

CHANGING SUBJECT OF A FORMULA

Pearson Edexcel - Tuesday 19 May 2020 - Paper 1 (Non-Calculator) Higher Tier

1.

17	$f = \frac{4d+3}{d+3}$	M1	for clearing the fraction eg $d(f-4) = 3(1-f)$ or $df-4d = 3-3f$	Condone error in expansion of RHS for this mark
		M1	(dep M1) for isolating f terms in a correct equation eg $df+3f = 3+4d$	
		M1	(dep on two terms in f) for factorising eg $f(d+3) = 3+4d$	
		A1	oe	

Pearson Edexcel - Thursday 6 June 2019 - Paper 2 (Calculator) Higher Tier

2.

15	$m = \frac{f+4}{f-3}$	M1	for multiplying both sides by $m-1$, eg. $f(m-1) = 3m+4$	Condone missing brackets for this mark only
		M1	(dep) for a method to rearrange the formula to isolate terms in m in a correct equation, eg. $fm-3m = f+4$ or $-fm+3m = -f-4$	
		A1	for $m = \frac{f+4}{f-3}$ oe, eg $m = \frac{-f-4}{-f+3}$	

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3.

2	(a)	6 or -6	M1	for $12^2 + 2 \times -3 \times 18 (= 36)$	Terms may be partially evaluated. Only one value is required for full marks
			A1	for 6 or -6, accept ± 6	
	(b)	$s = \frac{v^2 - u^2}{2a}$	M1	for subtracting u^2 from both sides or dividing all terms by $2a$ as the first step	Must see this step carried out, not just the intention shown
			A1	$s = \frac{v^2 - u^2}{2a}$ oe	

Pearson Edexcel - Tuesday 13 June 2017 - Paper 3 (Calculator) Higher Tier

4.

14	(a)	$\frac{x+4}{2x+3}$	M1	Factorising the denominator $(2x+3)(x+4)$ or $2\left(x+1\frac{1}{2}\right)(x+4)$
			M1	Factorising the numerator $(x-4)(x+4)$
			A1	oe
	(b)	$v = \frac{15t}{w+30}$	M1	A correct step towards solution e.g. expanding brackets to get $15t - 30v$ or multiply both sides by v
			M1	For a method to rearrange the formula to isolate terms in v eg $vw + 30v = 15t$
			A1	oe

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5.

3		$t = 3(y + 2a)$	M1 adding $2a$ to both sides or multiplying each term by 3 A1 $t = 3(y + 2a)$ or $t = 3y + 6a$
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Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

6.

13		$\frac{\sqrt[3]{4m^2 - 1}}{\sqrt[3]{(2m+1)(2m-1)}}$ or $\sqrt[3]{\frac{4m^2 - 1}{(2m+1)(2m-1)}}$	M1 clear fractions or remove sq rt sign as first step M1 (dep) clear fractions and remove sq rt sign A1 $(k =) \sqrt[3]{4m^2 - 1}$ or $\sqrt[3]{(2m+1)(2m-1)}$
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7.

1		$t = \frac{w - 11}{3}$	M1 For isolating term in t , eg. $3t = w - 11$ or dividing all terms by 3, eg. $\frac{w}{3} = \frac{3t}{3} + \frac{11}{3}$ A1 for $t = \frac{w-11}{3}$ oe
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Pearson Edexcel - Sample Paper 1 - (Non-Calculator) Higher Tier

8.

17		$a = \frac{7 - 3r}{r - 2}$	M1 Remove fraction and expand brackets M1 Isolate terms in a A1
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Pearson Edexcel - Thursday 9 June 2016 - Paper 2 (Calculator) Higher Tier

9.

