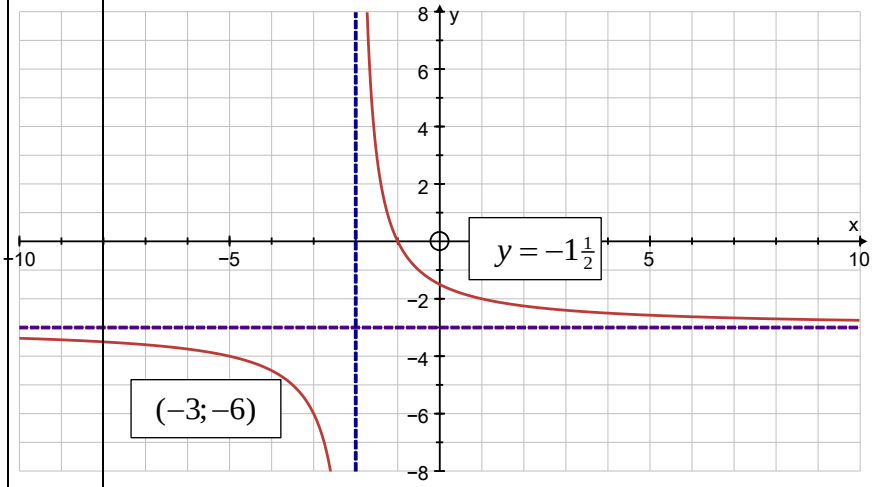
1.1.1	$x=\frac{-(-5)\pm\sqrt{(-5)^2-4(3)(-1)}}{2(3)}$ $x=1{,}85$ (-1 dp) or $x=-0{,}18$	Substitution Answer1 (CA) Answer 2 (CA)	3
1.1.2	$(2x+1)^2=4$ $2x+1=\pm2$ $2x=\pm2-1$ $x=\frac{1}{2}$ or $x=\frac{-3}{2}$ OR $4x^2+4x+1=4$ $4x^2+4x-3=0$ $(2x-1)(2x+3)=0$	Square root Answer 1 Answer 2 **OR** Standard form Answer 1 Answer 2	3
1.1.3	$x^2-6x+8<0$ $(x-4)(x-2)<0$ $2<x<4$	Standard form Factors Interval limits (CA) Interval inequality	4
1.1.4	$\sqrt{x-1}+\frac{3}{\sqrt{x-1}}=4$ $(x-1)+3=4\sqrt{x-1}$ $(x+2)^2=(4\sqrt{x-1})^2$ $x^2+4x+4=16(x-1)$ $x^2-12x+20=0$ $(x-2)(x-10)=0$ $x=2$ or $x=10$ OR $Let\quad k=\sqrt{x-1}$ $k^2+3=4k$ $k^2-4k+3=0$ $(k-3)(k-1)=0$ $\sqrt{x-1}=3$ or $\sqrt{x-1}=1$ $x-1=9$ or $x-1=1$ $x=10$ $x=2$	Multiply LCD Square both sides Correct squaring Standard form Both answers Multiply LCD Standard form Subs roots back Square both sides Both answers	5
1.1.5	$2^{2x+1}-3(2^{2x-1})+4^x=12$ $2^{2x}\left(2-3.2^{-1}+1\right)=12$ $2^{2x}=8$ $x=\frac{3}{2}$	HCF Bracket factor Divide by bracket Answer (CA)	4

