BASIC ALGEBRA ANSWERS EDEXCEL A LEVEL YEAR 1

1.

$x^2+2(2-x)=12$	or	$(2-y)^2+2y=12$	(Eqn. in x or y only)	M1
$x^2-2x-8=0$	or	$y^2-2y-8=0$	(Correct 3 term version)	A1
$(x-4)(x+2)=0 \quad x=\ldots$	or	$(y-4)(y+2)=0 \quad y=\ldots$		M1
$x=4, \quad x=-2$	or	$y=4, \quad y=-2$		A1
$y=-2, \quad y=4$	or	$x=-2, \quad x=4$	(M: attempt one, A: both)	M1 A1ft (6)
				6

2.

$x(x^2-4x+3)$	Factor of x. (Allow $(x-0)$)	M1
$=x(x-3)(x-1)$	Factorise 3 term quadratic	M1 A1
		(3)
		Total 3 marks

3.

(a) $3\sqrt{5}$ (or $a=3$)		B1
		(1)
(b) $\dfrac{2(3+\sqrt{5})}{(3-\sqrt{5})}\times\dfrac{(3+\sqrt{5})}{(3+\sqrt{5})}$		M1
$(3-\sqrt{5})(3+\sqrt{5})=9-5 \quad (=4)$	(Used as or intended as denominator)	B1
$(3+\sqrt{5})(p\pm q\sqrt{5})=\ldots$ 4 terms $(p\neq 0, q\neq 0)$	(Independent)	M1
or $(6+2\sqrt{5})(p\pm q\sqrt{5})=\ldots$ 4 terms $(p\neq 0, q\neq 0)$		
[Correct version: $(3+\sqrt{5})(3+\sqrt{5})=9+3\sqrt{5}+3\sqrt{5}+5$, or double this.]		
$\dfrac{2(14+6\sqrt{5})}{4}=7+3\sqrt{5}$	1st A1: $b=7$, 2nd A1: $c=3$	A1 A1
		(5)
		Total 6 marks

4.

$(x-2)^2 = x^2 - 4x + 4$	or	$(y+2)^2 = y^2 + 4y + 4$	M: 3 or 4 terms	M1	
$(x-2)^2 + x^2 = 10$	or	$y^2 + (y+2)^2 = 10$	M: Substitute	M1	
$2x^2 - 4x - 6 = 0$	or	$2y^2 + 4y - 6 = 0$	Correct 3 terms	A1	
$(x-3)(x+1) = 0, \quad x = ...$	or	$(y+3)(y-1) = 0, \quad y = ...$		M1	
(The above factorisations may also appear as $(2x-6)(x+1)$ or equivalent).					
$x = 3 \quad x = -1$	or	$y = -3 \quad y = 1$		A1	
$y = 1 \quad y = -3$	or	$x = -1 \quad x = 3$		M1 A1	(7)
(Allow equivalent fractions such as: $x = \frac{6}{2}$ for $x = 3$).					

5.

$\frac{(5-\sqrt{3})}{(2+\sqrt{3})} \times \frac{(2-\sqrt{3})}{(2-\sqrt{3})}$		M1	
$= \frac{10 - 2\sqrt{3} - 5\sqrt{3} + (\sqrt{3})^2}{...} \quad \left(= \frac{10 - 7\sqrt{3} + 3}{...}\right)$		M1	
$(= 13 - 7\sqrt{3}) \quad \left(\text{Allow } \frac{13 - 7\sqrt{3}}{1}\right)$	13 $(a = 13)$	A1	
	$-7\sqrt{3}$ $(b = -7)$	A1	(4)

6.

$\sqrt{7}^2 + 2\sqrt{7} - 2\sqrt{7} - 2^2$, or $7 - 4$ or an exact equivalent such as $\sqrt{49} - 2^2$	M1	
$= \mathbf{3}$	A1	
		[2]

7.

(a) $(7+\sqrt{5})(3-\sqrt{5}) = 21 - 5 + 3\sqrt{5} - 7\sqrt{5}$ Expand to get 3 or 4 terms	M1	
$= 16, \; -4\sqrt{5}$ (1st A for 16, 2nd A for $-4\sqrt{5}$)	A1, A1	
(i.s.w. if necessary, e.g. $16 - 4\sqrt{5} \rightarrow 4 - \sqrt{5}$)		(3)
(b) $\frac{7+\sqrt{5}}{3+\sqrt{5}} \times \frac{3-\sqrt{5}}{3-\sqrt{5}}$ (This is sufficient for the M mark)	M1	
Correct denominator without surds, i.e. $9 - 5$ or 4	A1	
$4 - \sqrt{5}$ or $4 - 1\sqrt{5}$	A1	(3)

8.

$\frac{5-2\sqrt{3}}{\sqrt{3}-1} \times \frac{(\sqrt{3}+1)}{(\sqrt{3}+1)}$		M1
$= \frac{\cdots}{2}$	denominator of 2	A1
Numerator $= 5\sqrt{3}+5-2\sqrt{3}\sqrt{3}-2\sqrt{3}$		M1
So $\frac{5-2\sqrt{3}}{\sqrt{3}-1} = -\frac{1}{2}+\frac{3}{2}\sqrt{3}$		A1
		4

9.

(a)	$\sqrt{32} = 4\sqrt{2}$ or $\sqrt{18} = 3\sqrt{2}$	B1	
	$(\sqrt{32}+\sqrt{18}=)$ $\underline{7\sqrt{2}}$	B1	(2)
(b)	$\times\frac{3-\sqrt{2}}{3-\sqrt{2}}$ or $\times\frac{-3+\sqrt{2}}{-3+\sqrt{2}}$ seen	M1	
	$\left[\frac{\sqrt{32}+\sqrt{18}}{3+\sqrt{2}} \times \frac{3-\sqrt{2}}{3-\sqrt{2}} = \right] \frac{a\sqrt{2}(3-\sqrt{2})}{[9-2]} \rightarrow \frac{3a\sqrt{2}-2a}{[9-2]}$ (or better)	dM1	
	$= \underline{3\sqrt{2}, -2}$	A1, A1	(4)
ALT	$(b\sqrt{2}+c)(3+\sqrt{2}) = 7\sqrt{2}$ leading to: $3b+c=7$, $3c+2b=0$	M1	
	e.g. $3(7-3b)+2b=0$ (o.e.)	dM1	
		6 marks	

10.

$(8^{2x+3} = (2^3)^{2x+3}) = 2^{3(2x+3)}$ or 2^{ax+b} with $a = 6$ **or** $b = 9$	M1
$= 2^{6x+9}$ *or* $= 2^{3(2x+3)}$ as **final** answer with no errors or $(y=)6x+9$ or $3(2x+3)$	A1
	[2]
	2 marks