Qn		Working	Answer	Mark	Notes	
1	a	e.g. $d - g = 2ac$ $$\frac{d}{2c} = \frac{g}{2c} + a$$			M1	for a correct first step eg subtract g from both sides **OR** divide all terms by 2 **OR** divide all terms by c **OR** divide all terms by $2c$
			$a = \dfrac{d-g}{2c}$	2	A1	oe
	b		$3f(3e-4)$	2	B2	(B1 for $3(3ef - 4f)$ or $f(9e - 12)$ or $3f(ke - 4)$ or $3f(3e - m)$ where $k \neq 0$ and $m \neq 0$)
	c	$x^2 - 5x + 2x - 10$			M1	for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** $x^2 - 3x \ldots$ **or** for $\ldots -3x - 10$
			$x^2 - 3x - 10$	2	A1	
	d	$\dfrac{n^{11}}{n^5}$ **OR** $n^{-1} \times n^7$ **OR** $n^4 \times n^2$ **OR** $n^4 \times n^7 \times n^{-5}$ **OR** $n^{"11"} \div n^5 = n^{("11" - 5)}$			M1	for simplifying two terms
			n^6	2	A1	
						Total 8 marks

2		(adding) $10x = -5$ or $21x + 35y = 42$ $21x - 15y = -33$ then $50y = 75$		3	M1	Correct method to eliminate x or y Or making coefficients of x or y the same **and** correct operator has been applied to eliminate x or y (2 out of 3 terms correct implies a correct operator) or correct algebraic substitution for x or y into other equation
			$x = -0.5$ oe $y = 1.5$ oe		A1 A1	Both A marks dep on M1
						Total 3 marks

3	$(x \pm 9)(x \pm 4)$	$\dfrac{-(-5)\pm\sqrt{(-5)^2-4\times1\times(-36)}}{2\times1}$ or $\dfrac{5\pm\sqrt{25+144}}{2}$			M1	**or** $(x + a)(x + b)$ where $ab = -36$ **or** $a + b = -5$ **OR** correct substitution into quadratic formula (condone one sign error in a, b or c) (if + rather than ± shown then award M1 only unless recovered with answers)
	$(x - 9)(x + 4)$	$\dfrac{5\pm\sqrt{169}}{2}$ or $\dfrac{5\pm13}{2}$			M1	$\dfrac{5\pm\sqrt{169}}{2}$ or $\dfrac{5\pm13}{2}$
			9, −4	3	A1	dep on at least M1
						Total 3 marks

4	(a)		5^{19}	1	B1	
	(b)			2	M1	A factor tree / division ladder of 3 or more factors ($\neq 1$), multiplying to 800, which must include 2 and 5. Condone 1 error when product $\neq 800$
			2×2×2×2×2×5×5		A1	dep on M1 oe eg $2^5 \times 5^2$
						Total 3 marks

5		$4x$ or $x - 7$		4	M1	Correct expression for B or C
		$x + 4x + x - 7 = 137$ oe			M1	Correct equation
		$x = 144 \div 6\ (=24)$ or $6x = 144$ or $6x - 144 = 0$			M1	Gathering up the x's and numbers Dep on previous M1
			17		A1	
						Total 4 marks

6	(a)		2, −1.5, −3, 0	2	B2	B1 for 2 or 3 values correct
	(b)			2	M1ft	At least 5 points plotted correctly ft from table dep on B1 in part (a)
					A1	For correct smooth curve.
						Total 4 marks

7	(a)		−1, 0, 1, 2, 3, 4	2	B2	B1 for − 2, −1, 0, 1, 2, 3, 4 or −1, 0, 1, 2, 3
						Total 2 marks

8	a		9	1	B1	
	b	$(g(2) =) \dfrac{4}{2+3}\left(=\dfrac{4}{5}\right)$ oe			M1	**or** for sight of fg(x) e.g. $\left(\dfrac{4}{x+3}-4\right)^2$
			10.24	2	A1	oe e.g. $\dfrac{256}{25}$
						Total 3 marks

9		e.g. $6(x − 1) (= 6x − 6)$			M1	method to find expression for perimeter of hexagon
		e.g. $2(x + 5) + 2x − 3 (= 4x + 7)$			M1	method to find expression for perimeter of triangle
		"$6x − 6$" = "$4x + 7$"			M1	(dep on at least M1) for equating both expressions
		e.g. $6x − 4x = 7 + 6$			M1	(dep on previous M1 and equation of the form $ax + b = cx + d$)for rearranging the x terms on one side and the numerical terms on the other and all expansions correct.
			5.5	5	A1	oe (dep on M2)
						Total 5 marks