18	(a)	$10a^2b^4$	2	B2 cao (B1 for any two of $10, a^2, b^4$ in a product)
	(b)	$y = 5p^2 - x$	3	M1 for a correct first step to either remove the square root, eg. $p^2 = \frac{x+y}{5}$ or clear the fraction, eg. $\sqrt{5}p = \sqrt{x+y}$ M1 (dep) for a method to remove the square root and a method to clear the fraction, eg. $5p^2 = x + y$ A1 for $y = 5p^2 - x$

Pearson Edexcel - Wednesday 4 November 2015 - Paper 1 (Non-Calculator) Higher Tier

10.

21	(a)		$\frac{9x-8}{x(2-x)}$	3	M1 for method to use a common denominator, e.g. $\frac{5(x)-4(2-x)}{x(2-x)}$ M1 (dep on M1) for correct expansion of brackets and combination of numerators e.g. $5x-8+4x (=9x-8)$ A1 for $\frac{9x-8}{x(2-x)}$ or $\frac{9x-8}{2x-x^2}$
	(b)		$y = \frac{2-2t}{t+3}$	4	M1 for intention to multiply both sides by $y+2$ as a first step e.g. $t \times y + 2 = 2 - 3y$ M1 for intention to correctly isolate their y terms on one side and the other terms on the other side, e.g. $ty+3y=2-2t$ M1 for intention to factorise, e.g. $y(t+3) (=2-2t)$ A1 for $y = \frac{2-2t}{t+3}$ oe

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11.

11	(a)		$\neq 7$	2	M1 for intent to divide both sides by 3 as a first step or answer of 7 or -7 A1 $\neq 7$
	(b)		0.125 or $\frac{1}{8}$	1	B1 cao
	(c)		$27x^6$	2	M1 for either 27 or x^6 in a two term product A1 cao
	(d)		$p = \frac{w+16}{4}$	2	M1 for $\div 4$ throughout or adding 16 to both sides as a first step A1 $p = \frac{w+16}{4}$ oe

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12.

20			$a = \frac{4p-5}{3+p}$ or	4	M1 for multiplying both sides by $4-a$ as the first step M1 (dep) for isolating their two terms in a M1 (dep) for factorising their two term expression in a A1 for $a = \frac{4p-5}{3+p}$ or $a = \frac{5-4p}{-p-3}$
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Pearson Edexcel - Friday 7 November 2014 - Paper 2 (Calculator) Higher Tier

13.

22	(a)	$\frac{(2x-3)(x-1)}{(x+6)(x-1)}$	$\frac{2x-3}{x+6}$	3	M1 for $(2x-3)(x-1)$ M1 for $(x+6)(x-1)$ A1 cao
	(b)	$\frac{mb-tv}{vb} = \frac{m-t}{R}$ $mbR - tvR = mvb - tvb$ $mbR - mvb = tvR - tvb$ $m(bR - vb) = tvR - tvb$ OR $\frac{m}{v} - \frac{t}{b} = \frac{m}{R} - \frac{t}{R}$ $\frac{m}{v} - \frac{m}{R} = \frac{t}{b} - \frac{t}{R}$ $\frac{mR - mv}{vR} = \frac{tR - tb}{bR}$ $\frac{m(R-v)}{vR} = \frac{tR-tb}{bR}$	$m = \frac{tv(R-b)}{b(R-v)}$	4	M1 for putting LHS over a common denominator with at least one correct numerator (ignore signs) or for showing an intention to multiply each term on both sides by R or v or b M1 for rearranging correctly to isolate terms in m M1 for factorising with common factor m from 2 terms A1 for $m = \frac{tv(R-b)}{b(R-v)}$ oe

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14.

12	*(a)		No, temp is 25°C	3	M1 for substitution of 77 into the RHS of the formula A1 for 25 cao or for 225/9 and 180/9 cao C1 (dep on M1) for conclusion (ft) following from working shown OR M1 for substitution of 20 into LHS of formula and correct process to find F A1 for 68 cao C1 (dep on M1) for conclusion (ft) following from working shown
	(b)		$F = \frac{9C}{5} + 32$	3	M1 for expansion of the brackets (eg $5 \times F - 5 \times 32$) or an attempt to multiply both sides by 9, or divide both sides by 5 as the first step. M1 (dep) for a correct second step A1 for $F = \frac{9C}{5} + 32$ oe

Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

15.

