Guidelines for marking the MCAT 2019

The title of the standard requires the candidate 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:

- 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, which 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 2a 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. When dealing with a negative sign outside a bracket in expanding this should only be penalised once in a question. This is an algebraic error not a numerical error.
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**".
5. For day 2, consistent factorising and solving is not accepted in question 3d when the question has failed to deal with the ½ in the triangle formula by either removing the common factor or multiplying the area of the rectangle by two.

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** 2**u** or more gains **2A**	1**r** gains **1M** 2**r** or more gains **2M**	1**t** gains **1E** 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

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 i.e. 3 parts of questions correct across the paper.
- 1A and 1E

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.

4. For the award of an Excellence grade (E)
At least 2 t grades and at least 2 r grades across at least 2 questions.

Results
1. When loading school data, ensure you follow the instructions given on the NZQA schools' secure web site. (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 web site. 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_FAQ19
You may wish to add 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 – 2019

L1 Mathematics and Statistics CAT: Apply algebraic procedures in solving problems (91027–A) Day 1

Candidates must show algebraic working.

Be aware that solutions in a multi-part question may be found in any part and awarded credit.

Equivalent answers are accepted.

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 Day 1	Expected coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
ONE (a)	$= 2 \times 16 + 6 + 5$ $= 32 + 6 + 5$ $= 43$	For award of u: • correct solution (no alternative – numerical errors not allowed).
(b)	Sets up factors: $(10x \quad 1)(x \quad 9) \quad (10x \quad 3)(x \quad 3)$ $(10x \quad 9)(x \quad 1)$ $(5x \quad 1)(2x \quad 9) \quad (5x \quad 3)(2x \quad 3)$ $(5x \quad 9)(2x \quad 1)$ and / or $(10x + 3)(x - 3) = 0$ Either $10x + 3 = 0$ or $x - 3 = 0$ $10x = -3$ or $x = 3$ $x = -\frac{3}{10}$ or $x = 3$	For award of u: ONE of: • sets up any **one pair** of the factorised brackets shown (regardless of signs) • writes $10x^2 - 30x + 3x - 9$ or $10x^2 + 3x - 30x - 9$ • **both** solutions consistent with their factorising. For award of r: • correct factorising gains an r grade regardless of the solutions stated afterwards.
(c)	$6^2 \times 6^{2x+6} = 6^{x^2}$ $6^{2x+8} = 6^{x^2}$ $2x + 8 = x^2$ $x^2 - 2x - 8 = 0$ $(x-4)(x+2) = 0$ Either $x - 4 = 0$ or $x + 2 = 0$ $x = 4$ or $x = -2$	For award of u: ONE of: • writes 36 as 6^2 • simplifies indices on the LHS • consistently generates the quadratic equation from their powers • consistently calculates correct values of x from their quadratic equation. For award of r: • consistently solves their quadratic equation. For award of t: • correct solutions.

<table>
<tr>
<td>(d)(i)</td>
<td>$2(8x + 3) + 2(6x + 2) = 290$
$16x + 6 + 12x + 4 = 290$
$28x + 10 = 290$
$28x = 290 - 10$
$28x = 280$
$x = \frac{280}{28}$
$x = 10$
or
$3x - 2 + 2x + 1 + 8x + 3 - 3x + 2 + 6x + 2 - x + 2x - 5$
$+ x + 8x + 3 - 2x + 5 + 6x + 2 - 2x - 1 = 290$
$28x = 290 - 10$
$28x = 280$
$x = \frac{280}{28}$
$x = 10$</td>
<td>For award of u:
ONE of:
• establishing the expression for the perimeter (ignore the omission of the = 290)
• consistent solving of their perimeter equation.

