REVISE
.wales

2.10 — Rearranging formulae

Mark schemes for the 2.10 question pack

Spec 2.1.16, 2.1.17 — Unit 2

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 22 questions in the corresponding revise.wales question pack (79 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

4. (a) $6m = y - 7$ or $y - 7 = 6m$ or $-6m = 7 - y$ $m = \frac{y-7}{6}$ or $m = \frac{7-y}{-6}$ or $m = (y - 7) \div 6$		B1 B1	 F.T. only from $6m = y + 7$. B1B0 for $-m = \frac{7-y}{6}$ or equivalent. *Note* Unsupported $m = y - 7 \div 6$ is B0B0. Unsupported $\frac{y-7}{6}$ is B1BO ('m' missing)
4.(b) $6x(x - 2)$		B2	B1 for any partial correct factorisation. OR B1 for $6x(x - \ldots)$ OR B1 for $6x(\ldots . - 2)$

			OR $(2\sqrt{3}x + 3\sqrt{3}y)(2\sqrt{3}x - 3\sqrt{3}y)$ o.e.
13.			FT until 2nd error for equivalent level of difficulty.
$ax - ab = cx - dx$	✓	B1	
$ax - cx + dx = ab$ OR $-ab = cx - dx - ax$	✓	B1	Or equivalent.
$x(a - c + d) = ab$ OR $-ab = x(c - d - a)$	✓	B1	Or equivalent.
$x = ab/(a - c + d)$ OR $-ab/(c - d - a) = x$	✓	B1	Or equivalent.
or $\frac{ab}{a-c+d}$ or $\frac{-ab}{c-d-a}$			Do not accept $-x = ab/(c - d - a)$
			Alternative method $ax - ab = x(c - d)$ *B1* *Only award the first* $-ab = x(c - d) - ax$ *B1* *B1 if the 2nd step is* $-ab = x(c - d - a)$ *B1* *attempted.* $-ab/(c - d - a) = x$ *B1*

12.	$d(c-5) = 3c-7$	✓	B1	FT until 2[nd] error for equivalent level of difficulty.
	$dc - 5d = 3c - 7$	✓	B1	$dc = 3c - 7 + 5d$ gains first B2.
	$dc - 3c = 5d - 7$ OR $7 - 5d = 3c - \mathrm{d}c$	✓	B1	
	$c(d-3) = 5d - 7$ OR $7 - 5d = c(3-d)$	✓	B1	
	$c = \dfrac{5d-7}{d-3}$ OR $\dfrac{7-5d}{3-d}$	✓	B1	Mark final answer. *Alternative version* $\left(c - 5 = \dfrac{3c}{d} - \dfrac{7}{d}\right)$ $c - \dfrac{3c}{d} = 5 - \dfrac{7}{d}$ B1 $c\left(1 - \dfrac{3}{d}\right) = 5 - \dfrac{7}{d}$ B1 $c = \dfrac{5 - \frac{7}{d}}{1 - \frac{3}{d}}$ B1 $c = \dfrac{5d-7}{d-3}$ B2 OR B1 for $c = \dfrac{\frac{1}{d}(5d-7)}{\frac{1}{d}(d-3)}$ oe

6(a) $2x + 2y = 7y - 3$ OR $x + y = \frac{7y - 3}{2}$	B1	F.T. until 2nd error provided of equivalent difficulty.
$2x = 5y - 3$ OR $x = \frac{7y - 3}{2} - y$	B1	
$x = \frac{5y - 3}{2}$	B1	Accept $x = \frac{5y}{2} - \frac{3}{2}$ OR $x = \frac{-5y + 3}{-2}$ OR $x = 2½y - 1½$ or equivalent. Must have 'x = '. An answer of $\frac{5y - 3}{2}$ gains B1B1B0 (missing 'x =') Mark final answer.
6.(b) $n^2 + 2$	B2	Mark final answer. B1 for $n^2 \pm$ …., not for n^2 alone B0 for $an^2 \pm$ ….. where $a \neq 1$.
7 $QS = \frac{8}{\sin 38}$	M2	M1 for $\frac{8}{QS} = \sin 38$. Accept M1 for $\frac{QS}{\sin 90} = \frac{8}{\sin 38}$ M2 for $QS = \frac{8 \times \sin 90}{\sin 38}$
$= 13$ or $12{\cdot}99(..)$	A1	
$\tan x = \frac{15}{12.99(..)}$	M1	F.T. 'their 12.99(..)', stated or shown on diagram.
$x = \tan^{-1}(15/12{\cdot}99\ldots)$	m1	
$= 49({\cdot}098..°)$	A1	Mark final answer. If FT leads to a non-integer value, allow to the nearest degree.