21	(a)		$(2x+3)(2x-3)$	1	B1 cao
	(b)		$m = \frac{g-5}{a+3}$	3	M1 for correct processes to isolate terms in m from other terms M1 for taking m out as a common factor A1 for $m = \frac{g-5}{a+3}$ or $m = \frac{5-g}{-a-3}$

Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

16.

18		$3p^2 = y + 4$ $p^2 = \frac{y+4}{3}$	$p = \sqrt{\frac{y+4}{3}}$	3	M1 for clear intention to add 4 to both sides or divide all terms by 3 (with at least 3 terms) M1 for clear intention to find the square root from $p^2 = (\text{expression in } y)$ A1 for $p = \sqrt{\frac{y+4}{3}}$ oe (accept \pm a correct root)
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Pearson Edexcel - Monday 4 March 2013 - Paper 2 (Calculator) Higher Tier

17.

14	(a)	$100 = 4 \times 2 \times c$	12.5	2	M1 for correct substitution into formula A1 for 12.5 oe
	(b)	$m^2 = \frac{k+1}{4}$ $4m^2 = k+1$ $k = 4m^2 - 1$ or $2m = \sqrt{k+1}$ $4m^2 = k+1$ $k = 4m^2 - 1$	$k = 4m^2 - 1$	3	M1 for correct method to clear fraction or remove square root sign M1 (dep) for a fully correct method to both clear fraction and remove square root sign A1 for $k = 4m^2 - 1$ or $k = (2m+1)(2m-1)$

Pearson Edexcel - Tuesday 6 November 2012 - Paper 1 (Non-Calculator) Higher Tier

18.

24			$t = \frac{3-4p}{p+2}$	4	M1 for intention to multiply both sides by $4+t$ eg $p \times 4 + t = 3 - 2t$ M1 for intention to correctly move their t terms to one side, and correctly move their other terms to the other side eg $p \times 4 + t - 4p + 2t = 3 - 2t + 2t - 4p$ M1 for intention to factorise eg $t(p \pm 2)$ A1 for $t = \frac{3-4p}{p+2}$ oe
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Pearson Edexcel - Monday 11 June 2012 - Paper 1 (Non-Calculator) Higher Tier

19.

8	(a)		$6y - 15$	1	B1 cao
	(b)		$4x(2x + y)$	2	B2 cao (B1 for $x(8x + 4y)$ or $2x(4x + 2y)$ or $4(2x^2 + xy)$ or $4x(ax + by)$ where a, b are positive integers or $ax(2x + y)$ where a is a positive integer or $4x(2x - y)$)
	(c)	$10t = gh$ $h = \frac{10t}{g}$	$\frac{10t}{g}$	2	M1 for clear intention to multiply both sides of the equation by 10 (eg. $\times 10$ seen on both sides of equation) or clear intention to divide both sides of the equation by g (eg. $\div g$ seen on both sides of equation) or $10t = gh$ or $\frac{t}{g} = \frac{h}{10}$ or fully correct reverse flow diagram eg. $\leftarrow \times 10 \leftarrow \div g \leftarrow$ A1 for $\frac{10t}{g}$ oe

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20.

20		$2d - 2t = 4t + 7$ $2d - 7 = 4t + 2t$ $2d - 7 = 6t$ $\frac{2d - 7}{6}$	$\frac{2d - 7}{6}$	3	B1 for $2d - 2t$ or $2t + \frac{7}{2}$ oe M1 for rearranging 4 terms correctly to isolate terms in t e.g. ' $2d - 7 = 4t + 2t$ ' or $2d - 7 = 6t$ or $-6t = 7 - 2d$ seen A1 for $\frac{2d - 7}{6}$ oe
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Pearson Edexcel - Friday 2 March 2012 - Paper 3 (Non-Calculator) Higher Tier

21.

