Q	Working	Answer	Mark	Notes
1	eg $6x + 10y = 6.2$ _ $6x + 3y = 3.75$ $7y = 2.45$ eg $30x + 15y = 18.75$ ___ $9x + 15y = 9.3$ $21x = 9.45$ **or** eg $6\left(\frac{3.1-5y}{3}\right)+3y=3.75$		3	M1 for correct method to eliminate one variable – multiplying one or both equations so the coefficient of x or y is the same in both (condone one arithmetic error), with the intention to subtract all 3 terms to eliminate one variable (intention to subtract is clearly showing a minus sign or subtracting 2 or 3 out of 3 terms) **or** isolating x or y in one equation and substituting into the other
	eg. $6 \times$ "0.45" $+ 3y = 3.75$ or $3 \times$ "0.45" $+ 5y = 3.1$ **or** $3x + 5 \times$ "0.35" $= 3.1$ or $6x + 3 \times$ "0.35" $= 3.75$			M1 dep. Substitute found value into one equation **or** correct method to eliminate second unknown.
		$x = 0.45$ oe $y = 0.35$ oe		A1 dep M1
				Total 3 marks

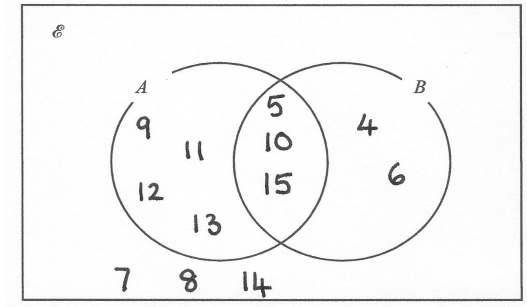
Q	Working	Answer	Mark	Notes
2 (a)	$5x \le 2+7$ **or** $5x \le 9$ **or** $\frac{5x}{5} - \frac{7}{5} \le \frac{2}{5}$ oe		2	M1 allow any sign instead of ≤ **or** for an answer of 1.8 oe **or** x and 1.8 oe with the incorrect sign
		$x \le 1.8$		A1 oe
(b)(i)	$(y \pm 7)(y \pm 5)$		2	M1 for $(y \pm 7)(y \pm 5)$ **or** $(y + a)(y + b)$ where $ab = -35$ **or** $a + b = -2$
		$(y - 7)(y + 5)$		A1 isw if student goes on to solve theequation in this part
(ii)		7, −5	1	B1ft answer must ft from their $(y + a)(y + b)$ in (b)(i). Award B0for 7, −5 if no marks scored in (i)
				Total 5 marks

3 (a)		$\frac{q}{1}$	1	B1
(b)		w^{12}	1	B1
(c)		$64x^{10}y^6$	2	B2 if not B2 then award B1 for 2 correctparts as part of a product eg $kx^{10}y^6$ where $k \ne 64$ **or** $64x^ky^6$ where $k \ne 10$ **or** $64x^{10}y^k$ where $k \ne 6$
(d)	$c + 8v = t^3$		2	M1
		$t = \sqrt[3]{c+8v}$		A1 oe SCB1 for an answer of $t = \frac{c+8v}{3}$ oe
				Total 6 marks

Q	Working	Answer	Mark	Notes
4 (a)	$2y-4y+8-y^2$		2	M1 for 3 correct terms **or** for 4 correct terms ignoring signs **or** $...-2y-y^2$ **or** $8-2y-...$
		$8-2y-y^2$		A1 Any order but simplified.
				Total 2 marks
(b)		$5b^3c(3b^2-7c^8)$	2	B2 fully correct **or** B1 for a correct partial factorisation with at least two terms outside the bracket eg $5b^3(3b^2c-7c^9)$ or $5c\ (3b^5-7b^3c^8)$ etc **or** the fully correct factor outside the bracket with a two term expression in terms of b and c inside the bracket eg $5b^3c(15b^2-c^8)$
				Total 2 marks