		from trial and improvement.
18. For sight of $gc^2 - v = c^2$	B1	
$c^2(g-1) = v$ OR $gc^2 - c^2 = v$ OR $-v = c^2 - gc^2$	B1	FT a formula with three or more terms AND with at least two terms in c^2. FT until 2nd error for equivalent level of difficulty.
$c^2 = \frac{v}{g-1}$ OR $\frac{-v}{1-g} = c^2$	B1	
$c = (\pm)\sqrt{\frac{v}{g-1}}$ OR $(\pm)\sqrt{\frac{-v}{1-g}}$	B1	

1.(a) $3x^3 - 6x$	B2	Must be in an expression for B2. B1 for sight of (+)$3x^3$ or $-6x$. Mark final answer.
1.(b) $3g = 2 - f$ or $f - 2 = -3g$ $g = \frac{2-f}{3}$ or $g = \frac{f-2}{-3}$ or $g = \frac{2}{3} - \frac{f}{3}$	B1 B1	 F.T only from $(\pm)3g = \pm f \pm 2$. B1B0 for $-g = \frac{f-2}{3}$. B1B0 for $g = 2 - f \div 3$. B1B0 for $\frac{2-f}{3}$ ('g' missing). Mark final answer.
1.(c)(i) $7x < 32$ $x < 32/7$ or $x < 4\frac{4}{7}$	B1 B1	Use of '=' is B0B0 unless replaced for final answer. FT from $7x < k$. Allow $x < 4{\cdot}57(....)$. Do not allow $x < 4{\cdot}6$ or $x < 4{\cdot}5$ unless $x < 4{\cdot}57(....)$ seen. Mark final answer. Penalise consistent use of '≤' by −1.
1.(c)(ii) 4	B1	OR F.T. 'their answer (inequality) in (c)(i)' if $x < a$. No FT from $x \le a$. 4x is B0.

13. $6c - 3d = g(c + 2)$	B1	FT until 2nd error, provided equivalent difficulty. May be implied by further working.
$6c - gc = 3d + 2g$	B1	Includes correct expansion **and** rearrangement.
$c(6 - g) = 3d + 2g$	B1	
$c = (3d + 2g)/(6 - g)$ or equivalent	B1	Mark final answer.

