

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 $2c$
		$a = \frac{d-g}{2c}$	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 $x^2 - 3x \dots$ or for $\dots - 3x - 10$
		$x^2 - 3x - 10$	2	A1
d	$\frac{n^{11}}{n^5}$ 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	$(x \pm 9)(x \pm 4)$	$\frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 1 \times (-36)}}{2 \times 1}$ or $\frac{5 \pm \sqrt{25 + 144}}{2}$			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 \pm shown then award M1 only unless recovered with answers)
	$(x - 9)(x + 4)$	$\frac{5 \pm \sqrt{169}}{2}$ or $\frac{5 \pm 13}{2}$			M1 or $\frac{5 \pm \sqrt{169}}{2}$ or $\frac{5 \pm 13}{2}$
			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 $\neq 800$
			$2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$		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	M1 ft	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	$(g(2) =) \frac{4}{2+3} \left(= \frac{4}{5} \right)$ oe			M1	or for sight of $fg(x)$ e.g. $\left(\frac{4}{x+3} - 4 \right)^2$
			10.24	2	A1	oe e.g. $\frac{256}{25}$
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 $36 \div \frac{2+6}{3+2+6} (= 49.5)$ oe or Asha = £9 OR Julie = £27			M1
	e.g. $3 \times "4.5"$ or $"49.5" \times \frac{3}{3+2+6}$ or $"9" \times \frac{3}{2}$ or $"27" \times \frac{3}{6}$			M1 or an answer of $\frac{27}{2}$
		13.5(0)	3	A1 SCB1 for $36/5 \times 7 (= 43.2)$ or $36/9 \times 2 (= 8)$
Total 3 marks				

11	e.g. $\frac{16}{5}$ and $\frac{21}{8}$ oe			M1 both fractions expressed as improper fractions
	e.g. $\frac{16^2}{5} \times \frac{21}{8^1}$ OR $\frac{336}{40}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = \frac{42}{5} = 8\frac{2}{5}$ or $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = 8\frac{16}{40} = 8\frac{2}{5}$ or $\frac{16^2}{5} \times \frac{21}{8^1} = \frac{42}{5} = 8\frac{2}{5}$ or candidate clearly shows that in the question, the result of $8\frac{2}{5} = \frac{42}{5}$ and that their answer becomes $\frac{42}{5}$	shown	3	A1 Dep on M2 for conclusion to $8\frac{2}{5}$ from correct working – either sight of the result of the multiplication e.g. $\frac{336}{40}$ must be seen or correct cancelling prior to the multiplication to $\frac{42}{5}$ 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

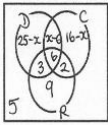
13

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
				<p>B2 (dep on M1) for all reasons relevant to their method – underlined words must be seen.</p> <p><u>angle at the centre</u> is $2 \times$ (double) angle at <u>circumference</u> / <u>angle at circumference</u> is $\frac{1}{2}$ angle at <u>centre</u></p> <p><u>angles</u> in a <u>triangle</u> add to 180° or angles in a <u>triangle</u> add to <u>180°</u></p> <p>base angles in an <u>isosceles</u> triangle (are equal)</p> <p>If not B2 then award B1 (dep on M1) for a correct circle theorem</p>
				Total 4 marks

16	$\frac{3}{2-\sqrt{y}} \times \frac{2+\sqrt{y}}{2+\sqrt{y}}$ 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
		$\frac{6+3\sqrt{y}}{4-y}$	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 $(5x + 4)(2x + 3)$ Factorising denominator as $(2x + 3)(2x - 3)$		3	M1
			$\frac{5x+4}{2x-3}$		M1
					A1
	(b)	$(8^{5y} =) 2^{15y}$ or $(4^n =) 2^{2n}$ or 2^{5y+2} $2^{5y+2} = 2^{15y-2n}$ oe $5y + 2 = 15y - 2n$ oe		4	M1
					M1 e.g. $2^{2n} = 2^{15y-5y-2}$
			$n = 5y - 1$		M1 Correct equation using the powers
					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 $-2(x + 3)^2 + \text{constant}$ or $25 - 2(x + \text{positive constant})^2$ SC B1 for answer of $-2(x - 3)^2 + \text{constant}$
					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. $ON = \frac{3}{5}(3\mathbf{a} + 4\mathbf{b})$
	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. $ON = \frac{3}{5}(3\mathbf{a} + 4\mathbf{b})$
	Alt:				
	$OC = 3\mathbf{a} + 4\mathbf{b}$			B1	Correct expression for OC
	$ON : NC = 6 : 4$ (i.e 3:2)			M1	
$ON = \frac{3}{5}OC$			M2		
	$ON = 1.8\mathbf{a} + 2.4\mathbf{b}$ oe		A1	e.g. $ON = \frac{3}{5}(3\mathbf{a} + 4\mathbf{b})$	
				Total 5 marks	

Edexcel averages: scores of candidates who achieved grade:

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