SOLVING EQUATIONS

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

1.

10	(a)	4	B1	cao	
	(b)	8	B1	cao	
	(c)	3	M1	for a correct first step eg subtracting 2 from both sides **or** dividing all terms by 6	Division by 6 must be ALL terms
			A1	cao	

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

2.

17	(a)	Full working seen	M1	for an initial step with the expressions eg doubling $2x + 1$ or $x + 2$ **or** halving $4x$ **or** for identifying CD as $x + 2$ **or** for identifying DE as $2x + 1$	May be seen in working or on diagram
			M1	for an expression for the total perimeter, eg $4x + 2 \times (2x + 1) + 2 \times (x + 2)$	
			C1	for full simplification and equating to 18	
	(b)	1.2	M1	for isolating terms in x can ft an equation stated in (a) provided in form $ax + b = c$	$10x = 18 - 6$
			A1	for 1.2 oe	Accept $\frac{12}{10}$ or $\frac{6}{5}$

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3.

11	(a)	17	B1	cao	
	(b)	12	B1	cao	
	(c)	5.5	B1	Accept $\frac{11}{2}$, $5\frac{1}{2}$ oe	

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4.

25	3.8	M1	for a correct first step, eg $5 - x = 2(2x - 7)$ or $5 - x = 4x - 14$ or $\frac{5}{2} - \frac{x}{2} = 2x - 7$	Method must show LHS ×2 and both terms on RHS ×2 or $5 - x$ and both terms on RHS ×2
		M1	(dep) for isolating terms in x eg $4x + x = 14 + 5$ or $-\frac{x}{2} - 2x = -7 - \frac{5}{2}$	eg $-4x$ both sides with -5 both sides or $+x$ both sides with $+14$ both sides
		A1	oe	Accept $\frac{19}{5}$, $3\frac{4}{5}$ oe but not $\frac{-19}{-5}$ oe

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5.

16		$1\frac{1}{2}$	M1 M1 A1	for correct expansion of the bracket or dividing all terms by 3 as a first step eg $3x - 3$ or $(5x - 6)/3 = 3(x - 1)/3$ for isolating terms in x on one side of an equation eg $5x - 6 - 3x = -3$ or both constants on one side of an equation, eg $5x = 3x - 3 + 6$, ft $5x - 6 = 3x - 1$ for $1\frac{1}{2}$ oe

Pearson Edexcel – Specimen 2 - Paper 1 (Non-Calculator) Foundation Tier

6.

10	a		-2	M1 A1	For subtraction of 7 from both sides or division of all terms by 3 as first step of solution cao
	b		8	M1 A1	For substitution $3\times6 - 2\times5$ cao

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7.

17	(a)		$4x + 6y$	M1 A1	for $4x$ or $6y$ for $4x + 6y$ or $2(2x + 3y)$
	(b)		$5(2x - 3)$	B1	cao
	(c)		4	M1 A1	for method to isolate terms in p on one side and constants on the other side cao

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8.

16	(a)		1.5	M1 A1	for rearranging, eg $11 - 5 = 4c$ 1.5 oe
	(b)		-3	M1 A1	for a first step of either dividing both sides by 5, eg $\frac{5(e+7)}{5} = \frac{20}{5}$ or for expanding the bracket, eg $5\times e + 5\times7 = 20$ cao
	(c)		m^6	B1	cao

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9.

10		38 15	B1 cao P1 (47 - 2) ÷ 3 A1 cao	

OCR – Tuesday 03 November 2020- Morning - Paper 1 (Calculator) Foundation Tier

10.

15	**(a)**		20	**2**	**M1** for $\frac{x}{2} = 15 - 5$ or better or $x + 10 = 30$	For **M1** must be an equation in x
	(b)		$5a(a - 2)$ final answer	**2**	**M1** for $5(a^2 - 2a)$ or $a(5a - 10)$ as answer	Condone missing final bracket
	(c)		$(x + 7)(x + 8)$ $^-7$ and $^-8$ final answer	**M2** **B1FT**	**M1** for $(x + a)$ and $(x + b)$ where $ab = 56$ or $a + b = 15$ for correct solutions from *their* quadratic factors If **0** scored **SC1** for answers ±7 and ± 8	

OCR Thursday 05 November 2020- Morning (Non-Calculator) Foundation Tier

11.