WJEC GCSE MATHEMATICS

SUMMER 2019 MARK SCHEME

GCSE MATHEMATICS **Unit 2 : Higher Tier**	**Mark**	**Comments**
1.(a) 3n + 5 or equivalent	B2	B1 for sight of 3n. B0 for −3n Mark final answer.
1.(b) $3t = r + 8$ or $r + 8 = 3t$ or $-3t = -r - 8$ $t = \frac{r+8}{3}$ or $\frac{r+8}{3} = t$ or $t = \frac{-r-8}{-3}$	B1 B1	F.T. only from $3t = \pm r \pm 8$, stated or implied. ($3t = r + 8$ will have already gained the previous B1.) B1B0 for $-t = \frac{-r-8}{3}$ or equivalent. Mark final answer. *Note* *Allow B1B0 for t = (r + 8) ÷ 3 with or without brackets.* *Allow B1B0 for $\frac{r+8}{3}$ ('t' missing)*
1.(c) 6x + 4 = 46 OR 3x + 2 = 23	B2	B1 for (x + 5) + (2x – 3) + (x + 5) + (2x – 3) = 46 or equivalent e.g. (x + 5) + (2x – 3) = 23
6x = 42 OR 3x = 21	B1	FT collection of 'their terms' if of equivalent difficulty. (linear equation only.)
(x =) 7	B1	FT only from ax = b. Allow a fraction from a FT value unless x is a whole number. (x =) 7 gains all four marks. Each B mark implies all previous B marks. Mark final answer.
1.(c) Alternative method *A trial showing correct values and understanding of perimeter. (e.g. 2(4 + 5) + 2(2×4 – 3) = 28)*	*B1*	*Consistent use of x AND correct evaluation.*
An improved trial.	*B1*	*Dependent on first B1.* *If 1st trial is using '7' award B1B1 followed by B1 if left embedded but B2 if shown as x = 7.*
(x =)7	*B2*	*B1 for an implied / embedded 'x = 7' but not shown as x = 7.* *(x =) 7 gains all four marks.* *Mark final answer.*

		Accept indication by 'shading out'.
11.		FT until 2nd error provided equivalent difficulty.
$cx - 4x = d + 3$ or $-3 - d = 4x - cx$	B1	Collecting x terms.
$x(c - 4) = d + 3$ or $-3 - d = x(4 - c)$	B1	Factorising.
$x = (d + 3)/(c - 4)$ or $x = (-3 - d)/(4 - c)$ or equivalent	B1	Dividing. Mark final answer.

15.		FT until 2nd error for equivalent level of difficulty. Allow sight of multiplication signs within expressions and allow multiplication by 1 at any stage.
$2a^2 - b = a^2b$	B1	
$2a^2 - a^2b = b$ OR $-b = a^2b - 2a^2$	B1	FT a formula with three or more terms AND with at least two terms in a^2.
$a^2(2 - b) = b$ OR $-b = a^2(b - 2)$	B1	
$a^2 = \frac{b}{2-b}$ OR $\frac{-b}{b-2} = a^2$	B1	
$a = (\pm)\sqrt{\frac{b}{2-b}}$ OR $a = (\pm)\sqrt{\frac{-b}{b-2}}$	B1	

16. Sight of $4y^2 = 3 + my^2$ $(4 - m)\,y^2 = 3$ OR $4y^2 - m\,y^2 = 3$ or equivalent $y^2 = 3\,/\,(4 - m)$ OR $y^2 = -3\,/\,(m - 4)$ $y = \pm\sqrt{[3\,/\,(4 - m)]}$ OR $y = \pm\sqrt{[-3\,/\,(m - 4)]}$	B1 B1 B1 B1	FT until 2nd error for equivalent level of difficulty. Squaring. Allow $2^2\,y^2$ or $(2y)^2$ for $4y^2$. Isolating terms in y^2. FT a formula with three or more terms AND with at least two terms in y^2. Isolating y^2. Taking square root. Allow omission of ±.
17. (a) $y = f(x) + 5$	B1	Correct notation required.
17. (b) $y = -f(x)$	B1	Correct notation required.
18. Sight of $x = (\sqrt{\pi}) \times r$ OR $x = \sqrt{(\pi\, r^2)}$ or equivalent Convincing concluding argument e.g. x is irrational since π (and therefore $\sqrt{\pi}$) is irrational.	B1 E1	Allow an equivalent expression, e.g. r = $x\,/\,(\sqrt{\pi})$ or r = $\sqrt{(x^2\,/\,\pi)}$. Allow use of 3.14 for π. E1 depends on B1. Accept e.g. multiplying an integer by $\sqrt{\pi}$ will not produce another integer; multiplying an integer by $\sqrt{\pi}$ will produce an infinite decimal. Do not accept a reason based on $\sqrt{\pi}$ not being a whole number. Consideration of a specific numerical case gains no credit.
<u>Allow an alternative method</u> *x^2 and $\pi\, r^2$ both seen <u>WITH</u> a related statement about* • *squares of integers, or* • *rational / irrational numbers, or* • *(infinite) decimal numbers.* *e.g.* *$\pi\, r^2$ (or $3.14\, r^2$) cannot be a square number;* *multiplying an integer by π (or 3.14) cannot produce a square number;* *$\pi\, r^2$ is irrational;* *π times an integer (squared) is a decimal (or cannot be an integer).* *Convincing concluding argument leading to x (not x^2) being a non-integer* *e.g. x is irrational since x^2 is irrational;* *x is not an integer since x^2 is a decimal.*	*E1* *E1*	*For $x^2 = \pi\, r^2$, allow an equivalent equation,* *e.g. $r^2 = x^2\,/\,\pi$.* *Allow use of 3.14 for π.* *Do not accept a statement that $3.14\, r^2$ is not an integer or that $3.14\, r^2$ is irrational.* *Depends on previous E1* *Consideration of a specific numerical case gains no credit.*