Q	Working	Answer	Mark	Notes
5	eg $\frac{27}{4}$ **and** $\frac{18}{7}$		3	M1 Both fractions expressed as improper fractions.
	$\frac{27}{4}\times\frac{7}{18}$ oe **or** eg $\frac{189}{28}\div\frac{72}{28}$			M1 for both fractions expressed as equivalent fractions with denominators that are a common multiple of 4 and 7 (seeing this stage gains M2)
	eg $\frac{27}{4}\times\frac{7}{18}=\frac{189}{72}=\frac{21}{8}=2\frac{5}{8}$ **or** $\frac{27}{4}\times\frac{7}{18}=\frac{189}{72}=2\frac{45}{72}=2\frac{5}{8}$ **or** $\frac{\cancel{27}^{3}}{4}\times\frac{7}{\cancel{18}^{2}}=\frac{21}{8}=2\frac{5}{8}$ **or** $\frac{189}{28}\div\frac{72}{28}=\frac{189}{72}=2\frac{45}{72}=2\frac{5}{8}$ oe if the student clearly shows $2\frac{5}{8}=\frac{21}{8}$ then they only need to complete the LHS to $\frac{21}{8}$(often done in 1st line of working)	shown		A1 dep M2 conclusion to $2\frac{5}{8}$ from correct working – either sight of the result of the multiplication e.g. $\frac{189}{72}$ must be seen then cancelled or correct cancelling prior to the multiplication with $\frac{21}{8}$ seen. NB entire solution using decimals scores no marks.
				Total 3 marks

Q	Working	Answer	Mark	Notes
6	$5x(x+2) = 5x^2 + 10x$ **or** $(x+2)(3x-4) = 3x^2 - 4x + 6x - 8 (= 3x^2 + 2x - 8)$ **or** $5x(3x-4) = 15x^2 - 20x$		3	M1 for a correct intention to multiply all 3 factors by starting to multiply 2 factors only, allow one error
	eg $[(5x^2 + 10x)(3x-4) =] 15x^3 - 20x^2 + 30x^2 - 40x$ **or** $[5x(3x^2 + 2x - 8) =] 15x^3 + 10x^2 - 40x$ **or** $[(x+2)(15x^2 - 20x) =] 15x^3 - 20x^2 + 30x^2 - 40x$			M1 (dep)ft for expanding by the third factor, allow one error (some may do the expansion in one stage and will get to $15x^3 - 20x^2 + 30x^2 - 40x$ without firstly expanding two factors, allow two errors)
		$15x^3 + 10x^2 - 40x$		A1 isw correct factorisation eg $5(3x^3 + 2x^2 - 8x)$ do not isw incorrect factorisation eg $15x^3 + 10x^2 - 40x = 3x^3 + 2x^2 - 8x$
				Total 3 marks

7			3	B3 all 4 parts of diagram correct (B2 for 2 or 3 parts correct) (B1 for 1 part correct) SCB1 if no marks scored, award B1 if 4,6 in the section $A \cap B'$ and 9, 11, 12, 13 in the section $A' \cap B$
				Total 3 marks

Q	Working	Answer	Mark	Notes
8 (a)	700 ÷ 200 (= 3.5)		3	M1 or 3.5 shown on diagram – within bounds of overlay
				M1 for line drawn at correct angle ± 2□within bounds of overlay
		C indicated in correct position		A1 for *C* drawn within bounds of overlay, inclusive of lines.
(b)		(1 :) 20 000	1	B1
				Total 4 marks

9 (a)	eg $2y = -7x(+10)$		2	M1	for $2y = -7x(+10)$ **or** an answer of $-3.5x$ oe **or** an answer of 3.5 oe
		-3.5		A1	oe
(b)		(0, 5)	1	B1	cao
					Total 3 marks

10	5 5 7 8 10 12 13 14 16 21 23		3	M1	For ordering the numbers Allow one error or omission in the list.
	16 & 7 identified for LQ and UQ			M1	For identifying 16 and 7 – may also have identified the median (12)
		9		A1	
					Total 3 marks

