + d) = 66$<br>$36 + 4d + 9d + d^2 = 66$<br>$d^2 + 13d – 30 = 0$<br>$(d + 15)(d – 2) = 0$<br>Either $d + 15 = 0$ or $d – 2 = 0$<br>$d = – 15$ or $d = 2$<br>so it will take 2 days<br>or<br>Let pizza's age be $x$, then chicken's will be $x + 5$.<br>$x(x + 5) = 66$<br>$x^2 + 5x = 66$<br>$x^2 + 5x – 66 = 0$<br>$(x – 6)(x + 11) = 0$<br>Either $x = 6$ or $x = –11$<br>So if $x$ = pizza = 6, then it must be in 2 days' time. | For award of u:<br>ONE of:<br>• forms valid equation in one variable<br>• consistent factorisation of quadratic<br>• consistent solving of quadratic equation.<br><br>For award of r:<br>• correct positive solution found for question. Units not required. |

| | | |
|---|---|---|
| (d) | $\frac{(3y-2)(2y+1)}{(3y+2)(3y-2)}$<br>$=\frac{2y+1}{3y+2}$<br>( $y \neq \frac{-2}{3}$ not required) | For award of u:<br>ONE of:<br>• factorising of numerator or denominator<br>• consistently simplified from their factorisation.<br>For award of r:<br>• simplification of expression. |
| (e) | $(w+2)^2 = \frac{h(y^2+5)}{g}$<br>$g(w+2)^2 = h(y^2+5)$<br>$\frac{g(w+2)^2}{h} = y^2+5$<br>$\frac{g(w+2)^2}{h} - 5 = y^2$<br>$y = \pm\sqrt{\frac{g(w+2)^2 - 5h}{h}}$<br>or<br>$y = \pm\sqrt{\frac{g(w+2)^2}{h} - 5}$<br>($\pm$ not required) | For award of u:<br>ONE of:<br>• consistently rearranging square root<br>• consistently rearranging the squared<br>• consistently rearranging the $g$ and $h$<br>• consistently rearranging the –5.<br>For award of r:<br>TWO of:<br>• consistently rearranging square root<br>• consistently rearranging the squared<br>• consistently rearranging the $g$ and $h$<br>• consistently rearranging the –5.<br>For award of t:<br>• correct rearrangement. |

| Q THREE | Expected Coverage | Grade (generated by correctly demonstrating the procedures listed in EN4)<br>Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent |
|---|---|---|
| (a) | $= 3 \times 2^2 - 6 + 4 \times (-3)^2 + 2^2 + 3$<br>$= 12 - 6 + 36 + 4 + 3$<br>$= 49$ | For award of u:<br>• correct solution. (No alternative – numerical errors not allowed). |
| (b) | $8y - 16 - 9 - 3y \geq 5 - 5y$<br>$5y - 25 \geq 5 - 5y$<br>$5y + 5y \geq 5 + 25$<br>$10y \geq 30$<br>$y \geq \frac{30}{10}$ or $y \geq 3$ or $3 \leq y$<br>or equivalent<br>(Accept $x > 3$) | For award of u:<br>ONE of:<br>• expansion of all brackets<br>• consistently solved from inequality containing one incorrect expansion.<br>For award of r:<br>• inequality solved. |
| (c) | $\frac{5(y+4)+3(y-2)}{(y-2)(y+4)} = 2$<br>$\frac{5y+20+3y-6}{y^2+2y-8} = 2$<br>$8y + 14 = 2(y^2 + 2y - 8)$<br>$8y + 14 = 2y^2 + 4y - 16$<br>$0 = 2y^2 - 4y - 30$<br>$0 = y^2 - 2y - 15$<br>$0 = (y - 5)(y + 3)$<br>$y = 5$ or $y = -3$<br>Both solutions required. | For award of u:<br>• correct arrangement for numerator and denominator (does not need to be simplified).<br>For award of r:<br>ONE of:<br>• simplification of equation to a single quadratic<br>• consistent solutions from their quadratic equation.<br>For award of t:<br>• equation solved for both values. |
| (d) | Area $= x^2 + xy + xz$<br>$= x(x + y + z)$<br>$= 8 \times 10$<br>$= 80$ cm²<br>or<br>Area $= 64 + 8y + 8z$<br>$= 64 + 8(2 - z) + 8z$<br>$= 64 + 16 - 8z + 8z$<br>$= 80$ cm²<br>Units not required. | For award of u:<br>ONE of:<br>• forming an expression for the total area<br>• consistent factorisation of the total area expression<br>• uses algebraic procedures to state $y$ in terms of $z$ or $z$ in terms of $y$.<br>For award of r:<br>• correct solution, showing algebraic procedures. |

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| (e) | $(2^3)^y \times (2^2)^{y^2-8} = 2^4$<br>$2^{3y} \times 2^{2y^2-16} = 2^4$<br>$3y + 2y^2 - 16 = 4$<br>$2y^2 + 3y - 20 = 0$<br>$(2y - 5)(y + 4) = 0$<br>Either $y = \frac{5}{2}$ or $y = -4$<br><br>Both solutions required. | For award of u:<br>ONE of:<br>• writes at least two original numbers as correct powers of 2<br>• writes all three original numbers in base 2, even if the powers are incorrect<br>• consistently simplifies indices on the LHS<br>• consistently generates the quadratic equation from their powers.<br><br>For award of r:<br>ONE of:<br>• forms a simplified quadratic equation<br>• consistently solves their quadratic equation.<br><br>For award of t:<br>• equation solved for both values. |