3. 6 −2 At least 5 correct plots and no incorrect plot. A smooth curve drawn through their plots.	B2 P1 C1	B1 for each. F.T. 'their (−1,6)' AND 'their (3,−2)'. Allow ±'$\frac{1}{2}$ a small square'. F.T. 'their 7 plots' OR a curve through the 5 given plots AND (−1,6) AND (3,−2). Allow for the intention to pass through their plots (within 1 small square, either horizontally **or** vertically of the point).
4. (Curved length =) 3·14 × 4 or equivalent = 12·56 (cm) (Perimeter =) 20·56 (cm)	M1 A1 B1	Do not allow M1 if subsequently divided by 2. Allow 4π for M1A1. Allow SC1 for an answer of 25·12 (whole circle). (If 12·56 shown, but then doubled, only award the SC1.) FT 'their derived 12·56' + 8 (even 'an area' + 8). Allow 4π + 8.
5.(a) $3k = p - 2$ or $p - 2 = 3k$ or $-3k = -p + 2$ $k = \frac{p-2}{3}$ or $\frac{p-2}{3} = k$ or $k = \frac{-p+2}{-3}$	B1 B1	F.T. only from $\pm 3k = \pm p \pm 2$, stated or implied. ($3k = p - 2$ will have already gained the previous B1.) B1B0 for $-k = \frac{-p+2}{3}$ or equivalent. Mark final answer. *Note* *Allow B1B0 for $k = (p - 2) \div 3$ with or without brackets.* *Allow B1B0 for $\frac{p-2}{3}$ ('k' missing)*
5.(b) (Midpoint =) (5, 17) Showing that 17 = 3 × 5 + 2 (convincing) AND 'Yes'	B2 B1	B1 for each coordinate. May be given as $x = 5$ and $y = 17$. Accept use of $x = 5$ and $y = 17$ in $y = 3x + 2$. Allow B1 for sight of $\frac{3+7}{2}$ or $\frac{7-3}{2} + 3$ OR $\frac{15+19}{2}$ or $\frac{19-15}{2} + 15$ Allow SC1 for unsupported (17, 5). FT 'their stated midpoint', but not (3,15) nor (7,19), with consequent calculation AND decision.
6.(a) $5{\cdot}8 \times 10^{-3}$	B1	
6.(b) 7×10^{5}	B2	B1 for sight of correct value not in standard form e.g. $0{\cdot}7 \times 10^{6}$ or 700000. Mark final answer.
7.(a) P(South Wales =) 1 − 0·3 − 0·25 = 0·45 AND shown on relevant branch. 0·2 and 0·8 shown on all relevant branches.	M1 A1 B1	
7.(b) 0·45 × 0·2 or equivalent = 0·09 or equivalent	M1 A1	FT 'their completed tree diagram' for values 0<p<1.

