

WRITING, SIMPLIFYING AND ORDERING FUNCTIONS

Pearson Edexcel – Thursday 4 June 2020 - Paper 2 (Calculator) Higher Tier

1.

10	(a)	1	B1	cao	
	(b)	$\frac{8}{x-4}$	B1	cao	
	(c)	$27n^{12}w^6$	B2 (B1)	cao for two of $27, n^{12}, w^6$ in a product)	

Pearson Edexcel – Monday 8 June 2020 - Paper 3 (Calculator) Higher Tier

2.

1	(a)	n^8	B1	cao	
	(b)	cd^3	M1 A1	for partial simplification, eg c or d^3 for cd^3	May be seen as simplification in original fraction Accept c^1d^3
	(c)	$x > \frac{14}{5}$	M1 A1	for $5x > 14$ or $5x = 14$ or critical value, $\frac{14}{5}$ oe $x > \frac{14}{5}$ or $x > 2\frac{4}{5}$ or $x > 2.8$	Must see carried out correctly, ie at least $5x > 7 \times 2$ not just intention seen. Allow other signs for this mark.

Pearson Edexcel – Monday 8 June 2020 - Paper 3 (Calculator) Higher Tier

3.

12	(a)	$\frac{3x^2}{(x-4)(x+2)}$	M1 M1 A1	for method to identify a common denominator, eg $(x-4)(x+2)$ for method to combine the fractions, eg $\frac{2x(x+2) + x(x-4)}{(x-4)(x+2)}$ for $\frac{3x^2}{(x-4)(x+2)}$ or $\frac{3x^2}{x^2-2x-8}$	Accept $\frac{2x(x+2)}{(x-4)(x+2)} + \frac{x(x-4)}{(x-4)(x+2)}$
	(b)	$8x^3 - 2x^2 - 51x - 45$	M1 M1 A1	for method to find the product of two linear expressions, eg 3 correct terms out of 4 terms or 4 terms ignoring signs for a complete method to obtain all terms, half of which are correct (ft their first product) eg $8x^3 - 12x^2 - 15x + 10x^2 - 36x - 45$ cao.	Note that, for example, $-3x - 9$ in expansion of $(x-3)(2x+3)$ is to be regarded as 3 correct terms. First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Higher Tier

4.

18	(a)	$3\sqrt{3}$	M1	for working unambiguously with $\sqrt{12}$, eg $\sqrt{4 \times 3}$ or $\sqrt{4} \times \sqrt{3}$ or $2\sqrt{3}$	May be seen as the first step
			A1	cao	
	(b)	$\frac{\sqrt{3}}{81}$	M1	for simplifying the power eg $(\sqrt{3})^7 = 27\sqrt{3}$	
			M1	for method to rationalise the denominator eg multiplying by $\frac{\sqrt{3}}{\sqrt{3}}$	
			A1	for $\frac{\sqrt{3}}{81}$ or equivalent fraction in form $\frac{\sqrt{b}}{c}$, eg $\frac{\sqrt{2187}}{2187}$	

Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Higher Tier

5.

20	fully correct working leading to $16(1+\sqrt{2})$	C1	for expanding the numerator, eg $18 + 2\sqrt{2}\sqrt{18} + 2$ or $\sqrt{324} + \sqrt{36} + \sqrt{36} + \sqrt{4}$ (= 32) or for simplifying $\sqrt{18}$, eg $\sqrt{18} = 3\sqrt{2}$ or $\sqrt{18} + \sqrt{2} = 4\sqrt{2}$	Expanded terms need not be simplified
		C1	(indep) for method to rationalise the denominator, eg. $\frac{\text{"numerator"}}{\sqrt{8}-2} \times \frac{\sqrt{8}+2}{\sqrt{8}+2}$	
		C1	for fully correct working leading to $16(1+\sqrt{2})$	

Pearson Edexcel - Monday 12 November 2018 - Paper 3 (Calculator) Higher Tier

6.

9	(a)	$2x^3 + x^2 - 7x - 6$	M1	for a method to find the product of two linear expressions eg 3 correct terms out of 4 terms or 4 terms ignoring signs	Note that (eg) $-x - 6$ in expansion of $(x - 2)(2x + 3)$ is to be regarded as 3 correct terms. First product must be quadratic but need not be simplified or may be simplified incorrectly
			M1	for a complete method to obtain all terms, half of which are correct (ft their first product) eg $2x^3 - x^2 - 6x + 2x^2 - x - 6$	
			A1	cao	
	(b)	-5	M1	for beginning to combine indices eg $4+n$ or y^{3+2}	
			A1	cao	
			(c)	1.27 and -0.472	
M1	for simplifying to the form $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ eg $\frac{4 \pm \sqrt{76}}{10}$ or 1.27 to 1.28 or -0.48 to -0.47				
A1	for 1.27 to 1.28 and -0.48 to -0.47	Condone one sign error in the substitution Accept -4^2 or $(-4)^2$			

Pearson Edexcel - Tuesday 12 June 2018 - Paper 3 (Calculator) Higher Tier

7.