21	(a)	$P = 3x + \frac{\pi x}{2} = x\left(3 + \frac{\pi}{2}\right)$ $x = \frac{P}{\left(3 + \frac{\pi}{2}\right)}$ OR $2P = 6x + \pi x = x(6 + \pi)$ $x = \frac{2P}{(6 + \pi)}$	$x = \frac{P}{\left(3 + \frac{\pi}{2}\right)}$	2	M1 for $x\left(3 + \frac{\pi}{2}\right)$ A1 for $x = \frac{P}{\left(3 + \frac{\pi}{2}\right)}$ oe OR M1 $2P = x(6 + \pi)$ A1 $x = \frac{2P}{(6 + \pi)}$ oe SC : B1 for $x = \frac{2P}{3 + \pi}$ oe or $x = \frac{P}{6 + \pi}$ SC Using $\pi = 3.14$, then B1 for $x = \frac{P}{4.57}$ or $\frac{2P}{9.14}$
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21	(b)	$A = x^2 + \frac{\pi}{2} \left(\frac{x}{2}\right)^2 = \left(1 + \frac{\pi}{8}\right)x^2$	$k = 1 + \frac{\pi}{8}$	3	M1 for $A = x^2 + \frac{\pi}{2} \left(\frac{x}{2}\right)^2$ (condone missing brackets around $\frac{x}{2}$) or $A = x^2 + \frac{\pi}{2} \times \frac{x^2}{4}$ oe M1 for $A = x^2 \left(1 + \frac{\pi}{8}\right)$ oe or $k = 1 + \frac{\pi}{2} \left(\frac{1}{2}\right)^2$ A1 cao SC B1 for $A = x^2 + \frac{\pi}{2} \times \frac{x^2}{2}$ SC B2 for $k = \left(1 + \frac{\pi}{4}\right)$
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Pearson Edexcel - Wednesday 9 November 2011 - Paper 3 (Non-Calculator) Higher Tier

22.

17	(a)	$-10 - 2 \times 3 \times (-5)^2 = -10 - 150$	-160	2	M1 $-10 - 2 \times 3 \times (-5)^2$ or 75 or 150 or -150 seen A1 cao
	(b)	$y = p - 2qx^2$ $2qx^2 = p - y$ $x^2 = \frac{p-y}{2q}$	$x = \pm \sqrt{\frac{p-y}{2q}}$	3	M1 at least one correct process from isolate $2qx^2$, divide by q , or by 2 or by $2q$ M1 (dep on M1) attempt to square root both sides of $x^2 = \frac{p-y}{2q}$, A1 $x = \pm \sqrt{\frac{p-y}{2q}}$ oe condone omission of \pm

Pearson Edexcel - Monday 6 June 2011 - Paper 3 (Non-Calculator) Higher Tier

23.

23		$t(k-2) = k$ $tk - 2t = k$ $tk - k = 2t$ $k(t-1) = 2t$	$k = \frac{2t}{t-1}$	4	M1 for attempt to multiply LHS by $(k-2)$ or sight of $t(k-2)$ or $tk - 2t$ or $tk - 2$ (ignore RHS) M1 for attempt to subtract k from LHS or sight of $tk - k$ (ignore RHS) or attempt to subtract tk to give $-2t = k - tk$ (ignore LHS) M1 for attempt to factorise for k e.g. $k(t-1)$ or $k(1-t)$ A1 for $\frac{2t}{t-1}$ or $\frac{-2t}{1-t}$ oe
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Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

24.

13		$t - 2 = \frac{v}{5}$ or $5t = v + 10$	$v = 5(t - 2)$	2	M1 subtracting 2 from each side or multiplying each side by 5 A1 for $v = 5(t - 2)$ or $v = 5t - 10$ (multiplication signs may be present) SC : If no marks scored, award B1 for $v = 5t - 2$ oe or $v = t - 10$ or $v = t - 2 \times 5$ oe
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Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

25.

