1	(i) $3^{7/2}$ oe or $k = 7/2$ oe	**2**	**M1** for $\frac{3^4}{\sqrt{3}}$ or $\frac{81}{3^{1/2}}$ or $81\times3^{-1/2}$ or $3^3\sqrt{3}$ or $27 \times 3^{1/2}$ or better or for $81 = 3^4$ or $\sqrt{3} = 3^{1/2}$ or $\frac{1}{\sqrt{3}} = 3^{-1/2}$ or (following correct rationalisation of denominator) for $27 = 3^3$ isw conversion of 7/2 oe	**M0** for just $81 = 3 \times 3 \times 3 \times 3$ oe – indices needed allow an M mark for partially correct work still seen in fraction form eg $\frac{3^4}{3^{-1/2}}$ gets mark for $81 = 3^4$
1	(ii) $\frac{14+5\sqrt{3}}{11}$ or $\frac{28+10\sqrt{3}}{22}$ www isw	**3**	**M1** for multiplying num and denom by $5 + \sqrt{3}$ and **M1** for num or denom correct in final answer (M0 if wrongly obtained)	2nd **M1** is not dependent on 1st **M1**

2	(i) a^6b^7	**2**	**B1** for two elements correct; condone multiplication signs left in SC1 for eg $250 + a^6 + b^7$
	(ii) 16	**1**	
	(iii)	**2**	condone ±64 **M1** for $[\pm]4^3$ or for $\sqrt{4096}$ or for only –64

3	$ac = \sqrt{y} - 5$ o.e. $ac + 5 = \sqrt{y}$ o.e. $[y =](ac+5)^2$ o.e. isw	**M1** **M1** **M1**	**M1** for each of 3 correct or ft correct steps s.o.i. leading to *y* as subject or some/all steps may be combined; allow **B3** for $[y =](ac+5)^2$ o.e. isw or **B2** if one error

4 (i)	$\frac{1}{12}$ or $\pm\frac{1}{12}$	**2**	**M1** for $\frac{1}{144^{\frac{1}{2}}}$ o.e. or for $\sqrt{144} = 12$ soi
4 (ii)	denominator = 18 numerator = $5 - \sqrt{7} + 4(5 + \sqrt{7})$ = $25 + 3\sqrt{7}$ as final answer	**B1** **M1** **A1**	**B0** if 36 after addition for **M1**, allow in separate fractions allow **B3** for $\frac{25 + 3\sqrt{7}}{18}$ as final answer www

5	(i) (ii)	2 1	B1 for 5^0 or for 25 × 1/25 o.e.	 3

6	(i) 0.125 or (ii)	1 1	as final answer	2

7	(i) $^{3.5}$ or k = 3.5 or 7/2 o.e. (ii) a^6b^{10}	2 2	M1 for $125 = 5^3$ or $\sqrt{5} = 5^{\frac{1}{2}}$ SC1 for $5^{\frac{3}{2}}$ o.e. as answer without working M1 for two 'terms' correct and multiplied; mark final answer only	4

8	(i) www (ii) $x^{10}y^{13}z^4$ or $2^3x^{10}y^{13}z^4$	2 3	allow 2 for ±5; M1 for $25^{1/2}$ seen or for 1/5 seen or for using $25^{1/2} = 5$ with another error (ie M1 for coping correctly with fraction and negative index or with square root) mark final answer; B2 for 3 elements correct, B1 for 2 elements correct; condone multn signs included, but −1 from total earned if addn signs	5

9	(i) (ii) 1/64	1 3	M1 for dealing correctly with each of reciprocal, square root and cubing (allow 3 only for 1/64) eg M2 for 64 or −64 or $1/\sqrt{4096}$ or $¼^3$ or M1 for $1/16^{3/2}$ or 4^3 or -4^3 or 4^{-3} etc	4

10	(i) x^4y (ii)	2 2	M1 for two elements correct; condone y^1 M1 for $\left(\frac{2}{1}\right)^5$ or 2^5 soi or $\left(\frac{1}{32}\right)^{-1}$ or $\frac{1}{\frac{1}{32}}$	4

11	(i) (ii) $\frac{9}{49}$ as final answer	2 2	M1 for $25^{\frac{1}{2}} = \sqrt{25}$ soi or for $\sqrt{25^3}$ M1 for $a^{-1} = \frac{1}{a}$ soi eg by 3/7 or 3/49	4

12	(i) $\sqrt{6}$ (ii) $-12\sqrt{5}$ isw	2 3	1 for $30\sqrt{6}$ or $2\sqrt{6}$ or $2\sqrt{2}\sqrt{3}$ or $28\sqrt{2}\sqrt{3}$ 2 for 49 and 1 for $-12\sqrt{5}$ or M1 for 3 correct terms from $4 - 6\sqrt{5} - 6\sqrt{5} + 45$	5

13	(i) 4 (ii) $a^{10}b^{8}c^{-2}$ or $\frac{3a^{10}b^{8}}{c^{2}}$	2 3	1 for 4 or 27 2 for 3 'elements' correct, 1 for 2 elements correct, −1 for any adding of elements; mark final answer; condone correct but unnecessary brackets	 5