2	$9p + 13$	M1	for method to expand one bracket, eg $5 \times p + 5 \times 3$ (= $5p + 15$) or $2 \times 1 - 2 \times 2p$ (= $2 - 4p$) or $-2 \times 1 - 2 \times -2p$ (= $-2 + 4p$)	If an attempt is made to multiply by -2 in the second brackets then it must be done consistently.
		A1	cao	

Pearson Edexcel - Thursday 2 November 2017 - Paper 1 (Non-Calculator) Higher Tier

8.

16		$\frac{7}{3}$	M1 M1 A1	for $y = k \sqrt[3]{x}$ oe or $\frac{7}{6} = \sqrt[3]{8} k$ oe for $k = \frac{7}{6 \times \sqrt[3]{8}}$ oe for $\frac{7}{3}$ oe
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Pearson Edexcel - Thursday 8 June 2017 - Paper 2 (Calculator) Higher Tier

9.

11		$9\frac{1}{3}$	M1 M1 M1 A1	for writing at least 2 fractions with a common denominator eg. $\frac{3(3x-2)}{12}, \frac{4(2x+5)}{12}, \frac{2(1-x)}{12}$ with at least one correct numerator or for $\frac{3x}{4} - \frac{2}{4} - \frac{2x}{3} - \frac{5}{3} = \frac{1}{6} - \frac{x}{6}$ (accept $+\frac{5}{3}$ instead of $-\frac{5}{3}$) (dep) for a method to eliminate all fractions in an equation, ignore errors in any expanded terms eg. $3(3x - 2) - 4(2x + 5) = 2(1 - x)$ or $6 \times [3(3x - 2) - 4(2x + 5)] = 12 \times [1 - x]$ or $3 \times 3x - 3 \times 2 - 4 \times 2x - 4 \times 5 = 2 \times 1 - 2 \times x$ OR for the correct expansion of brackets leading to $\frac{9x-6-8x-20}{12} = \frac{2-2x}{12}$ (dep on M2) for correctly isolating terms in x and number terms of their linear equation e.g. $9x - 8x + 2x = 2 + 6 + 20$ for $9\frac{1}{3}$ oe
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Pearson Edexcel - Thursday 8 June 2017 - Paper 2 (Calculator) Higher Tier

10.

19		$a = 4, b = -42$	M1 M1 M1 A1	for at least two terms from $2(x - 3)(x + 3), (x + 2)(x + 3), (x - 6)(x - 3)$ (dep) for the correct expansion of at least two expressions, irrespective of signs, eg. $2x^2 - 18, x^2 + 2x + 3x + 6, x^2 - 6x - 3x + 18$ oe for $2x^2 - 18 - x^2 - 5x - 6 - x^2 + 9x - 18$ for $a = 4, b = -42$ (accept $4x - 42$)
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Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

11.

14			Completes reasoning	M1 Expansion of $(4 - \sqrt{3})(4 + \sqrt{3})$ with at least 3 terms out of 4 correct or $4^2 - \sqrt{3} \times \sqrt{3}$ C1 for $\sqrt{13}$ from correct working
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Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

12.

17		$3 \pm \sqrt{17}$	<p>M1 For $(x - 3)^2 - 9 - 8 (= 0)$ or $(x =) \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-8)}}{2(1)}$ allow sign error for b</p> <p>M1 For $x - 3 = \pm \sqrt{17}$ or $x = \frac{6 \pm \sqrt{68}}{2}$</p> <p>A1 cao</p>
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Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

13.

20		$3x$	<p>M1 Factorising numerator and denominator of first fraction $\frac{3(x+2)}{(x-5)(x+2)} (= \frac{3}{x-5})$</p> <p>M1 Factorising denominator of second fraction $\frac{x+5}{x(x+5)(x-5)} (= \frac{1}{x(x-5)})$</p> <p>M1 Multiplication by reciprocal $\frac{3(x+2)}{(x-5)(x+2)} \times \frac{x(x+5)(x-5)}{(x+5)}$</p> <p>A1 Completing algebra to reach $3x$</p>
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Pearson Edexcel - Specimen Papers Set 2 - Paper 2 (Calculator) Higher Tier

14.