Q	Working	Answer	Mark	Notes
11 (a)	$12.6 \times 10^{(-24+145)}$ or 12.6×10^{121} or 1.26×10^{n}		2	M1
		1.26×10^{122}		A1 allow 1.3×10^{122}
(b)	216 or 2.16 or 10^{120} or 10^{122} or $6^3 \times 10^{40\times3}$		3	M1 or for digits 216
	216×10^{120} oe or or 2.16×10^{n} where $n \neq 122$			M1
		2.16×10^{122}		A1
				Total 5 marks

12	$\left(\frac{2w^2}{y^5}\right)^{-3}$ or $\left(\frac{y^{20}}{16w^8}\right)^{\frac{3}{4}}$ or $\left(\frac{4096w^{24}}{y^{60}}\right)^{-\frac{1}{4}}$		3	M1 for one of fourth rooting or reciprocating or cubing
	$\left(\frac{8w^6}{y^{15}}\right)^{-1}$ or $\frac{2^{-3}w^{-6}}{y^{-15}}$ or $\frac{\frac{1}{8}w^{-6}}{y^{-15}}$ or $\left(\frac{y^5}{2w^2}\right)^{3}$ or $\left(\frac{y^{60}}{4096w^{24}}\right)^{\frac{1}{4}}$ or $\frac{0.125y^{15}}{w^6}$ or $\frac{0.125w^{-6}}{y^{-15}}$ or $\frac{0.125}{y^{-15}w^6}$ oe			M1 for two of fourth rooting or reciprocating or cubing
		$\frac{y^{15}}{8w^6}$		A1 allow $\frac{y^{15}}{8w^6}$ or $\frac{y^{15}w^{-6}}{8}$ or $0.125y^{15}w^{-6}$ or $\frac{1}{8}y^{15}w^{-6}$ or $\frac{w^{-6}}{8y^{-15}}$ or $\frac{1}{8y^{-15}w^6}$
				Total **3 marks**

Q	Working	Answer	Mark	Notes
13 (a)		17.75	1	B1 oe
(b)		18.25	1	B1 oe $18.24\dot{9}$ (allow 18.249…)
				SC B1 for 17.5 in (a) **and** 18.5 (or $18.4\dot{9}$)in (b)
				Total 2 marks

14 (i)		(−4, 7)	1	B1	
(ii)		(5, 10)	1	B1	
					Total 2 marks

15		$x \geq -1$	1	B1	oe condone > in place of ≥
		$y \geq x$	1	B1	oe condone > in place of ≥
		$x + 2y \leq 8$	1	B1	oe condone < in place of ≤
				SCB1	if all inequalities reversed
					Total 3 marks

Q	Working		Answer		Mark	Notes
16	$3x^2+(2x-3)^2-x(2x-3)=5$	$3\left(\frac{y+3}{2}\right)^2+y^2-y\left(\frac{y+3}{2}\right)=5$		5	M1	Correct substitution of x for y (or y for x)
	$5x^2-9x+4(=0)$ oe **or** $5x^2-9x=-4$	$5y^2+12y+7(=0)$ oe **or** $5y^2+12y=-7$			M1	for a correct equation in the form $ax^2+bx+c\ (=0)$ oe **or** $ax^2+bx=-c$
	$(5x-4)(x-1)(=0)$ or $(x=)\frac{9\pm\sqrt{(-9)^2-4\times5\times4}}{2\times5}$ or $5\left[x-\left(\frac{9}{10}\right)^2-\left(\frac{9}{10}\right)^2\right]+4(=0)$ [leading to x values of 0.8 and 1]	$(5y+7)(y+1)(=0)$ or $(y=)\frac{-12\pm\sqrt{12^2-4\times5\times7}}{2\times5}$ or $5\left[\left(y+\frac{6}{5}\right)^2-\left(\frac{6}{5}\right)^2\right]+7(=0)$ [leading to y values of -1.4 and -1]			M1ft	dep on M1 for solving their quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as $\frac{9\pm\sqrt{81-80}}{10}$ oe **or** $\frac{-12\pm\sqrt{144-140}}{10}$ oe **or** $5\left(x-\frac{9}{10}\right)^2-\frac{1}{20}$ oe **or** $5\left(y+\frac{6}{5}\right)^2-\frac{1}{5}$
	$(y=)\ 2\times$ "0.8" -3 **and** $2\times$ "1" -3	$(x=)\frac{"-1.4"+3}{2}$ **and** $\frac{"-1"+3}{2}$			M1	dep on previous M1
			$x=0.8$ & $y=-1.4$ / $x=1$ & $y=-1$		A1	oe, for both solutions dep on M2
						Total 5 marks