21			$[x =]\ -1$ $[y =]\ 4$	**4**	**M1** for attempt to equate coefficients **M1** for correct method to eliminate 1 variable **A1** for 1 correct solution If A0, **SC1** for a pair of values that satisfy one of the original equations	ISW correct answers seen in working then reversed Condone 1 arithmetic error – a sign error is not an arithmetic error Condone 1 further arithmetic error Alt method M1 for rearrangement of one equation to make either x or y the subject M1 for correct substitution of *their* rearrangement into the other equation

OCR November 09 November 2020- Morning (Calculator) Foundation Tier

12.

11			$c = 2$ final answer $d = ^-3$ final answer	**5**	**B3** for $c = 2$ and **B2** for $d = ^-3$ OR **M4** for $5 + 2d = ^-1$ oe or **M3** for $10 + c = 12$ or $5 + cd = ^-1$ or $10x + cx = 12x$ or **M2** for $10x + 5 + cx + cd$ [$= 12x - 1$] oe or **M1** for $10x + 5$ or $cx + cd$	Must not come from wrong working Accept e.g. $d2$ or $2 \times d$ etc for $2d$ e.g. $10x + cx + cd = 12x - 6$

OCR Tuesday 6 November 2018 – Morning (Calculator) Foundation Tier

13.

13			31.4[2] or 31.41…	2	**M1** for π × 10 oe	Method can be spoiled

14.

14	(a)	(i)	7 cao	1		Do not allow a7 or a^7
		(ii)	12 cao	1		Do not allow $b12$ or b^{12}
	(b)		$9x(2x + 1)$ final answer	2	**B1** for $9(2x^2 + x)$ or $x(18x + 9)$ or $3x(6x+3)$ or $3(6x^2+3x)$	condone final bracket missing

OCR Monday 12 November 2018 – Morning (Calculator) Foundation Tier

15.

7	(a)		Hollow circle at 3 only Line/arrow "pointing" right from 3	1 1	 Marks independent	No other blobs Open line or arrow only and condone mark/blob over 8 or x If line, must reach approx. 8 Condone line/arrow starting closer to 3 than 4
	(b)		$11a - 2c$ final answer	2	**B1** for $11a$ or $-2c$ seen	Accept in any order $11a + -2c$ scores 1 mark
	(c)		6	2	**M1** for $2x = 12$ or $\frac{x}{3} = 2$ or $\frac{x}{1.5} = 4$	If T&I only correct answer scores Must be algebraic method for M1 Do not accept embedded answers

16.

11	(a)		6	1		
	(b)		1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$ oe	2	**M1** for $18 = 2 \times 6[\times]g$ or better	May be (eg) $\frac{18}{6} = 2g$ or $\frac{18}{2\times 6}$ etc.

OCR Monday 24 May 2018 – Morning (Calculator) Foundation Tier

17.

6			11	2	**M1** for 3 + 2 × 4	

Pearson Edexcel – Sample Papers - Paper 1 (Non-Calculator) Foundation Tier

18.

19		7	M1 Correct method to isolate terms in x A1

OCR Sample Question Paper 1 – Morning/Afternoon (Calculator) Foundation Tier

19.

17	**(a)**		E	**1** 1 AO1.3a		
	(b)		C and D	**2** 2 AO1.3a	**B1** for each	

OCR Sample Question Paper 2 – Morning/Afternoon (Non - Calculator) Foundation Tier

20.

12	**(a)**		6	**2** 2 AO1.3a	**M1** for $3x = 18$	
	(b)		-3 -5	**3** 3 AO1.3a	**M2** for $(x + 3)(x + 5)$ seen or implied in table Or **M1** for $(x \pm 3)(x \pm 5)$ seen or pair of factors giving two correct terms seen or implied in table And **B1** for correct solutions **FT** *their* quadratic factors	

OCR Sample Question Paper 2 – Morning/Afternoon (Non - Calculator) Foundation Tier

21.