For award of r:
• correct solution showing algebraic procedures.</td>
</tr>
<tr>
<td>(d)(ii)</td>
<td>$(8x + 3)(6x + 2) - (2x + 1)(3x - 2) - x(2x - 5)$
$= 48x^2 + 16x + 18x + 6 - (6x^2 - 4x + 3x - 2) - 2x^2 + 5x$
$= 48x^2 + 34x + 6 - 6x^2 + x + 2 - 2x^2 + 5x$
$= 40x^2 + 40x + 8$
$= 40L - 32$</td>
<td>If the candidate has found the area in (d)(i), this can be used as evidence for (d)(ii)
For award of u:
ONE of:
• establishing the expression for the area
• expansion of two of the pairs of brackets in their area expression
• using $x = 10$ to state the area as 4408 (or consistent with solution from (d)(i)).

For award of r:
ONE of:
• simplified quadratic
• consistent simplification of expression for the area of the lawn to a quadratic expression which may result from missing the effect of a negative sign in brackets in one expansion
• consistently rewriting the quadratic in terms of L and x.

For award of t:
• expression for area in terms of L.</td>
</tr>
</table>

Q Day 1	Expected coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
TWO (a)(i)	$w - r = pq^2$ $\frac{w-r}{q^2} = p$	For award of u: • expression for p.
(ii)	$fk^2 - 16gk^2 = 4d^2 + 9c^2$ $k^2(f-16g) = 4d^2 + 9c^2$ $k^2 = \frac{4d^2+9c^2}{f-16g}$ $k = \sqrt{\frac{4d^2+9c^2}{f-16g}}$ or equivalent.	For award of u: • one valid step leading to both terms involving k^2 being on one side of the equals sign.
		For award of r: • one valid step leading to both terms involving k^2 being on one side of the equals sign and ONE of: • factorising of k^2 terms • consistent expression for k.
		For award of t: • expression for k (± not required in front of radical sign).
(b)	$= \frac{3x(x+3)}{(x+3)(x-3)}$ $= \frac{3x}{x-3}$	For award of u: ONE of: • factorising of numerator or denominator • consistently simplified from their factorisation
		For the award of r: • simplification of expression ($x \neq 3$ not required).
(c)	$= \frac{3(8x-1)+4(3x-5)}{12}$ $= \frac{24x-3+12x-20}{12}$ $= \frac{36x-23}{12}$ or equivalent.	For award of u: ONE of: • correct arrangement for numerator (does not need to be simplified) • consistent simplification of numerator.
		For award of r: • correct expression with denominator.

<table>
<tr>
<td>(d)</td>
<td>
Area of rectangle = $2y(3y - 1)$

Area of triangle $= \frac{1}{2}(2y - 2)(5y + 9)$

$= (y - 1)(5y + 9)$

$2y(3y - 1) = \frac{1}{2}(2y - 2)(5y + 9)$

$6y^2 - 2y = (y - 1)(5y + 9)$
$6y^2 - 2y = 5y^2 + 4y - 9$

$6y^2 - 2y - 5y^2 - 4y + 9 = 0$
$y^2 - 6y + 9 = 0$

$(y - 3)(y - 3) = 0$

$y = 3$
</td>
<td>
For award of u:
ONE of:
• forms equation for both areas
• area of triangle in expanded and simplified form
or
expands both triangle and rectangle quadratic expressions (½ may still be stated with triangle expression) without forming equation
• consistently simplifies their equation to a quadratic equation
• consistent factorisation of their quadratic equation into two brackets
• consistent solving of their factorised quadratic equation.

For award of r:
• consistent solution(s) from their quadratic equation.