Q	Working	Answer	Mark	Notes
17	$\frac{360}{10}(=36)$ ext angle **or** $\frac{(10-2)\times 180}{10}(=144)$		4 M1	method to find interior or exterior angle. (angles may be seen on diagram)
	$x =$ "144" – 90 (= 54) or $x = \frac{"540"-3\times"144"}{2}(=54)$ or $x = 90 - "36"(=54)$ 54 on the diagram is insufficient – must see working		M1	method to find x (must show it is intended to be x) eg use of int angle – 90^0 use of ext angle + x = 90^0 use of pentagon *GHIJA* All figures in " " must come from correct working
	$BAD = CDA = GDE = DGF = \frac{360-2\times"144"}{2}(=36)$		M1	A correct method to find an angle of 36º within the shape (not exterior angle) or 36º shown in correct place in diagram
	There are other correct methods. Please check for correct working.	$x = 54$ $y = 54$	A1	dep on M3 to find each of x and y and the correct value of 54 for both from correct working
				Total 4 marks
ALT	ADG = "144" – 2 × "36" (= 72)		M1	
	JA is parallel to GD		M1	
	$DGA = DAG$ (y) [isosceles triangle]		M1	
	$x = DGA = y$	shown	A1	
	There are other correct methods. Please check for correct working.			**Total 4 marks**

Q	Working	Answer	Mark	Notes
18	eg $\frac{\sqrt{12}}{\sqrt{3}+2}\times\frac{\sqrt{3}-2}{\sqrt{3}-2}$		3	M1 rationalise denominator – award for seeing multiplication by $\frac{\sqrt{3}-2}{\sqrt{3}-2}$ or $\frac{-\sqrt{3}+2}{-\sqrt{3}+2}$
	eg $\frac{\left(\sqrt{36}-2\sqrt{12}\right)}{3-4}$ **or** $\frac{\left(6-2\sqrt{12}\right)}{-1}$ **or** $-6+2\sqrt{12}$ **or** $\frac{6-4\sqrt{3}}{-1}$ **or** $=6+4\sqrt{3}$			M1 dep M1 correctly simplifying numerator and denominator. (denominator could be 3 – 4 or –1)
		$-6+\sqrt{48}$		A1 dep M2 must be in correct form (including $\sqrt{48}$) allow $a = -6$ and $b = 48$
				Total 3 marks

Q	Working	Answer	Mark	Notes
19 (a)		–0.2 and 2.2	2	B2 Both correct to 1 decimal place (B1 for (–0.2, 0), (2.2, 0) **or** a single correct value to 1 decimal place **or** both values within –0.2 to –0.23 and 2.2 to 2.23)
(b)	(y =) $-2x + 1$ oe seen		3	M1 Written – could be label on graph
	$y = -2x + 1$ drawn			M1 dep on previous M1 for drawing $y = -2x + 1$ passing through (–1, 3) and (2, –3) (allow 1 square tolerance)
		–0.6 and 1.6		A1 dep on M2 for both answers to 1 decimal place
				Total 5 marks