10	e.g. $36 \div (2+6)$ $(=4.5)$ **or** $36 \div \dfrac{2+6}{3+2+6}(=49.5)$ oe **or** Asha = £9 **OR** Julie = £27			M1	
	e.g. $3 \times$ "4.5" **or** "49.5"$\times \dfrac{3}{3+2+6}$ **or** "9"$\times\dfrac{3}{2}$ **or** "27"$\times\dfrac{3}{6}$			M1 or an answer of $\dfrac{27}{2}$	
		13.5(0)	3	A1 SCB1 for 36/5 × 7(= 43.2) or 36/9 × 2(= 8)	
				Total 3 marks	

11	e.g. $\dfrac{16}{5}$ **and** $\dfrac{21}{8}$ oe			M1	both fractions expressed as improper fractions
	e.g. $\dfrac{\cancel{16}^{2}}{5}\times\dfrac{21}{8^{1}}$ **OR** $\dfrac{336}{40}$ oe			M1	correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\dfrac{16}{5}\times\dfrac{21}{8}=\dfrac{336}{40}=\dfrac{42}{5}=8\dfrac{2}{5}$ **or** $\dfrac{16}{5}\times\dfrac{21}{8}=\dfrac{336}{40}=8\dfrac{16}{40}=8\dfrac{2}{5}$ **or** $\dfrac{\cancel{16}^{2}}{5}\times\dfrac{21}{8^{1}}=\dfrac{42}{5}=8\dfrac{2}{5}$ **or** candidate clearly shows that in the question, the result of $8\dfrac{2}{5}=\dfrac{42}{5}$ and that their answer becomes $\dfrac{42}{5}$	shown	3	A1	Dep on M2 for conclusion to $8\dfrac{2}{5}$ from correct working – either sight of the result of the multiplication e.g. $\dfrac{336}{40}$ must be seen or correct cancelling prior to the multiplication to $\dfrac{42}{5}$ NB: use of decimals scores no marks
					Total 3 marks

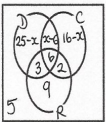| 12		Fully correct perpendicular bisector with all relevant arcs shown.	2	B2	Fully correct bisector with all arcs. Correct arcs can be on the same side of *AB*.
					B1 for all correct arcs and no bisector drawn or for a correct bisector within guidelines but no arcs.
					NB: On tramlines = within tramlines.
					Total 2 marks

13	a		23	1	B1	accept 22 – 24
	b	e.g. 29 − 17			M1	For subtracting readings from 15 and 45
			12	2	A1	accept 10 – 14
	c				B1	ft comparison of the medians
			Two comparisons (at least one of which must be in context)	2	B1	ft comparison of the IQR **Note: to award 2 marks at least one comparison must be in context**
						Total 5 marks

14	5, 7, 11, 12, 13, 14, 15, 16, 17, 18, 18		3	M1	Ordering marks (allow 1 error)
	11 and 17 selected			M1	LQ = 11 and UQ =17 identified
		6		A1	
					Total 3 marks

15	$(AOC =) 38 \times 2 (= 76)$		4	M1	
		52		A1	
				B2	(dep on M1) for all reasons relevant to their method – underlined words must be seen. <u>angle</u> at the <u>centre</u> is <u>2 ×</u> (double) angle at <u>circumference</u> / <u>angle</u> at <u>circumference</u> is <u>½</u> angle at <u>centre</u> <u>angles</u> in a <u>triangle</u> add to <u>180°</u> **or** angles in a <u>triangle</u> add to <u>180°</u> base angles in an <u>isosceles</u> triangle (are equal) If not B2 then award B1 (dep on M1) for a correct circle theorem
					Total 4 marks

16	$\dfrac{3}{2-\sqrt{y}} \times \dfrac{2+\sqrt{y}}{2+\sqrt{y}}$ **or** $6+3\sqrt{y}$ **or** $4-y$			M1	for multiplying numerator and denominator by $(2+\sqrt{y})$ **or** a correct expression for the numerator or denominator
		$\dfrac{6+3\sqrt{y}}{4-y}$	2	A1	
					Total 2 marks