For award of t:
• correct value of y found.
</td>
</tr>
</table>

Q Day 1	Expected coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
THREE (a)	$\frac{20}{N}+7=2$ $\frac{20}{N}=-5$ $N=-4$	For award of u: • Form and solve linear equation.
(b)	$30-12x-20+12x>5x+20$ $10>5x+20$ $10-20>5x$ $-10>5x$ $-2>x$ Accept $x<-2$	For award of u: ONE of: • expansion of all brackets • consistently solved from inequality containing one incorrect expansion • solution given as an equality. For award of r: • inequality solved (accept $x<-2$ or $-2>x$).
(c)	$(x+12)(x+2)=(x+4)(x+4)$ $x^2+2x+12x+24=x^2+4x+4x+16$ $14x+24=8x+16$ $14x-8x=16-24$ $6x=-8$ $x=\frac{-8}{6}$ or $x=\frac{-4}{3}$	For award of u: ONE of: • expansion and arrangement of both sides (ignore any denominator) • consistent solution • consistent simplification of both sides. For award of r: • correct solution (or equivalent).
(d)	$7+x-6x^2=8x+4$ $6x^2+7x-3=0$ $(3x-1)(2x+3)=0$ Either $3x-1=0$ or $2x+3=0$ $3x=1$ or $2x=-3$ $x=\frac{1}{3}$ or $x=-\frac{3}{2}$ or equivalent.	For award of u: ONE of: • equation formed by equating the equations of the two graphs and simplifying to a quadratic equation • consistent factorisation of their quadratic equation. For award of r: ONE of: • consistent solutions to their simplified quadratic equation • factorisation of the correct quadratic. For award of t: • correct solutions.

<table>
<tr>
<td>(e)</td>
<td>Finding the gradient between the two stated points:

$\text{Gradient} = \frac{-21}{-14}$ or $\frac{21}{14} = \frac{-3}{-2}$ or $\frac{3}{2}$

$y = \frac{-3}{-2}x + c$ or $y = \frac{3}{2}x + c$

Tests using one of the coordinates given:

e.g. $2(11) = 3(9) + 5$ ✗

$-2(11) = -3(9) + 5$ ✓

$p = -3$
$q = -2$

or

Simultaneous Equations:

$-10q = -5p + 5$
$11q = 9p + 5$

$55p - 110q = 55$
$-90p + 110q = 50$

$p = -3$
$q = -2$</td>
<td>For award of u:
ONE of:
• finding gradient

or

• forms both equations
• consistent combining of their equations in one variable
• consistent solution for one variable.

For award of r:
• tests values in equation at least once
or
• correctly finds the value of p or q.

For award of t:
• correct solutions for both p and q.</td>
</tr>
</table>

Guidelines for marking the MCAT 2019

The title of the standard requires the candidate 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.

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- 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, which 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 2a 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. When dealing with a negative sign outside a bracket in expanding this should only be penalised once in a question. This is an algebraic error not a numerical error.
3. Units are not required anywhere in the paper.
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5. For day 2, consistent factorising and solving is not accepted in question 3d when the question has failed to deal with the ½ in the triangle formula by either removing the common factor or multiplying the area of the rectangle by two.

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** 2**u** or more gains **2A**	1**r** gains **1M** 2**r** or more gains **2M**	1**t** gains **1E** 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

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 i.e. 3 parts of questions correct across the paper.
- 1A and 1E

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.

4. For the award of an Excellence grade (E)
At least 2 t grades and at least 2 r grades across at least 2 questions.

Results
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The completed verification report will be posted on the NZQA schools' secure site.

Assessment Schedule – 2019

Mathematics and Statistics CAT: Apply algebraic procedures in solving problems (91027–B) Day 2

Candidates must show algebraic working.

Be aware that solutions in a multi-part question may be found in any part and awarded credit.

Equivalent answers are accepted.

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 Day 2	Expected Coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
ONE (a)	$\frac{60}{m} + 12 = 14$ $\frac{60}{m} = 2$ $m = 30$	For award of u: • form and solve linear equation.
(b)	$12 - 24y + 24y - 8 < 4y + 16$ $4 < 4y + 16$ $4 - 16 < 4y$ $-12 < 4y$ $-3 < y$ Accept $y > -3$	For award of u: ONE of: • expansion of all brackets • consistently solved from inequality containing one incorrect expansion • solution given as an equality.
		For award of r: • inequality solved (accept $y > -3$ or $-3 < y$).
(c)	$(y + 8)(y + 3) = (y + 6)(y + 2)$ $y^2 + 3y + 8y + 24 = y^2 + 2y + 6y + 12$ $11y + 24 = 8y + 12$ $11y - 8y = 12 - 24$ $3y = -12$ $y = -4$	For award of u: ONE of: • expansion and arrangement of both sides (ignore any denominator) • consistent solution • consistent simplification of both sides.
		For award of r: • correct solution (or equivalent).