18	**(a)**		The first error is in step 2 $-3x - 2x = -5x$, not $-x$ as given	**2** 2 AO2.5a	**B1** for identifying step 2 **B1** for explaining the error	

	(b)		$[x^2 + 4x + x + 4 = x^2 - 3x - 2x + 6]$ $x^2 + 5x + 4 = x^2 - 5x + 6$ $5x + 4 = -5x + 6$ $10x + 4 = 6$ $10x = 2$ $x = \frac{1}{5}$	**2** 2 AO1.3a	**M1** for an attempt to correct the solution in line with their answer to **(a)**	

OCR Sample Question Paper 3 – Morning/Afternoon (Calculator) Foundation Tier

22.

1	(a)	(i)	9	1 1 AO1.3a		
		(ii)	3	1 1 AO1.3a		
		(iii)	45	1 1 AO1.3a		
	(b)	(i)	13	2 2 AO1.3a	**M1** for $12 \times 4 - 5 \times 7$ or better	
		(ii)	$r = \frac{p+q}{4}$	2 2 AO1.3a	**M1** for $4r = p + q$	Allow correct equivalents of $\frac{p+q}{4}$

AQA Tuesday 19 May 2020 – Morning (Non-Calculator) Foundation Tier

23.

Q	Answer	Mark	Comments
14(a)	$6x = 13 + 11$ or $6x = 24$ or $\frac{24}{6}$	M1	oe eg $-6x = -13 - 11$ or $-6x = -24$ or $\frac{-24}{-6}$
	4	A1	
	Additional Guidance		
	Embedded answer, eg $6 \times 4 - 11 = 13$		M1A0
	24 with no other working		M0A0
	Flow chart method, if 4 not given as the answer. $x \rightarrow \times 6 \rightarrow -11 \rightarrow 13$ and $13 \rightarrow +11 \rightarrow \div 6 \rightarrow x$		M1A0

Q	Answer	Mark	Comments
14(b)	$(2 \times 4a =)\ 8a$	B1	
	$\left(\frac{15a}{3} =\right)\ 5a$	B1	
	$13a + 2$	B1ft	ft B1B0 or B0B1 for their $8a$ + their $5a + 9 - 7$ is in the form $pa + q$ do not award with further incorrect work eg $13a + 2 = 15a$
	Additional Guidance		
	$13a + c$ could come from incorrect working eg $8a + 4 + 9 + 5a - 7 = 13a + 16$ (their $8a$ is $8a + 4$) eg $8a + 4 + 9 + 5a - 7 = 13a + 6$ (their $8a$ is $8a + 4$) eg $8a + 9 + 5a - 7 = 13a + 16$ eg $13a + 16$ (no other working)		B0B1B0ft B0B1B1ft B1B1B0ft B1B1B0ft
	$6a + 9 + 5a - 7 = 11a + 2$		B0B1B1ft
	$8a + 9 + 12a - 7 = 20a + 2$		B1B0B1ft
	$8a + 9 + 5 - 7 = 8a + 7$		B1B0B1ft
	$8a + \frac{15a}{3} + 7$		B1B0B0ft
	$6a + 9 + 12a - 7 = 18a + 2$		B0B0B0ft
	$6a + 5a + 16 = 11a + 16$		B0B1B0ft

AQA Thursday 4 June 2020 – Morning (Calculator) Foundation Tier

24.

Q	Answer	Mark	Comments
5(a)	8	B1	
	Additional Guidance		
	$56 \div 7 = 8$	B1	
	Answer of $\times 8$ (unless recovered)	B0	
	Answer of $8x$ (unless recovered)	B0	
	Award the mark for an embedded answer only if the answer is selected eg1 $7 \times 8 = 56$ with no answer or with incorrect answer eg2 $7 \times (8) = 56$ with no contradictory answer	 B0 B1	

Q	Answer	Mark	Comments
5(b)	7	B1	
	Additional Guidance		
	$25 - 18 = 7$	B1	
	$18 - 25 = 7$ (allow recovery)	B1	
	Answer of -7 (unless recovered)	B0	
	Answer of $7y$ (unless recovered)	B0	
	Award the mark for an embedded answer only if the answer is selected eg1 $25 - 7 = 18$ with no answer or with incorrect answer eg2 $25 - (7) = 18$ with no contradictory answer	 B0 B1	

AQA Tuesday 21 May 2019 – Morning (Non-Calculator) Foundation Tier

25.