Q	Working	Answer	Mark	Notes
20 (a)	$7 - 3(x^2 - 4x)$		3	M1 **or** for one of a, b or c correct
	$7 - 3[(x - 2)^2 - 4]$			M1 **or** for two of a, b or c correct
		$19 - 3(x - 2)^2$		A1
(b)		(2, 19)	1	B1 ft their expression
				Total 4 marks

Q	Working	Answer	Mark	Notes
21	eg $(2n + 1)^2 + (2n – 1)^2$ or $(2n + 1)^2 + (2n + 3)^2$ oe		3	M1 for setting up a correct algebraic expression (any letter can be used) must have intention to add (may come after expanding)
	Eg $4n^2 + 4n + 1 + 4n^2 – 4n + 1$ **or** $8n^2 + 2$ **or** $4n^2 + 4n + 1 + 4n^2 + 12n + 9$ **or** $8n^2 + 16n + 10$ oe			M1 correct expansion of brackets and correct signs or a correct result.
	eg $8 \times n^2 + 2$ $\frac{8n^2+16n+10}{8} = n^2 + 2n + \frac{10}{8}$ which shows a remainder of 2 or $10 – 8 = 2$ or $\frac{8n^2+16n+10}{8} = n^2 + 2n + 1$ remainder 2 oe $\frac{8n^2+16n+10}{8} = n^2 + 2n + 1 + \frac{2}{8}$ oe $8(n^2 + 2n + 1) + 2$ oe	shown clearly		A1 conclusion dep on M2 for eg $8n^2 + 2$ **and** a suitable conclusion (may be shown as a calculation/in numbers). The conclusion must be an intention to show that the result is a multiple of 8 and there is 2 remaining.
				Total 3 marks

Q	Working	Answer	Mark	Notes
22	eg $\overrightarrow{ON} = 8\mathbf{a} + \frac{1}{2}(6\mathbf{b} - 8\mathbf{a})(= 3\mathbf{b} + 4\mathbf{a})$ **or** $\overrightarrow{ON} = 6\mathbf{b} + \frac{1}{2}(-6\mathbf{b} + 8\mathbf{a})(= 3\mathbf{b} + 4\mathbf{a})$ **or** $\overrightarrow{NO} = \frac{1}{2}(8\mathbf{a} - 6\mathbf{b}) - 8\mathbf{a}(= -4\mathbf{a} - 3\mathbf{b})$ **or** $\overrightarrow{NO} = -6\mathbf{b} + \frac{1}{2}(6\mathbf{b} - 8\mathbf{a})(= -3\mathbf{b} - 4\mathbf{a})$ **or** $\overrightarrow{AM} = -8\mathbf{a} + \frac{1}{3}(6\mathbf{b})(= 2\mathbf{b} - 8\mathbf{a})$ **or** $\overrightarrow{AM} = -8\mathbf{a} + 6\mathbf{b} - \frac{2}{3}(6\mathbf{b})(= 2\mathbf{b} - 8\mathbf{a})$ **or** $\overrightarrow{MA} = 8\mathbf{a} - \frac{1}{3}(6\mathbf{b})(= 8\mathbf{a} - 2\mathbf{b})$ **or** $\overrightarrow{MA} = \frac{2}{3}(6\mathbf{b}) + 8\mathbf{a} - 6\mathbf{b}(= 8\mathbf{a} - 2\mathbf{b})$		5	M1 a correct expression for $\overrightarrow{ON}$ **or** $\overrightarrow{NO}$ **or** $\overrightarrow{AM}$ **or** $\overrightarrow{MA}$
	$\overrightarrow{OP} = \mu(3\mathbf{b} + 4\mathbf{a})$ and one of eg $\overrightarrow{OP} = 8\mathbf{a} + x(2\mathbf{b} - 8\mathbf{a})(= (8 - 8x)\mathbf{a} + 2x\mathbf{b})$ or $\overrightarrow{OP} = 2\mathbf{b} + y(8\mathbf{a} - 2\mathbf{b})(= (2 - 2y)\mathbf{b} + 8y\mathbf{a})$			M2 oe (M1 for one correct expression for $\overrightarrow{OP}$) (where μ, x, y are scalars)
	eg $\frac{4}{3} = \frac{8y}{2-2y}$ **or** $\frac{4}{3} = \frac{8-8x}{2x}$ oe **or** $3\mu = 2x$ **and** $4\mu = 8 - 8x$ **or** $3\mu = 2 - 2y$ **and** $4\mu = 8y$			M1 A correct expression to find the position of P along $\overrightarrow{ON}$ **or** two correct simultaneous equations coming from the expressions for $\overrightarrow{OP}$
		$2\mathbf{a} + \frac{3}{2}\mathbf{b}$		A1 dep on M3, oe eg $2\mathbf{a} + 1.5\mathbf{b}$
				Total 5 marks