<table>
<tr>
<td>(d)</td>
<td>$7x - 15 = 10 + 12x - 6x^2$
$6x^2 - 5x - 25 = 0$
$(2x - 5)(3x + 5) = 0$
Either $2x - 5 = 0$ or $3x + 5 = 0$
$2x = 5$ or $3x = -5$
$x = \frac{5}{2}$ or $x = -\frac{5}{3}$
or equivalent.</td>
<td>For award of u:
ONE of:
• equation formed by equating the two graphs and simplifying to a quadratic equation
• consistent factorisation of their quadratic equation.

For award of r:
ONE of:
• consistent solutions to the simplified quadratic equation
• factorisation of correct quadratic.

For award of t:
• correct solutions.</td>
</tr>
<tr>
<td>(e)</td>
<td>Finding the gradient between the two stated points:
Gradient $= \frac{5}{-4}$ or $\frac{-5}{4}$
$y = \frac{-5}{4}x + c$ or $y = \frac{5}{-4}x + c$
Tests using one of the coordinates given:
e.g. $-4(-3) = 5(3) + 3$ ✗
$4(-3) = -5(3) + 3$ ✓
$g = -5$
$h = 4$

or

Simultaneous Equations:
$-3h = 3g + 3$
$-8h = 7g + 3$

$-21h - 21g = 21$
$-24h - 21g = 9$

$g = -5$
$h = 4$</td>
<td>For award of u:
ONE of:
• finding gradient

or

• forms both equations
• consistent combining of their equations in one variable
• consistent solution for one variable.

For award of r:
• tests values in equation at least once
or
• correctly finds the value of g or h.

For award of t:
• correct solutions for both g and h.</td>
</tr>
</table>

Q Day 2	Expected Coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
TWO (a)	$= 3 \times 16 + 10 + 2$ $= 48 + 10 + 2$ $= 60$	For award of u: • correct solution (no alternative – numerical errors not allowed).
(b)	Sets up factors: $(15y \quad 1)(y \quad 4) \quad (15y \quad 2)(y \quad 2)$ $(15y \quad 4)(y \quad 1)$ $(5y \quad 1)(3y \quad 4) \quad (5y \quad 2)(3y \quad 2)$ $(5y \quad 4)(3y \quad 1)$ and / or $(3y-2)(5y+2)=0$ Either $3y-2=0$ or $5y+2=0$ $3y=2$ or $5y=-2$ $y=\frac{2}{3}$ or $y=-\frac{2}{5}$	For award of u: ONE of: • sets up any **one pair** of the factorised brackets shown (regardless of signs) • writes $15y^2 + 6y – 10y – 4$ or $15y^2 – 10y + 6y – 4$ • **both** solutions consistent with their factorising. For award of r: • correct factorising gains an r grade regardless of the solutions stated afterwards.
(c)	$5^2 \times 5^{2y+13} = 5^{y^2}$ $5^{2y+15} = 5^{y^2}$ $2y+15 = y^2$ $y^2 - 2y - 15 = 0$ $(y-5)(y+3)=0$ Either $y – 5 = 0$ or $y + 3 = 0$ $y = 5$ or $y = –3$	For award of u: ONE of: • writes 25 as 5^2 • simplifies indices on the LHS • consistently generates the quadratic equation from their powers • consistently calculates correct values of x from their quadratic equation. For award of r: • consistently solves their quadratic equation. For award of t: • correct solutions.

<table>
<tr>
<td>(d)(i)</td>
<td>$2(10y + 5) + 2(5y + 1) = 192$
$20y + 10 + 10y + 2 = 192$
$30y + 12 = 192$
$30y = 192 - 12$
$30y = 180$
$y = \frac{180}{30}$
$y = 6$
or
$8y + 8 + 4y + 1 + 6y + 5 + 2y - 1 + 2y - 3 + 3y + 2 + 4y + y = 192$
$30y + 12 = 192$
$30y = 192 - 12$
$30y = 180$
$y = \frac{180}{30}$
$y = 6$</td>
<td>For award of u:
ONE of:
• establishing the expression for the perimeter (ignore the omission of the = 192)
• consistent solving of their perimeter equation.