24(a)	$-a$	B1	

24(b)	$\frac{1}{c}$	B1	

AQA Thursday 8 November 2018 – Morning (Calculator) Foundation Tier

26.

20	**Alternative method 1**		
	$35x + 6x = ax$ or $35 + 6 = a$ or $41x = ax$	M1	
	$a = 41$	A1	
	$40 + 3b = 13$	M1	oe
	$b = -9$	A1	SC3 $a = 41$, $b = -27$ or $a = 41$, $b = \frac{5}{3}$
	Alternative method 2		
	$35x + 40 + 6x + 3b$ or $41x + 40 + 3b$	M1	
	$35x + 6x = ax$ or $35 + 6 = a$ **and** $40 + 3b = 13$	M1dep	oe eg $41x = ax$ and $3b = -27$
	$a = 41$	A1	implies first M1 only
	$b = -9$	A1	SC3 $a = 41$, $b = -27$ or $a = 41$, $b = \frac{5}{3}$
	Additional Guidance		
	$a = 41$ and $b = -9$		M1A1M1A1
	$a = 41$ or $b = -9$		M1A1
	$35x$, 40, $6x$ and $3b$ seen without addition signs shown or implied		M0
	$35x + 40 + 6x + b$ leading to an answer of $a = 41$ and $b = -27$		SC3
	$35x + \mathbf{8} + 6x + 3b$ leading to an answer of $a = 41$ and $b = \frac{5}{3}$		SC3
	$35x + \mathbf{8} + 6x + b$ leading to an answer of $a = 41$ and $b = 5$		M1A1
	$a = 41x$		M0
	For $\frac{5}{3}$ accept 1.66… or 1.67		
	Condone multiplication signs eg $35 \times x$ for $35x$		

AQA Monday 6 November 2017 – Morning (Calculator) Foundation Tier

27.

27	**Alternative method 1**		
	$12x - 8$	M1	May be seen in a grid
	their $12x - 2x = -5$ + their 8 or $10x = 3$ or their $-8 + 5 = 2x$ – their $12x$ or $-3 = -10x$	M1	Collecting two terms in x and two constant terms correctly oe eg $10x - 3 = 0$
	0.3 or $\frac{3}{10}$	A1ft	ft M1M0 or M0M1 with exactly one error
	Alternative method 2		
	$\frac{x}{2} - \frac{5}{4}$	M1	
	$3x$ – their $\frac{x}{2}$ = their $-\frac{5}{4}$ + 2 or $\frac{5}{2}x = \frac{3}{4}$ or -2 + their $\frac{5}{4}$ = their $\frac{x}{2} - 3x$ or $-\frac{3}{4} = -\frac{5}{2}x$	M1	Collecting two terms in x and two constant terms correctly oe eg $\frac{5}{2}x - \frac{3}{4} = 0$
	0.3 or $\frac{3}{10}$	A1ft	ft M1M0 or M0M1 with exactly one error

Additional guidance continues on the next page

	Additional Guidance	
27 cont	$12x - 2 = 2x - 5$ $10x = -3$ $x = -0.3$	M0 M1 A1ft
	$12x - 8 = 2x - 5$ $10x = -5$ $x = \frac{-5}{10}$	M1 M0 A1ft
	$12x - 8 = 2x - 5$ $14x = 3$ $x = \frac{3}{14}$	M1 M0 A1ft
	$12x - 8 = 2x - 5$ $14x = -13$ $x = -\frac{13}{14}$ (two errors)	M1 M0 A0ft
	$12x - 8 = 8x - 20$	M1M0A0
	Any ft answer must be exact or rounded or truncated to at least 2 dp	
	The last two marks can be implied without the collection of terms seen eg $12x - 6 = 2x - 5$ and answer 0.1	M0M1A1ft
	Collecting terms before the bracket has been expanded	Zero

AQA Sample Paper 2– Morning (Calculator) Foundation Tier

28.

29	$(x - 4)(x + 8) = 0$	B1	