Q	Working	Answer	Mark	Notes

				Edexcel averages: scores of candidates who achieved grade:								
Qn	Mean score	Max score	Mean %	ALL	9	8	7	6	5	4	3	U
1	2.37	3	79	2.37	2.96	2.91	2.81	2.57	1.97	1.32	0.42	0.04
2	3.85	5	77	3.85	4.95	4.76	4.52	3.95	3.15	2.03	1.02	0.00
3	4.81	6	80	4.81	5.85	5.66	5.39	4.84	4.12	3.22	2.15	0.00
4	3.04	4	76	3.04	3.85	3.67	3.42	3.10	2.52	1.91	1.01	0.00
5	2.25	3	75	2.25	2.84	2.67	2.48	2.20	1.85	1.53	0.86	0.35
6	2.02	3	67	2.02	2.83	2.69	2.46	2.10	1.29	0.64	0.25	0.13
7	2.16	3	72	2.16	2.84	2.71	2.42	2.04	1.66	1.14	0.96	0.55
8	2.21	4	55	2.21	3.38	2.70	2.46	2.05	1.39	0.91	0.46	0.00
9	1.52	3	51	1.52	2.81	2.41	1.73	0.92	0.35	0.12	0.07	0.00
10	1.55	3	52	1.55	2.56	1.95	1.66	1.41	0.81	0.45	0.26	0.04
11a	0.99	2	50	0.99	1.63	1.25	1.04	0.84	0.57	0.35	0.13	0.09
11b	1.63	3	54	1.63	2.73	2.22	1.72	1.41	0.77	0.39	0.24	0.09
12	1.53	3	51	1.53	2.59	1.95	1.62	1.18	0.87	0.61	0.17	0.04
13	0.91	2	46	0.91	1.42	1.13	0.92	0.83	0.62	0.31	0.14	0.00
14	0.87	2	44	0.87	1.83	1.42	0.80	0.36	0.17	0.04	0.04	0.00
15	1.24	3	41	1.24	2.63	1.89	1.15	0.56	0.25	0.08	0.03	0.02
16	2.14	5	43	2.14	4.54	3.40	1.85	0.92	0.43	0.20	0.07	0.00
17	1.19	4	30	1.19	2.56	1.64	1.07	0.57	0.32	0.11	0.04	0.04
18	0.95	3	32	0.95	2.09	1.38	0.74	0.44	0.21	0.09	0.03	0.00
19	1.00	5	20	1.00	2.06	1.30	0.94	0.59	0.28	0.14	0.03	0.00
20	0.84	3	28	0.84	2.38	1.08	0.41	0.09	0.01	0.00	0.00	0.00
21	0.74	3	25	0.74	2.00	0.97	0.38	0.15	0.02	0.01	0.00	0.00
22	0.77	5	15	0.77	2.30	0.79	0.30	0.16	0.01	0.00	0.00	0.00
	40.58	**80**	**41**	**40.58**	**65.63**	**52.55**	**42.29**	**33.28**	**23.64**	**15.60**	**8.38**	**1.39**

Q	Working	Answer	Mark	Notes

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	59	47	38	28	20	12	7