For award of r:
• correct solution showing algebraic procedures.</td>
</tr>
<tr>
<td>(d)(ii)</td>
<td>$(10y + 5)(5y + 1) - (3y + 2)(2y - 3) - y \times 4y$
$= 50y^2 + 10y + 25y + 5 - (6y^2 - 9y + 4y - 6) - 4y^2$
$= 50y^2 + 35y + 5 - 6y^2 + 5y + 6 - 4y^2$
$= 40y^2 + 40y + 11$
$= 40T - 29$</td>
<td>If the candidate has found the area in (d)(i) this can be used as evidence for (d)(ii)
For award of u:
ONE of:
• establishing the expression for the area
• expansion of two of the pairs of brackets in their area expression
• using $y = 6$ to state the area as 1691 (or consistent with solution from (d)(i)).

For award of r:
ONE of :
• simplified quadratic
• consistent simplification of expression for the area of the lawn to a quadratic expression which may result from missing the effect of a negative sign in brackets in one expansion
• consistently rewriting the quadratic in terms of T and y.

For award of t:
• expression for area in terms of T.</td>
</tr>
</table>

Q Day 2	Expected Coverage	Grade (generated by correctly demonstrating the procedures listed in EN4) Requirements are for the student responses to be correct (ignoring numerical errors) unless the statement specifies consistent)
THREE (a)(i)	$g+2f=de^2$ $\frac{g+2f}{e^2}=d$	For award of u: • expression for d.
(ii)	$jz^2-25wz^2=5y^2+16x^2$	For award of u: • one valid step leading to both terms involving z^2 being on one side of the equals sign.
	$z^2(j-25w)=5y^2+16x^2$ $z^2=\frac{5y^2+16x^2}{j-25w}$ $z=\sqrt{\frac{5y^2+16x^2}{j-25w}}$ or equivalent.	For award of r: • one valid step leading to both terms involving z^2 being on one side of the equals sign and ONE of: • factorising of z^2 terms • consistent expression for z.
		For award of t: • expression for z (± not required in front of radical sign).
(b)	$=\frac{5y(y-5)}{(y+5)(y-5)}$ $=\frac{5y}{y+5}$	For award of u: ONE of: • factorising of numerator or denominator • consistently simplified from their factorisation.
		For award of r: • simplification of expression ($y\neq -5$ not required).
(c)	$=\frac{4(10y-2)+5(4y-5)}{20}$ $=\frac{40y-8+20y-25}{20}$ $=\frac{60y-33}{20}$ or equivalent.	For award of u: ONE of: • correct arrangement for numerator (does not need to be simplified) • consistent simplification of numerator.
		For award of r: • correct expression with denominator.

(d)	Area of rectangle = $w(5w - 14)$ Area of triangle $= \frac{1}{2}(4w-4)(3w-8)$ $= (2w - 2)(3w - 8)$ $w(5w-14) = \frac{1}{2}(4w-4)(3w-8)$ $5w^2 - 14w = (2w - 2)(3w - 8)$ $5w^2 - 14w = 6w^2 - 22w + 16$ $6w^2 - 22w + 16 - 5w^2 + 14w = 0$ $w^2 - 8w + 16 = 0$ $(w - 4)(w - 4) = 0$ $w = 4$	For award of u: ONE of: • forms equation for both areas • area of triangle in expanded and simplified form or expands both triangle and rectangle quadratic expressions (½ may still be stated with triangle expression) without forming equation • consistently simplifies their equation to a quadratic equation • consistent factorisation of their quadratic equation into two brackets • consistent solving of their factorised quadratic equation. For award of r: • consistent solution(s) from their quadratic equation. For award of t: • correct value of w found.