26	(a)	$P = \frac{k}{V} : 5 = \frac{k}{8}; k = 40$	$P = \frac{40}{V}$	3	M1 for $P \propto \frac{1}{V}$ or $P = \frac{k}{V}$, k algebraic M1 for subs $P = 5$ and $V = 8$ into $P = \frac{k}{V}$ A1 for $P = \frac{40}{V}$
	(b)	$P = \frac{40}{2}$	20	1	B1 ft on k for $P = \frac{1k'}{V}$

Pearson Edexcel - Friday 11 June 2010 - Paper 4 (Calculator) Higher Tier

26.

17		$r^2 = \frac{A}{3}$	$A = 3r^2$	2	M1 for an attempt to square both sides $r^2 = \frac{A}{3}$ or an attempt to multiply both sides by $\sqrt{3}$ A1 cao
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Pearson Edexcel - Thursday 5 November 2009 - Paper 3 (Non-Calculator) Higher Tier

27.

16		$5q + 5p = 4 + 8p$ $5q = 4 + 8p - 5p$ $5q = 4 + 3p$ $q = \frac{4 + 3p}{5}$	$q = \frac{4 + 3p}{5}$	3	M1 for expansion of bracket or $5q + 5p$ or each term $\div 5$ M1 for correct process to $aq = bp + c$, a , b and c numbers A1 $q = \frac{4 + 3p}{5}$ oe [SC B2 for ambiguous answer eg $4+3p/5$]
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OCR GCSE – Thursday 8 November 2018 – Paper 5 (Non-Calculator) Higher Tier

28.

9		$y = [\pm]\sqrt{x-7}$	2	M1 for $x - 7 = y^2$ or for answer $[\pm]\sqrt{x-7}$ or for correct step to answer after incorrect first step shown	e.g. answer $y = \sqrt{x+7}$ after 1 st step is $y^2 = x + 7$
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OCR GCSE – Wednesday 8 November 2017 – Paper 6 (Calculator) Higher Tier

29.

1	(a)	200	2	B1 for 50 or 150 soi	Eg. answer 500 or 275 with $(5 \times 10) + \dots$ seen
	(b)	$a = \frac{2(s-ut)}{t^2}$ oe	2	M1 for $s - ut = \frac{1}{2} at^2$	

OCR GCSE – Thursday 8 June 2017 – Paper 5 (Non - Calculator) Higher Tier

30.

*5	(a)	$\frac{y+3}{7}$ or $\frac{-y-3}{-7}$ final answer	2	M1 for $y + 3 = 7x$ or $\frac{y}{7} = x - \frac{3}{7}$ or for correct FT completion to answer after incorrect first step has been shown	For M1, accept the 'negative terms' versions
	(b) (i)	$x(x - y)$ final answer	1		Condone omission of final bracket Condone $[1]x([1]x - [1]y)$
	(ii)	$(x + 6)(x + 2)$ final answer	2	M1 for $(x + a)(x + b)$ where $ab = \pm 12$ or $a + b = \pm 8$ or for $x(x + 6) + 2(x + 6)$ seen or $x(x + 2) + 6(x + 2)$ seen	a, b integers For 2 marks, condone solutions after correct factors For 2 marks or M1, condone omission of final bracket

AQA GCSE – Thursday 4 June 2020 – Paper 2 (Calculator) Higher Tier

31.

15	Alternative method 1		
	$ac = b + 5c$	M1	oe fraction eliminated
	$ac - 5c = b$ or $c(a - 5) = b$ or $\frac{b}{a - 5}$	M1dep	oe terms in c collected
	$c = \frac{b}{a - 5}$	A1	
	Alternative method 2		
	$a - 5 = \frac{b}{c}$	M1	
	$\frac{1}{a - 5} = \frac{c}{b}$ or $\frac{a - 5}{b} = \frac{1}{c}$ or $c(a - 5) = b$ or $\frac{b}{a - 5}$	M1dep	
	$c = \frac{b}{a - 5}$	A1	
	Additional Guidance		
	$c = \frac{b}{a - 5}$ in working lines with $\frac{b}{a - 5}$ on answer line		M1M1A1

AQA GCSE – Tuesday 11 June 2019 – Paper 3 (Calculator) Higher Tier

32.