17	(a)			3	B3	All 8 values inserted correctly B2 for 4 to 7 correct values B1 for 2 or 3 correct values NB: Expressions involving x do not have to be simplified.
	(b)	"$[(25 - x) + (x - 6) + (16 - x) +$ $3 + 6 + 2 + 9 + 5]$" $= 50$		2	M1ft	For sum of all their values $= 50$ oe
			10		A1	
						Total 5 marks

18	(a)	Factorising numerator as $(5x + 4)(2x + 3)$		3	M1	
		Factorising denominator as $(2x + 3)(2x - 3)$			M1	
			$\dfrac{5x + 4}{2x - 3}$		A1	
	(b)	$(8^{5y} =)\, 2^{15y}$ or $(4^n =)2^{2n}$ or 2^{5y+2}		4	M1	
		$2^{5y+2} = 2^{15y - 2n}$ oe			M1	e.g. $2^{2n} = 2^{15y - 5y - 2}$
		$5y + 2 = 15y - 2n$ oe			M1	Correct equation using the powers
			$n = 5y - 1$		A1	Dep on M2 (accept $5y - 1$)
						Total 7 marks

19	$(N + 1)^2 = (N^2 + 2N + 1)$ and $(N − 1)^2 = (N^2 − 2N + 1)$		3	M1	
	$(N^2 + 2N + 1) − (N^2 − 2N + 1) = 4N$			M1	Must reach 4N correctly
		$N = 5x$ oe Therefore $4N = 20x$		A1	Dep. on M2. A correct conclusion (i.e. 20 "x") following fully correct working
	Alt: $N = 5x$ oe in both A and B			M1	
	$(5x + 1)^2 = (25x^2 + 10x + 1)$ and $(5x − 1)^2 = (25x^2 − 10x + 1)$			M1	
		$(25x^2 + 10x + 1) −$ $(25x^2 − 10x + 1)$ $= 20x$		A1	Dep. on M2. Subtraction of two correct brackets to reach 20 "x"
	Alt: $A^2 − B^2 = (A + B)(A − B)$ $A + B = 2N$ and $A − B = 2$			M1	
	$A^2 − B^2 = 2N \times 2 = 4N$			M1	
		$N = 5x$ oe Therefore $4N = 20x$		A1	Dep. on M2. A correct conclusion (i.e. 20 "x") following fully correct working
					Total 3 marks

20	$-2(x^2 + 6x - 3.5)$ or $-2(x^2 + 6x) + 7$		3	M1	Factorising by -2
	$-2[(x+3)^2 - 9 - 3.5]$ or $-2[(x+3)^2 - 9] + 7$			M1	Completing the square
		$25 - 2(x+3)^2$		A1	
	Alt : $a + b(x^2 + 2cx + c^2)$				
	$2bc = -12$ or $a + bc^2 = 7$ or $b = -2$			M1	Equating coefficients or stating value of b
	$2 \times -2 \times c = -12$ or $c = 3$			M1	Equating coefficients or stating value of c
	$a + -2 \times (3)^2 = 7$ or $a = 25$ seen			A1	Equating coefficients or stating value of a
					Special Cases: SC B2 for answer of $-2(x+3)^2 +$ constant or $25 - 2(x +$ positive constant$)^2$ SC B1 for answer of $-2(x-3)^2 +$ constant
					Total 3 marks