3	(a)		$13y - 1$	<p>M1 for expansion of one bracket</p> <p>A1 for full simplification</p>
	(b)		$35u^3w^7$	<p>B1 for 2 of $35, u^3$ and w^7 correct</p> <p>B1 cao</p>

Pearson Edexcel - Specimen Papers Set 2 - Paper 2 (Calculator) Higher Tier

15.

18		$(\sqrt{a} + 2\sqrt{b})(\sqrt{a} - 2\sqrt{b})$ $\sqrt{a} \times \sqrt{a} - 2\sqrt{a}\sqrt{b} +$ $2\sqrt{b}\sqrt{a} - 2\sqrt{b} \times 2\sqrt{b}$	$a - 4b$	<p>M1 for expansion of brackets or $\sqrt{4b} = 2\sqrt{b}$</p> <p>M1 for a or $(-4b)$</p> <p>A1 cao</p>
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Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

16.

15		$\frac{2x-5}{x+5}$	<p>M1 factorising to give $(2x - 5)(x + 1)$</p> <p>M1 factorising to give $(x + 5)(x + 1)$</p> <p>A1 cao</p>
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Pearson Edexcel - Specimen Papers Set 1 - Paper 3 (Calculator) Higher Tier

17.

11		$(x + 1)^2 - 9$	M1 for $(x + 1)^2$ or $m = 1$ A1 cao
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Pearson Edexcel - Specimen Papers Set 1 - Paper 3 (Calculator) Higher Tier

18.

14		$\frac{3x + 10}{x + 2}$	B1 for factorising to get $(x + 3)(x + 2)$ M1 for dealing with the division of $(x + 3)$ by $\frac{x^2 + 5x + 6}{x - 2}$ M1 for two correct fractions with a common denominator or a correct single fraction prior to subtracting eg $\frac{4(x+2)-(x-2)}{x+2}$ or $\frac{4(x+2)}{(x+2)} - \frac{(x-2)}{(x+2)}$ A1 $\frac{3x+10}{x+2}$
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Pearson Edexcel - Sample Paper 1 - (Non-Calculator) Higher Tier

19.

23		Given result	C1 Correct first step towards simplifying expression eg. $\frac{\sqrt{2}}{\sqrt{2} + 1}$ C1 Correct step to rationalise denominator C1 Conclusion to given result
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Pearson Edexcel - Sample Paper 2 - (Calculator) Higher Tier

20.

13		20	M1 Establishing method linked to proportion eg $d=k+c$ or $25=k+280$ M1 (dep) substitution eg $d = 7000 \div 350$ or $25 \times 280 \div 350$ oe A1 cao
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Pearson Edexcel - Sample Paper 2 - (Calculator) Higher Tier

21.

16		$\frac{2x+1}{3x+5}$	M1 for $(3x \pm 5)(2x \pm 1)$ or $(2x + 1)(2x - 1)$ M1 $\frac{1}{(3x \pm 5)(2x \pm 1)} \times (2x + 1)(2x - 1)$ A1
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Pearson Edexcel - Thursday 26 May 2016 - Paper 1 (Non-Calculator) Higher Tier

22.

24		100, 25, 4	4	<p>M1 for $y = \frac{k}{x^2}$ oe or $1 = \frac{k}{10^2}$</p> <p>M1 for complete method to find k or $y = \frac{100}{x^2}$ oe</p> <p>OR (dep on M1) for $k = 100$</p> <p>A1 for one entry correct</p> <p>A1 for other two entries correct</p>
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Pearson Edexcel - Thursday 9 June 2016 - Paper 2 (Calculator) Higher Tier

23.

24	(a)		$\frac{-1}{3x+4}$	2	<p>M1 for $(3x \pm 4)(x \pm 3)$ or $(-3x \pm 4)(-x \pm 3)$</p> <p>A1 for $\frac{-1}{3x+4}$, accept $\frac{1}{-3x-4}$</p>
	(b)		$\frac{2x}{x^2-1}$	3	<p>M1 for common denominator $(x-1)(x+1)$ or x^2-1</p> <p>M1 for $\frac{x(x+1)}{(x-1)(x+1)} - \frac{x(x-1)}{(x-1)(x+1)}$ oe or $\frac{x(x+1)-x(x-1)}{(x-1)(x+1)}$ oe</p> <p>(NB: The denominator must be $(x-1)(x+1)$ or x^2-1 or another suitable common denominator)</p> <p>A1 for $\frac{2x}{(x-1)(x+1)}$ or $\frac{2x}{x^2-1}$</p>

Pearson Edexcel - Friday 6 November 2015 - Paper 2 (Calculator) Higher Tier

24.