8. Showing $4x + 3y = 19$ or equivalent. Showing $6x - y = 12$ or equivalent. A correct method to eliminate one variable e.g. 'equal coefficients AND appropriate addition or subtraction'. OR 'method of substitution'. First variable found, $x = 2½$ or $y = 3$. Second variable found	B1 B1 M1 A1 A1	$2x + 2x + 3y = 19$ is an equivalent answer. *Workings must be shown for M1A1A1.* FT to solve for simultaneous equations if of equivalent difficulty. Allow one error in one term (not the term with equal coefficients.) C.A.O. for 'their equations'. FT substitution of their '1st variable' if M1 gained. If NO (i.e. none of the five) marks gained, allow SC1 for <u>both</u> answers of $x = 2½$ AND $y = 3$
9. <u>Enlargement</u> with scale factor <u>$-\frac{1}{2}$</u> and centre (<u>1, 0</u>)	B3	Award B2 for reference to any two of 'enlargement', '$-\frac{1}{2}$' and 'centre (1, 0)'. Award B1 for reference to any one of 'enlargement', '$-\frac{1}{2}$' and 'centre (1, 0)'. If B0, award 1 mark for reference to 'enlargement' within a multi-stage transformation.
10. Sight of $20x^2 + 15x - 8x^2 + 4x$ or equivalent.	B2	Award B1 for sight of $5x(4x + 3) - 4x(2x - 1)$ OR three of the four terms correct.
Sight of denominator of $(2x - 1)(4x + 3)$	B1	Must be seen or stated as the denominator.
$\frac{12x^2+19x}{(2x-1)(4x+3)}$ or $\frac{12x^2+19x}{8x^2+2x-3}$	B1	FT from one error in numerator. Note the numerator may be factorised as $x(12x + 19)$ Mark final answer.
11. (Area scale factor =) Sight of $(\frac{7}{5})^2$ $(=\frac{49}{25})$ OR $1{\cdot}4^2$ $(= 1{\cdot}96)$	B1	Or equivalent Accept a method based on ratios e.g. $5^2 : 7^2 = 25 : 49 = 1 : \frac{49}{25}$
$\frac{49}{25}$ (< 2) or $1{\cdot}96$ (< 2) AND 'No (Mari is not correct)'	B1	Accept any equivalent statement. Accept $(\frac{7}{5})^2 < 2$ or $1{\cdot}4^2 < 2$ or equivalent. B0 if evaluation of $(\frac{7}{5})^2$ or $1{\cdot}4^2$ is incorrect.
<u>Alternative method</u> (using scale factor 2) *$5^2 \times 2$ (= 50)*	*B1*	*Accept a method based on ratios* *e.g. $5^2 : 7^2 = 25 : 49 = \frac{25}{49} : 1$*
(7^2 =) 49 < 50 AND 'No (Mari is not correct)'	*B1*	*Accept any equivalent statement e.g. $\sqrt{49}<\sqrt{50}$* *B0 if evaluation of 5^2 or 7^2 is incorrect.*
12. $xw + 8w = 3y - 4$ or $4 - 3y = -xw - 8w$	B1	Collecting w terms. F.T. until 2nd error provided equivalent difficulty
$w(x + 8) = 3y - 4$ or $4 - 3y = w(-x - 8)$	B1	Factorising. Accept $4 - 3y = -w(x + 8)$
$w = \frac{3y-4}{x+8}$ or $w = \frac{4-3y}{-x-8}$ or equivalent	B1	Dividing. Mark final answer. $\frac{4-3y}{x+8} = -w$ only gains B1B1B0

2. (a) $8m = w + 3$ or $w + 3 = 8m$ or $-8m = -w - 3$ $m = \frac{w+3}{8}$ or $\frac{w+3}{8} = m$ or $m = \frac{-w-3}{-8}$	B1 B1	Allow $-8m = -(w + 3)$. FT only from $\pm 8m = \pm w \pm 3$, stated or implied. (note: $8m = w + 3$ or $-8m = -w - 3$ will have already gained the previous B1). B1B0 for $-m = \frac{-3-w}{8}$ or equivalent. Mark final answer. <u>Note</u> Allow B1B0 for $m = (w + 3) \div 8$ with or without brackets. Allow B1B0 for $\frac{w+3}{8}$ ('$m =$' missing).