21	$OC = 3\mathbf{a} + 4\mathbf{b}$		5	B1	Correct expression for OC
	$ON = t(3\mathbf{a} + 4\mathbf{b})$			M1	Correct expressions for ON
	$ON = 3\mathbf{a} + s(-3\mathbf{a} + 6\mathbf{b})$			M1	
	$t(3\mathbf{a} + 4\mathbf{b}) = 3\mathbf{a} + s(-3\mathbf{a} + 6\mathbf{b})$ $\rightarrow t = 0.6, \ s = 0.4$			A1	t or s value correct
		$ON = 1.8\mathbf{a} + 2.4\mathbf{b}$ oe		A1	e.g. $ON = \dfrac{3}{5}(3\mathbf{a} + 4\mathbf{b})$
	Alt:				
	$AB = -3\mathbf{a} + 6\mathbf{b}$			B1	Correct expression for AB
	$AN = s(-3\mathbf{a} + 6\mathbf{b})$			M1	Correct expressions for AN
	$AN = -3\mathbf{a} + t(3\mathbf{a} + 4\mathbf{b})$			M1	
	$-3\mathbf{a} + t(3\mathbf{a} + 4\mathbf{b}) = s(-3\mathbf{a} + 6\mathbf{b})$ $\rightarrow t = 0.6, \ s = 0.4 \rightarrow AN = -1.2\mathbf{a} + 2.4\mathbf{b}$ $ON = 3\mathbf{a} + AN$			A1	t or s value correct
		$ON = 1.8\mathbf{a} + 2.4\mathbf{b}$ oe		A1	e.g. $ON = \dfrac{3}{5}(3\mathbf{a} + 4\mathbf{b})$
	Alt:				
	$OC = 3\mathbf{a} + 4\mathbf{b}$			B1	Correct expression for OC
	$ON : NC = 6 : 4$ (i.e 3:2)			M1	
	$ON = \dfrac{3}{5} OC$			M2	
		$ON = 1.8\mathbf{a} + 2.4\mathbf{b}$ oe		A1	e.g. $ON = \dfrac{3}{5}(3\mathbf{a} + 4\mathbf{b})$
					Total 5 marks

Qn	Paper	Question	Skill tested	Max score	Mean %	Edexcel averages: scores of candidates who achieved grade:							
						ALL	9	8	7	6	5	4	3
1	1HR	Q03	Algebraic manipulation	8	91	7.28	7.92	7.84	7.64	7.35	6.94	5.70	4.42
2	2HR	Q07	Simultaneous linear equations	3	86	2.57	2.95	2.80	2.78	2.39	2.35	1.88	1.25
3	1HR	Q06	Quadratic equations	3	83	2.49	2.92	2.85	2.72	2.11	2.01	1.63	1.00
4	2HR	Q01	Powers and roots	3	89	2.68	2.90	2.92	2.70	2.56	2.52	2.25	2.25
5	2HR	Q03	Linear equations	4	82	3.29	3.94	3.84	3.60	3.13	2.33	1.62	0.67
6	2HR	Q15	Graphs	4	86	3.43	3.86	3.71	3.56	3.18	3.08	2.70	2.30
7	2HR	Q11a	Inequalities	2	81	1.62	1.95	1.87	1.76	1.61	1.10	0.92	0.36
8	1HR	Q17ac	Function notation	3	82	2.45	2.93	2.87	2.53	2.21	1.77	1.42	0.89
9	1HR	Q10	Linear equations	5	75	3.74	4.80	4.74	4.08	2.98	1.87	0.97	0.36
10	1HR	Q01	Ratio and proportion	3	78	2.35	2.87	2.76	2.44	2.30	1.69	0.96	0.97
11	1HR	Q02	Fractions	3	78	2.32	2.68	2.60	2.38	2.29	2.08	1.62	1.03
12	2HR	Q06	Construction	2	73	1.45	1.81	1.65	1.52	1.25	0.99	0.72	0.67
13	1HR	Q12	Statistical measures	5	67	3.35	4.58	4.00	3.09	2.37	2.12	1.54	1.14
14	2HR	Q14	Statistical measures	3	62	1.85	2.54	2.10	1.79	1.34	1.06	0.83	0.61
15	1HR	Q14	Circle properties	4	58	2.32	3.18	2.68	2.24	1.70	1.35	1.06	0.69
16	1HR	Q13b	Powers and roots	2	62	1.23	1.93	1.62	1.06	0.62	0.51	0.13	0.00
17	2HR	Q17ab	Set language and notation	5	56	2.78	4.21	3.20	2.41	1.76	1.34	1.07	0.84
18	2HR	Q21	Algebraic manipulation	7	53	3.71	6.33	4.54	2.86	1.97	0.86	0.50	0.14
19	2HR	Q25	Algebraic manipulation	3	42	1.26	2.28	1.55	0.84	0.40	0.23	0.06	0.00
20	2HR	Q23	Algebraic manipulation	3	41	1.23	2.52	1.42	0.72	0.32	0.15	0.00	0.00
21	2HR	Q26	Vectors	5	28	1.39	2.73	1.25	0.77	0.41	0.19	0.06	0.06
				80	68	54.79	71.83	62.81	53.49	44.25	36.54	27.64	19.65

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	67	58	49	40	32	24	18