1.2.1	$x=2-y$ $y+1=\frac{-3}{(2-y)-1}$ $(y+1)(1-y)=-3$ $1-y^2=-3$ $y^2=4$ $y=\pm 2$ $\therefore\ x=4 \text{ or } x=0$ OR $y=2-x$ $(2-x)+1=\frac{-3}{x-1}$ $(3-x)(x-1)=-3$ $-3+4x-x^2=-3$ $0=x^2-4x$ $x=0 \text{ or } x=4$ $y=2 \quad y=-2$	$x=2-y$ Subs into 2nd eqn (CA) LCD multiplied $y^2=4$ $y=\pm 2$ $x=4 \text{ or } x=0$	6
1.2.2	$\left(\frac{1}{4}-\frac{1}{-2}\right)=\frac{1}{4}+\frac{1}{2}=\frac{3}{4}$ *OR* $\left(\frac{1}{0}-\frac{1}{2}\right)$ is UNDEFINED	Subs (4; -2) (CA) Answer Subs (0; 2) Answer	4
1.3	$(1-a^2)(1+a^2)(1+a^4).....(1+a^{256})$ $=(1-a^4)(1+a^4).....(1+a^{256})$ $=1-a^{512}$ Problem solving	- Multiply PxQ to get first DOTS factor $(1-a^2)$ - Answer **x 2**	3
			[32]
2.1.1	$\frac{5^{x-2}.2^{x+2}}{10^x\left(1-10^{-1}.2\right)}$ $=\frac{5^x.5^{-2}.2^x.2^2}{10^x\left(1-\frac{1}{5}\right)}=\frac{10^x(5^{-2}.2^2)}{10^x(\frac{4}{5})}$ $=\frac{4}{25}\div\frac{4}{5}$ $=\frac{1}{5}$	HCF in denominator Simplify HCF away Answer	3
2.1.2	$\left[\frac{16x^2}{81x^{-2}}\right]^{\frac{-1}{2}}=\left[\frac{4^2x^4}{9^2}\right]^{\frac{-1}{2}}=\frac{4^{-1}x^{-2}}{9^{-1}}=\frac{9}{4x^2}$ OR $\frac{16^{\frac{-1}{2}}x^{-1}}{81^{\frac{-1}{2}}x}=\frac{\left(9^2\right)^{\frac{1}{2}}}{\left(4^2\right)^{\frac{1}{2}}x^2}=\frac{9}{4x^2}$	- Brackets first positive exponents - Multiply neg exp numerator - Multiply negative exp denom - Answer in pos exp form OR - Multiply negative exp numerator - Mult neg exp denom - Simplify number pos exp - Simplify variable pos exp	4
2.1.3	$\left(\sqrt{p}-2\sqrt{m}\right)^2=p-4\sqrt{mp}+4m$	p $-4\sqrt{mp}$ $4m$	3

2.2	**show** that: $\frac{2}{1+\sqrt{2}}-\frac{8}{\sqrt{8}}=-2$ $\frac{2\sqrt{8}-8(1+\sqrt{2})}{\sqrt{8}\left(1+\sqrt{2}\right)}$ $=\frac{4\sqrt{2}-8-8\sqrt{2}}{\sqrt{8}+\sqrt{16}}$ $=\frac{-4\sqrt{2}-8}{2\sqrt{2}+4}$ $=\frac{-4\left(\sqrt{2}+2\right)}{2\left(\sqrt{2}+2\right)}=-2$ NB: Can also use rationalising of denominators as a method. NB: if dropped denom then max ¼ for numerator	LCD Numerator multiplied correctly Factorising answer	4
			[14]
3.1.1	92; **88; 84;**…….	88 84	2
3.1.2	$T_n=-4n+96$	$-4n$ 96	2
3.1.3	$-4m+96+\left(-4n+96\right)=3$ $-4(m+n)=-189$ $m+n=\frac{189}{4}$	Subs expressions (CA) Factorise -189 answer	4
3.2	$2x^2+5x+2-\left(2x^2+5x+5\right)=3x^2+4x-3-\left(2x^2+5x+2\right)$ $-3=x^2-x-5$ $0=x^2-x-2$ $0=(x-2)(x+1)$ $x=2 \quad \text{or} \quad x=-1$	equate differences equate differences standard form 2 solutions	4
			[12]
4.1	$-1; x; 3; x+8;$ … …. $x+1 \;;\; 3-x \;;\; x+5$ $3-x-(x+1)=x+5-(3-x)$ $-2x+2=2x+2$ $4x=0$ $x=0$	First difference 2nd difference (CA) Equate 2nd difference X = 0	4
4.2	$-1 \;;\; 0 \;;\; 3 \;;\; 8$ $a=1 \quad b=-2 \quad c=0$ $Tn=n^2-2n$	A=1 B=-2 C=0 Tn=	4
4.3	$T_{70}=(70)^2-2(70)=4760$	Subs 70 Answer	2
4.4	$n^2-2n=8800$ $n^2-2n-8800=0$ $n=95$ $T_{95}=8835$	=8800 SF N=95 T94 = 8835	4
			[14]