2. (b)	$y^2 + y - 20$ ISW	B2	Allow $y^2 + 1y - 20$. Award B1 for one of the following: • $y^2 + 5y - 4y - 20$ • $y^2 + 5y \ - 4y + - 20$ • $y^2 + 5y + - 4y - 20$ • $y^2 + 5y + - 4y + - 20$ • $y^2 + ky - 20$ (where $k \neq$ 0 or 1) • $y^2 + (1)y + t$ (where $t \neq -20$) • for sight of y^2 AND $+5y$ AND $-4y$ AND -20 but not in an expression.

10.		FT until 2nd error provided equivalent difficulty (requiring factorisation).
$5x + yx = t - 4$ or $4 - t = -yx - 5x$	B1	Collecting *x* terms.
$x(5 + y) = t - 4$ or $4 - t = x(-y - 5)$	B1	Factorising. Allow B1 for $4 - t = -x(y + 5)$.
$x = \frac{t - 4}{5 + y}$ or equivalent	B1	Dividing. Allow $x = \frac{4 - t}{-y - 5}$ Mark final answer.

		more times
19.		FT until 2nd error for equivalent level of difficulty. Allow sight of multiplication signs within expressions and allow multiplication by 1 at any stage.
Sight of $ab + ac^2 + de - dc^2$	B1	For expanding brackets
$ac^2 - dc^2 = f - ab - de$ OR $ab + de - f = dc^2 - ac^2$	B1	For isolating terms in c^2. FT a formula with four or more terms AND with at least two terms in c^2.
$c^2(a - d) = f - ab - de$ OR $ab + de - f = c^2(d - a)$	B1	For factorising.
$c^2 = \frac{f-ab-de}{a-d}$ OR $c^2 = \frac{ab+de-f}{d-a}$	B1	For isolating 'their c^2' by division.
$c = \pm\sqrt{\frac{f-ab-de}{a-d}}$ OR $c = \pm\sqrt{\frac{ab+de-f}{d-a}}$	B1	For taking the square roots. Allow omission of $\pm$. Mark final answer.

			FT until 2nd error.
1.(a)	$7 + 5x - 10 = 3x + 8$ or equivalent.	B1	Bracket must be expanded or correct division by 5 e.g $x - 2 = \frac{3x}{5} + \frac{1}{5}$ (but not $x - 2 = \frac{3x + 1}{5}$)
	$2x = 11$ OR $-11 = -2x$	B1	Or equivalent Correctly simplifying the equation to a single x term and number term (e.g. $2x - 11 = 0$).
	$x = \frac{11}{2}$ or 5·5 or equivalent.	B1	Mark final answer. Correct answer implies B1B1B1. Do not allow $-x = \frac{-11}{2}$ or $x = \frac{-11}{-2}$ A final answer of '11 ÷ 2' is B1B1B0. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. Allow any decimal answer to be rounded or truncated to 1 or more decimal place. Allow B1B1B1 for a correct embedded answer BUT only B1B1B0 if contradicted by $x \neq \frac{11}{2}$ or equivalent. Note: $12x - 24 = 3x + 8$ B0 $9x = 32$ B1 (FT) $x = \frac{32}{9}$ or $3{\cdot}5(55\ldots.)$ or $3{\cdot}6$. B1 (FT) If no marks awarded, award SC1 for sight of one of the following: • $5x - 10$ • $12x - 24$.
1.(b)	$2f = 13 - h$ or $h - 13 = -2f$	B1	Or equivalent.
	$f = \frac{13 - h}{2}$ or $\frac{h - 13}{-2} = f$ or equivalent	B1	Or equivalent. Must not come from incorrect working. Mark final answer. FT only from $\pm 2f = \pm 13 \pm h$. Unsupported $f = \frac{\pm 13 \pm h}{\pm 2}$ implies B0B1 unless B2. Award B1B0 for $-f = \frac{h - 13}{2}$ or equivalent. **If no marks**, award SC1 for a final answer of either: • $f = (13 - h) \div 2$ with or without brackets • $f = (h - 13) \div -2$ with or without brackets • $\frac{13 - h}{2}$ ('f =' missing). • $\frac{h - 13}{-2}$ ('f =' missing).
1.(c)	$5(3x - 7y)$	B1	Mark final answer. Allow $-5(-3x + 7y)$ or $5(3x + -7y)$.