22			$2x^2 + 7x + 4 = 0$	3	<p>M1 for finding a correct coefficient</p> <p>M1 for a method to find a and c or b and c</p> <p>A1 $2x^2 + 7x + 4 = 0$ or $a = 2, b = 7, c = 4$</p>
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Pearson Edexcel - Thursday 4 June 2015 - Paper 1 (Non-Calculator) Higher Tier

25.

8	(a)		$2g - 3h$	2	<p>M1 for $2g$ or $-3h$</p> <p>A1 for $2g - 3h$ or $-3h + 2g$</p>
	(b)		$y(y-2)$	1	B1
	(c)		p^5	2	<p>M1 for $\frac{p^{3+4}}{p^2}$ ($= \frac{p^7}{p^2}$) or $p^{3-2} \times p^4$ ($= p^1 \times p^4$)</p> <p>or $p^3 \times p^{4-2}$ ($= p^3 \times p^2$)</p> <p>A1 cao</p>

Pearson Edexcel - Wednesday 5 November 2014 - Paper 1 (Non-Calculator) Higher Tier

26.

21		$3 - \sqrt{2} + 3\sqrt{2} - \sqrt{2}\sqrt{2}$	$1 + 2\sqrt{2}$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao
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Pearson Edexcel - Wednesday 5 November 2014 - Paper 1 (Non-Calculator) Higher Tier

27.

22	(a)		1	1	B1 cao
	(b)		$\frac{5y}{8x^3}$	2	M1 for correct square root or correct use of reciprocal eg $\frac{8x^3}{5y}$ or $\frac{25y^2}{64x^6}$ A1 for $\frac{5y}{8x^3}$ or $\frac{5}{8}yx^{-3}$ oe
	(c)		$\frac{x+27}{(x-3)(x+3)}$	3	M1 for denominator $(x-3)(x+3)$ or x^2-9 M1 for $\frac{5(x+3)}{(x-3)(x+3)}$ oe or $\frac{4(x-3)}{(x-3)(x+3)}$ oe (NB The denominator must be $(x-3)(x+3)$ or x^2-9 or another suitable common denominator) A1 for $\frac{x+27}{(x-3)(x+3)}$ or $\frac{x+27}{x^2-9}$

Pearson Edexcel - Friday 13 June 2014 - Paper 2 (Calculator) Higher Tier

28.

24			8	3	M1 for $p = \frac{k}{t}$ oe ($k \neq 1$) or $12 = \frac{k}{4}$ M1 for correct method to find k or $p = \frac{48}{t}$ oe or (dep on M1) for $k=48$ A1 cao OR M1 for $\frac{6}{4}$ oe M1 for $12 \div \frac{6}{4}$ oe A1 cao
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Pearson Edexcel - Wednesday 6 November 2013 - Paper 1 (Non-Calculator) Higher Tier

29.

21			100	4	M1 $y = kx^2$ oe or $36 = k \times 3^2$ A1 $k = 4$ M1 (dep on M1) $(y =) '4' \times 5^2$ A1 cao
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Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

30.

16	(a)		6.25	3	M1 for clear intention to expand bracket or divide both sides of the equation by 5 as first step M1 for correct method to isolate terms in f A1 for 6.25 oe
	(b)		-0.75	4	M1 for correct method to clear fractions eg. multiply all terms by 6 M1 for expansion of brackets oe M1 (dep on M1) for isolating the terms in h and the constant terms A1 for -0.75 oe

Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

31.

23		$\frac{4(x+5)}{(x+5)(x-3)}$	$\frac{4}{x-3}$	2	M1 for $(x \pm 5)(x \pm 3)$ A1 for $\frac{4}{x-3}$
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Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

32.

22			1.33	3	M1 for $3.4 = \frac{k}{5^2}$ oe or $3.4 \times 5^2 (=85)$ M1 for ' $3.4 \times 5^2 \div 8^2$ ' A1 for answer in range 1.32 to 1.33 or $\frac{85}{64}$
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Pearson Edexcel - Monday 6 June 2011 - Paper 3 (Non-Calculator) Higher Tier

33.