8	$x = \frac{y+2}{3}$	B1	
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AQA GCSE – Monday 12 November 2018 – Paper 3 (Calculator) Higher Tier

33.

26	$y(x - 4) = 2x + 3$	M1	$x(y - 4) = 2y + 3$
	$yx - 4y = 2x + 3$	M1dep	$xy - 4x = 2y + 3$
	$yx - 2x = 4y + 3$ or $x(y - 2) = 4y + 3$ or $x = \frac{4y + 3}{y - 2}$	M1dep	$xy - 2y = 4x + 3$ or $y(x - 2) = 4x + 3$
	$\frac{4x + 3}{x - 2}$	A1	oe Must be in terms of x
	Additional Guidance		
	Ignore any attempt to give the domain of f^{-1}		

AQA GCSE – Thursday 7 June 2018 – Paper 2 (Calculator) Higher Tier

34.

28(a)	$5 - 2x$	B1	may be implied	
	$3(x - 1) + 7$ or $3x + 4$	M1	oe ignore incorrect expansion if $3(x - 1) + 7$ seen	
	$9 + x$	A1		
	Additional Guidance			
	Working out $2f(x)$			B0
	Working out $g(x + 1)$			M0

28(b)	Alternative method 1		
	$x - 7 = 3y$ or $y - 7 = 3x$	M1	allow $x - 7 = 3g$ or $g - 7 = 3x$
	$\frac{x-7}{3}$ or $\frac{y-7}{3}$	A1	oe allow $\frac{g-7}{3}$
	-1.4 or $-\frac{7}{5}$	A1	oe
	Alternative method 2		
	$3(2x) + 7$	M1	oe
	$x = 3(2x) + 7$ or $x = 6x + 7$	A1	oe equation
	-1.4 or $-\frac{7}{5}$	A1	oe
	Additional Guidance		
	Beware $-3x - 7 = 2x$ leading to -1.4		M0A0A0

AQA GCSE – Wednesday 8 November 2017 – Paper 3 (Calculator) Higher Tier

35.

9(a)	Alternative method 1			
	$v - u = at$	$-at = u - v$	M1	
	$t = \frac{v-u}{a}$	$t = \frac{u-v}{-a}$	A1	oe
	Alternative method 2			
	$\frac{v}{a} = \frac{u}{a} + t$		M1	
	$t = \frac{v}{a} - \frac{u}{a}$		A1	oe
	Additional Guidance			
	$t = (v - u) \div a$			M1A1
	$v - u = at$ and $t = v - u \div a$			M1A0
	$\frac{v-u}{a}$ or $\frac{u-v}{-a}$ or $\frac{v}{a} - \frac{u}{a}$			M1A0
	$a = \frac{v-u}{t}$ with or without working			M1A0
$t = v - u \div a$			M0A0	
$t = \frac{v+u}{a}$			M0A0	

9(b)	(Speed) m/s or ms ⁻¹ (Acceleration) m/s ² or ms ⁻² or m/s/s	B2	B1 for one correct or two mutually consistent units eg km/h and km/h ² Accept mps for m/s and mps ² for m/s ²	
	Additional Guidance			
	Allow units given in words eg metres per second metres per second squared or metres per second per second			
	m/s ⁻¹ (speed)			B0
	m/s ⁻² (acceleration)			B0

AQA GSCE – Tuesday 13 June 2017 – Paper 3 (Calculator) Higher Tier

36.

3	$w = \frac{y}{2x}$	B1	
	Additional Guidance		

AQA GSCE – Sample Paper 2 (Calculator) Higher Tier

37.

19	$\frac{x}{3}$	B1	
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