		148·84 [from $(671/55)^2$].
11. $x^2(a+1) = b$ OR $-x^2(a+1) = -b$ OR $x^2(-a-1) = -b$	B1	FT until 2nd error. x^2 or $-x^2$ factorised.
$x^2 = \frac{b}{a+1}$ OR $-x^2 = \frac{-b}{-a-1}$	B1	Isolating the x^2 or $-x^2$. Allow a FT from $2x^2 = \frac{b}{a}$.
$x = \pm\sqrt{\frac{b}{a+1}}$	B1	B0 for $\sqrt{[b \div (a+1)]}$ (use of the division sign). Allow omission of $\pm$. Mark final answer. Note: $2x^2 = \frac{b}{a}$ B0 $x^2 = \frac{b}{2a}$ B1 (FT) $x = (\pm)\sqrt{\frac{b}{2a}}$ B1 (FT)

18.		No FT for 'splitting' the cube root into a sum of two roots, otherwise FT until 2nd error for equivalent level of difficulty.
Sight of $ct^3 - 9 = t^3$	B1	Cubing
$(c-1)t^3 = 9$	B1	Isolating terms in t^3 and factorising. FT a formula with three or more terms AND with at least two terms in t^3.
$t^3 = \frac{9}{c-1}$ OR $t^3 = \frac{-9}{1-c}$	B1	Isolating t^3.
$t = \sqrt[3]{\frac{9}{c-1}}$ OR $t = \sqrt[3]{\frac{-9}{1-c}}$	B1	Taking cube root. B0 for inclusion of $\pm$

Unit 1: Higher Tier	Mark	Comments
16. (a) (Numerator) $4y\,(y + 2x)$	B1	
(Denominator) $(y + 2x)(y - 2x)$	B2	B1 for $(y \ldots 2x)(y \ldots 2x)$
$\frac{4y}{y-2x}$ or equivalent.	B1	Mark final answer. FT provided no more than one previous error and provided simplification required.
16. (b)		FT until 2nd error for equivalent level of difficulty.
Sight of $hf^2 - m = 9f^2$	B1	Squaring Allow $3^2 f^2$ or $(3f)^2$ or $(3f)(3f)$ for $9f^2$.
$hf^2 - 9f^2 = m$ or equivalent	B1	Isolating terms in f^2. FT a formula with three or more terms AND with at least two terms in f^2.
$f^2\,(h - 9) = m$ or equivalent	B1	Factorising fully.
$f^2 = \frac{m}{h-9}$ OR $f^2 = \frac{-m}{9-h}$	B1	Isolating f^2.
$f = \pm\sqrt{\frac{m}{h-9}}$ OR $f = \pm\sqrt{\frac{-m}{9-h}}$	B1	Mark final answer. Allow omission of $\pm$.