22	(a)	$27^{\frac{1}{3}} = 3$ $3^{-2} = \frac{1}{3^2}$	$\frac{1}{9}$	2	M1 for a correct cube root, reciprocal or square A1 for $\frac{1}{9}$ or 0.11(1...)
	(b)	$\frac{8-\sqrt{18}}{\sqrt{2}} = \frac{8}{\sqrt{2}} - \frac{\sqrt{18}}{\sqrt{2}}$ $= \frac{8}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} - \sqrt{\frac{18}{2}}$ $\frac{8\sqrt{2}}{2} - 3$	$a = -3$ $b = 4$	3	M1 for attempt to rationalise denominator, e.g. $\frac{8}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} - \frac{\sqrt{18}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ or $\frac{8-\sqrt{18}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ Or $8 - \sqrt{18} = \sqrt{2}(a + b\sqrt{2})$ oe A2 for $-3 + 4\sqrt{2}$ (A1 for -3) (A1 for 4) SC B1 if M0 scored for -3 or 4 seen on either answer line

Pearson Edexcel - Friday 12 November 2010 - Paper 4 (Calculator) Higher Tier

34.

25	(a)	$(2x + 4y)(4x - 5y)$ $= 8x^2 - 10xy + 16xy - 20y^2$	$8x^2 + 6xy - 20y^2$	2	B2 cao (B1 for 3 out of 4 terms correct or all 4 correct ignoring signs)
	(b)		$x + 10$	1	B1 for $x + 10$ or $(x + 10)$ or $(x + 10)^1$
	(c)	$= \frac{(x+5)(x-5)}{(x+5)(x+2)}$	$\frac{x-5}{x+2}$	3	M1 for $(x+5)(x-5)$ M1 (indep) for $(x+5)(x+2)$ A1 cao
	(d)	$x^2 + 6x - 2 = (x + 3)^2 - 9 - 2$	$p = 3$ $q = -11$	2	M1 for $(x + 3)^2 \pm k$ or $x^2 + 2px + p^2 + q$ oe or $p = 3$ or $q = -11$ A1 cao

Pearson Edexcel - Thursday 5 November 2009 - Paper 3 (Non-Calculator) Higher Tier

35.

21		$(2+\sqrt{3})(2-\sqrt{3})$ $= 4-2\sqrt{3}+2\sqrt{3}-\sqrt{3}\sqrt{3}$ $= 4-3$	1	2	M1 for all 4 terms correct ignoring signs or 3 out of 4 terms with correct signs.or correct use of difference of 2 squares A1 cao (SC M1 for $4-2\sqrt{3}+2\sqrt{3}$)
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OCR GCSE – Monday 9 November 2020 – Paper 6 (Calculator) Higher Tier

36.

18		$\frac{412}{990} = \frac{206}{495}$ with correct working or $\frac{41.2}{99} = \frac{206}{495}$ with correct working	3		"Correct working" requires M2 Subtractions can be implied
					M2 for $1000x [-] 10x = 416.16[1...] [-]$ $4.16[1...] \text{ leading to } 990x = 412$ or for $100x [-] x = 41.616[1...] [-]$ $0.416[1...] \text{ leading to } 99x = 41.2$ or M1 for $10x = 4.16[1...] \text{ or } 100x = 41.616[1...] \text{ or } 1000x = 416.16[1...] \text{ seen}$

OCR GCSE – Thursday 7 June 2018 – Paper 5 (Non - Calculator) Higher Tier

37.

1	(a)	$1\frac{9}{40}$	3	Mark final answer M2 for $\frac{24[k] + 25[k]}{40[k]}$ or better (k is positive integer) or M1 for two equivalent fractions with common denominator of $40[k]$ attempted with one numerator correct If 0 scored, SC1 for answer 1.225	Could be separate fractions M2 soi by $\frac{49[k]}{40[k]}$ oe Could be seen in 2 different fractions without addition
	(b)	4.84×10^4	3	M2 for figs 484 in final answer or B1 for 50 000 or 50×10^3 seen or for 1600 or 0.16×10^4 seen	Allow M2 if correct answer oe seen in working

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

38.

1	$x + 4x \equiv 5x$	B1	
	Additional Guidance		

AQA GSCE – Tuesday 21 May 2019 – Paper 1 (Non - Calculator) Higher Tier

39.

4	$\frac{37}{8}$	B1	
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AQA GSCE – Tuesday 21 May 2019 – Paper 1 (Non - Calculator) Higher Tier

40.

19	$\frac{1}{9}$	B1	
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