1	(a)		h^9	1	B1	

2	a		g^{10}	1	B1	
	b		k^7	1	B1	
	c		$9c^2d^8$	2	B2	B1 for 2 out of 3 terms correct in a product
	d	$4x > 2 - 7$ oe			M1	accept as an equation or with wrong inequality sign.
			$x > -1.25$	2	A1	oe allow $(-1.25, (+)\infty)$ Note: award M1A0 for an answer on the answer line of -1.25 with no sign or the incorrect sign eg $x = -1.25$, $x < -1.25$
						Total 6 marks

3	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

4	(a)	Factorising numerator as $(5x + 4)(2x + 3)$		3	M1	
		Factorising denominator as $(2x + 3)(2x - 3)$			M1	
			$\frac{5x+4}{2x-3}$		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

5	$-2(x^2 + 6x - 3.5)$ 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

6	a		$4e^5f^3$	2	B2	(B1 for 2 out of 3 terms correct in a 3 term product)

7	(a)		$81k^8$	2	B2	B1 for 81 or k^8 seen in their final answer.
	(b)		$7m^4n^6$	2	B2	B1 for $7m^4$ or n^6 in a product with no other terms in m or n
						Total 4 marks

8	(a)		$16x^{12}y^{20}$	2	B2	B1 for an answer in the form ax^ny^m with 2 correct from $a = 16$, $n = 12$, $m = 20$

9 (b)	$\frac{7(4x)}{32x}-\frac{8(x+3)}{32x}$ oe or $\frac{7(4x)}{8(4x)}-\frac{8(x+3)}{8(4x)}$ oe or $\frac{28x}{32x}-\frac{8(x+3)}{32x}$ oe or $\frac{28x}{32x}-\frac{8x+24}{32x}$ oe or $\frac{28x-8(x+3)}{32x}$ oe or $\frac{7x}{8x}-\frac{2(x+3)}{8x}$ oe or $\frac{7x-2(x+3)}{8x}$ oe		3	M1 for two correct fractions with common denominator **or** a single correct fraction
	$\frac{28x-8x-24}{32x}$ oe or $\frac{20x-24}{32x}$ oe or $\frac{7x-2x-6}{8x}$ oe or $\frac{20x}{32x}-\frac{24}{32x}$ oe or $\frac{28x}{32x}-\frac{8x}{32x}-\frac{24}{32x}$ oe			M1 for correct fraction(s) with bracket(s) expanded **and** dealing with the negative signs
		$\frac{5x-6}{8x}$		A1 or $\frac{-6+5x}{8x}$

10	$(a=)\frac{14}{3\times\frac{7}{4y-3}-7}$		3	M1	For a correct substitution
	$(a=)\frac{14(4y-3)}{21-7(4y-3)}$ oe eg $\frac{56y-42}{21-28y+21}$			M1	or for a correct but unsimplified answer in the form $\frac{m}{n}$ ie the denominator should be simplified to remove the fraction
		$\frac{4y-3}{3-2y}$		A1	oe but must be simplified
					Total 3 marks
10 alt	$x=\frac{14+7a}{3a}$ **and** $\frac{14+7a}{3a}=\frac{7}{4y-3}$		3	M1	For rearranging 'x' to be in terms of a and equating two expressions for a
	$a(42-28y)=56y-42$ oe eg $(a=)\frac{56y-42}{21-28y+21}$			M1	or for a correct but unsimplified answer in the form $\frac{m}{n}$
		$\frac{4y-3}{3-2y}$		A1	oe but must be simplified
					Total 3 marks

11	eg $\frac{2\times3\times3\times(3^{\frac{3}{2}})^{4n+6}}{2\times3\times3^{2(2n+8)}}$ or $\frac{3\times3^{\frac{3}{2}(4n+6)}}{3^{2(2n+8)}}$ $\sqrt{27}$ to be changed to a power of 3 and not $3\sqrt{3}$ unless recovered		3	M1	For **2** of: • writing 18 as 2×3^2 oe **and** 6 as 2×3 **OR** cancelling 6 & 18 fully • writing $\sqrt{27}$ as $3^{\frac{3}{2}}$ or $3\times3^{\frac{1}{2}}$ **OR** $\left(\sqrt{27}\right)^{4n+6}$ as $\left(3^3\right)^{2n+3}$ or 3^{6n+9} • writing 9 as 3^2 **OR** 9^{2n+8} as $3^{2(2n+8)}$ or 3^{4n+16}
	eg $\frac{3\times3^{6n+9}}{3^{4n+16}}$ or $\frac{3^{6n+10}}{3^{4n+16}}$ or $\frac{3\times3^{1.5(4n+6)}}{3^{2(2n+8)}}$ or $\frac{3^2\times3^{6n+9}}{3\times3^{4n+16}}$ or $\frac{3^{6n+11}}{3^{4n+17}}$ oe or eg $3^{6n+11}=3^x\times3^{4n+17}$ oe			M1	For a correct expression or equation using only powers of 3 (powers of 3 but not necessarily a single power)
		$2n-6$		A1	oe eg $2(n-3)$ dep on M1
					Total 3 marks

12	(b)		$27a^6b^{12}$	2	B2 (B1 for 2 of 3 parts in a product)

13	$(x+2)(x-2)$ oe or $(4x+1)(x-2)$ oe		4	M1	for complete factorisation of x^2-4 **or** $4x^2-7x-2$ Each factor must be in the form $(ax \pm b)$ where a and b are integers
	$(x+2)(x-2)\times\frac{x}{(4x+1)(x-2)}$ or $\frac{x(x+2)(x-2)}{(4x+1)(x-2)}$ or $\frac{x(x+2)}{(4x+1)}$			M1	for complete factorisation of $4x^2-7x-2$ **and** x^2-4 and inverting and intention to multiply
	$\frac{x(x+2)-2x(4x+1)}{(4x+1)}$ or $\frac{x^2+2x-8x^2-2x}{(4x+1)}$ or $\frac{x(x+2)}{(4x+1)}-\frac{2x(4x+1)}{(4x+1)}$ or $\frac{x^2+2x}{(4x+1)}-\frac{8x^2+2x}{(4x+1)}$			M1	for a correct single fraction following correct cancellation or for two correct fractions with common denominator following correct cancellation
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{-7x^2}{4x+1}$		A1	oe but must be in form $\frac{ax^2}{bx+c}$ where a, b and c are integers.
					Total 4 marks

13 **ALT**	$\frac{-7x^3+14x^2}{4x^2-7x-2}$ oe		4	M1	for a correct single fraction
	$\frac{-7x^2(x-2)}{(4x+1)(x-2)}$ oe			M1	for complete factorisation of $-7x^3+14x^2$ **or** $4x^2-7x-2$ Each factor must be in the form $(ax \pm b)$
	$\frac{-7x^2(x-2)}{(4x+1)(x-2)}$ oe			M1	for complete factorisation of $-7x^3+14x^2$ **and** $4x^2-7x-2$ Each factor must be in the form $(ax \pm b)$
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{-7x^2}{4x+1}$		A1	oe but must be in form $\frac{ax^2}{bx+c}$ where a, b and c are integers.
					Total 4 marks