7(a) (AER =) $(1 + 0.0026)^{12} - 1$ or equivalent = 3.16(500…) or 3.17 or 3.2 (%)	M1 A1	e.g. $\left(1+\frac{12 \times 0.0026}{12}\right)^{12} - 1$ or $\left(1+\frac{0.0312}{12}\right)^{12} - 1$
7(b) $AER = \left(1+\frac{2.48 \div 100}{4}\right)^{4} - 1 =$ (= 0.025(03…) or 2.5(03…) (%)) (Amount in account after 10 years =) $3000 \times (1 + 0.025(03…))^{10}$ = (£)3841.43(752…) or (£)3841.44 (Percentage increase =) $\frac{3841.43(752…) - 3000}{3000}$ (×100) or $\frac{3841.43(752…)}{3000} - 1$ (×100) = 28(.04) to 28.05 (%)	M1 M1 A1 M1 A1	The −1 may be implied in further working FT 'their derived 0.025(03…)' provided it comes from the AER formula with $1 < n \le 12$ CAO. Must come from M1M1 Accept (£)3840.25 from the use of the multiplier 1.025 provided M1M1 previously awarded FT 'their 3841.43(752…)' provided at least one M1 previously awarded An amount in the account after 10 years of (£)3840.25 leads to 28(.008) (%) If no marks awarded, SC1 for an answer of 27.7(58…) or 27.8% from use of $\frac{3000 \times (1.0248)^{10} - 3000}{3000} \times 100$ or $((1.0248)^{10} - 1) \times 100$ or equivalent
7(b) <u>Alternative method 1:</u> *(Quarterly rate =)* $\frac{2.48}{4}$ *(%) or* $\frac{2.48 \div 100}{4}$ *(= 0.62(%) or 0.0062)* *(Amount in account after 10 years =)* $3000 \times \left(1+\frac{2.48 \div 100}{4}\right)^{10 \times 4}$ *or* 3000×1.0062^{40} *= (£)3841.43(752…) or (£)3841.44* *(Percentage increase =)* $\frac{3841.43(752…) - 3000}{3000}$ *(×100)* *or* $\frac{3841.43(752…)}{3000} - 1$ *(×100)* *= 28(.04) to 28.05 (%)*	*M1* *M1* *A1* *M1* *A1*	*May be implied in further working* *FT 'their 0.0062' provided it comes from 2.48(÷100) /n provided* $1 < n \le 12$ *Allow* $3000 \times \left(1+\frac{2.48 \div 100}{n}\right)^{10 \times n}$ *provided their value of n has been used consistently and* $1 < n \le 12$ *CAO. Must come from M1M1* *FT 'their 3841.43(752…)' provided at least one M1 previously awarded*

7(b) Alternative method 2: $AER = \left(1 + \frac{2.48 \div 100}{4}\right)^4 - 1 =$ (= 0.025(03…) or 2.5(03…) (%))	M1	The −1 may be implied in further working
(Percentage increase =) $(1 + 0.025(03\ldots))^{10} - 1$	M3	FT 'their 0.025(03…)' provided it comes from $\left(1 + \frac{2.48 \div 100}{n}\right)^n - 1$ where n has been used consistently and $1 < n \leq 12$ M2 for $(1 + 0.025(03\ldots))^{10}$
= 28(.04) to 28.05 (%)	A1	CAO. Must come from M1M3
7(b) Alternative method 3: (Quarterly rate =) $\frac{2.48}{4}$ (%) or $\frac{2.48 \div 100}{4}$ (= 0.62(%) or 0.0062)	M1	
(Percentage increase =) $(1 + 0.0062)^{10\times4} - 1$	M3	FT 'their 0.0062' provided it comes from 2.48(÷100) /n provided $1 < n \leq 12$ Allow $\left(1 + \frac{2.48 \div 100}{n}\right)^{10\times n} - 1$ provided their value of n has been used consistently and $1 < n \leq 12$ M2 for $(1 + 0.0062)^{10\times4}$
= 28(.04) to 28.05 (%)	A1	CAO

19.		FT until 2nd error for equivalent level of difficulty.
$\frac{3d}{d+g} = h^2$ OR $\sqrt{3d} = h \times \sqrt{d+g}$	B1	Squaring or clearing the fraction.
$3d = h^2(d+g)$	B1	Clearing the fraction from 'their squaring' OR squaring from 'their clearing the fraction'.
$3d = h^2d + h^2g$ OR $-3d = -h^2d - h^2g$ OR $3d - h^2d = h^2g$ OR $h^2d - 3d = -h^2g$	B1	Expanding the bracket.
$d(3-h^2) = h^2g$ OR $d(h^2-3) = -h^2g$	B1	Factorising terms in d.
$d = \frac{h^2g}{(3-h^2)}$ OR $d = \frac{-h^2g}{(h^2-3)}$	B1	Isolating d.