5.1	$F_v = 25000(1-0.11)^4 = 15685{,}56$	Subs into correct formula Answer	2
5.2	$1+i_{eff} = \left(1+\frac{0.1245}{12}\right)^{12}$ $i_{eff} = 0.13185.....$ $r = 13.19\%$ If incorrect formula max is 2/4 n = 12 and i -> r (CA)	subs correct formula n=12 $i_{eff} = 0.13185.....$ $r = 13.19\%$	4
5.3	$Fv = 10000\left(1+\frac{0.096}{2}\right)^4\left(1+\frac{0.052}{4}\right)^4 - 5000\left(1+\frac{0.096}{2}\right)^3\left(1+\frac{0.052}{4}\right)^4 + 13500\left(1+\frac{0.052}{4}\right)^4$ $= 20857.86$	$10000\left(1+\frac{0.096}{2}\right)^4$ $10000\left(1+\frac{0.096}{2}\right)^4\left(1+\frac{0.052}{4}\right)^4$ $-5000\left(1+\frac{0.096}{2}\right)^3$ $-5000\left(1+\frac{0.096}{2}\right)^3\left(1+\frac{0.052}{4}\right)^4$ $+13500\left(1+\frac{0.052}{4}\right)^4$ Answer (CA)	6
			[12]
6.1	$x = 0$ $y = 0$	X = 0 Y = 0	2
6.2	$g(x) = \frac{3}{x}+4$	Equation	1
6.3.1	$h(x) = \frac{3}{x+2}-3$	Horizontal shift Vertical shift	2
6.3.2	Subs (-2 ; -3) $y-(-3) = x-(-2)$ $y = x-1$	Gradient = 1 Equation	2
6.3.3		Asymptotes X-intercept @ -1 Y-intercept Point on other half -1 for shape	4
6.4	Reflection over x-axis/y-axis Shift right/forward 1 unit	Reflection over x/y-axis Shift right/forward 1 unit	
			[13]

7.1	$g(x) = -x - 5$	Equation	1
7.2	$(x+5)(x-1) = 0$ $x = -5 \quad \text{or} \quad x = 1$ $AB = 1 - (-5) = 6 \text{ units}$	Set = 0 2 solutions AB = 6 (CA)	3
7.3	$y = (-2)^2 + 4(-2) - 5 = -9$ $(-2; -9)$	Subs -2 D(-2 ; -9)	2
7.4	$(-4; -5)$	M(-4 ; -5)	1
7.5	$PQ = -x - 5 - (x^2 + 4x - 5)$ $= -x^2 - 5x$ OR $x = \frac{-(-5)}{2(-1)} = \frac{-5}{2}$ $= -\left(x + \frac{5}{2}\right)^2 + \frac{25}{4}$ $\therefore \quad PQ = \frac{25}{4}$	Linear – quadratic $-x^2 - 5x$ Method $\therefore \quad PQ = \frac{25}{4}$	4
7.6	$x \leq 1 \; ; \; x \neq -5$	$x \leq 1$ Restriction	2
7.7	$x^2 + 4x - 5 = kx - 6$ $x^2 + (4-k)x + 1 = 0$ $0 = (4-k)^2 - 4(1)(1)$ $0 = k^2 - 8k + 12$ $0 = (k-6)(k-2)$ $k = 6 \quad \text{or} \quad k = 2$	Equate Δ = 0 Subs correct b & ac 2 values of k (CA)	4
			[17]

8.1	**Show that** the equation of f is $f(x) = 2(3)^{-x-1} + 2$. $2b^{(-2)+1} + 2 = 8$ $2b^{-1} = 6$ $b^{-1} = 3$ $b = \frac{1}{3}$ $\therefore \quad f(x) = 2(3^{-1})^{x+1} + 2$ $= 2(3)^{-x-1} + 2$	Subs asymptote of 2 Subs (-2 ; 8) $b = \frac{1}{3} = 3^{-1}$ subs to form $\Rightarrow$ $f(x) = 2(3^{-1})^{x+1} + 2$	3
8.2	$f(1) = 2(3)^{-(1)-1} + 2 = \frac{20}{9} \simeq 2.22$	Subs x = 1 Y = $\frac{20}{9}$	2
8.3	$avgm = \frac{8 - \frac{20}{9}}{-2-1} = \frac{-52}{27} \simeq -1.93$	(CA) Subs correctly into m m = $\frac{-52}{27}$	2
8.4	$h(x) = -2(3)^{-x-1} + 2$	Negative a ie. -2 Asymptote stays the same ie. 2	2
8.5	$h(-1) = -2(3)^{-(-1)-1} + 2 = 0$ $\therefore \quad y \leq 0$	Subs x = -1 into h answer	2
			[11]
total			**125**