Topic Y1 Polynomials and graphs (Pre-TT) [45] MARKSCHEME

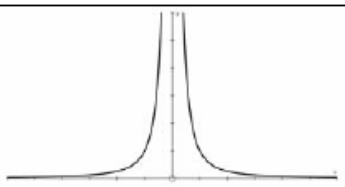
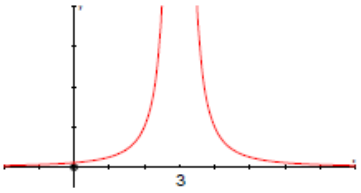
1.

4(a)	States or uses $f(+3) = 0$	M1	1.1b
	$4(3)^3 - 12(3)^2 + 2(3) - 6 = 108 - 108 + 6 - 6 = 0$ and so $(x - 3)$ is a factor	A1	1.1b
		(2)	
(b)	Begins division or factorisation so x $4x^3 - 12x^2 + 2x - 6 = (x - 3)(4x^2 + \ldots)$	M1	2.1
	$4x^3 - 12x^2 + 2x - 6 = (x - 3)(4x^2 + 2)$	A1	1.1b
	Considers the roots of their quadratic function using completion of square or discriminant	M1	2.1
	$(4x^2 + 2) = 0$ has no real roots with a reason (e.g. negative number does not have a real square root, or $4x^2 + 2 > 0$ for all x So $x = 3$ is the only real root of $f(x) = 0$ *	A1*	2.4
		(4)	

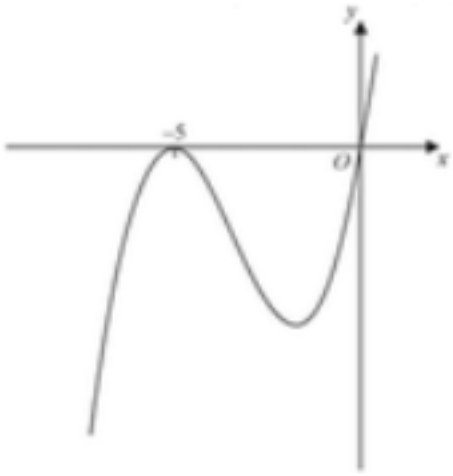
2.

$2x^2 - 8x + 8 = 26 - 3x$	M1		Attempt to eliminate x or y	Must be a clear attempt to reduce to one variable. Condone poor algebra for first mark. If x eliminated: $y = 2(\frac{26 - y}{3} - 2)^2$ Leading to $2y^2 - 89y + 800 = 0$ $(2y - 25)(y - 32) = 0$ etc.
$2x^2 - 5x - 18 (= 0)$	A1		Correct 3 term quadratic (not necessarily all in one side)	
$(2x - 9)(x + 2) (= 0)$	M1		Correct method to solve quadratic	
$x = \frac{9}{2}, x = -2$	A1		x values correct	
$y = \frac{25}{2}, y = 32$	A1	5	y values correct	
		5	SR If A0 A0, one correct pair of values, spotted or from correct factorisation www B1	

3.

(i)		B1 B1	 2	Correct curve in one quadrant Completely correct
(ii)		M1 A1√	 2	Translate (i) horizontally Translates all of their (i) $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ 3 must be labelled or stated
(iii)	(One-way) stretch, sf 2, parallel to the y-axis	B1 B1 B1	 3	Stretch (Scale) factor 2 Parallel to y-axis o.e. **SR** Stretch B1 Sf $\sqrt{2}$ parallel to x-axis B2

4.

13(a)	$x^3+10x^2+25x=x(x^2+10x+25)$	M1	1.1b
	$=x(x+5)^2$	A1	1.1b
		(2)	
(b)	 A cubic with correct orientation	M1	1.1b
	Curve passes through the origin (0, 0) and touches at $(-5, 0)$ (see note below for ft)	A1ft	1.1b
		(2)	
(c)	Curve has been translated a to the left	M1	3.1a
	$a=-2$	A1ft	3.2a
	$a=3$	A1ft	1.1b
		(3)	
			(7 marks)

5.

(i)	Quotient = $3x+...$	B1		For correct leading term in quotient
	For evidence of correct division process	M1		Or for cubic $\equiv(x^2-2x+5)(gx+h)\ (+...)$
	$3x+4$	A1		For correct quotient
	$-6x-13$	A1	**4**	For correct remainder ISW
(ii)	$a=7$	B1√		Follow through If rem in (i) is $Px+Q$,
	$b=20$	B1√	**2**	then B1√ for $a=1-P$ and B1√ for $b=7-Q$
	[SR: If B0+B0, award B1√ for $a=1+P$ AND $b=7+Q$; also SR B1 for $a=20, b=7$]			

6.

5 (i)		M1		Reflection in either axis
		A1	2	Correct reflection in x axis
(ii)	(1, 3)	B1 B1	2	Correct x coordinate Correct y coordinate **SR** B1 for (3, 1)
(iii)	Translation 2 units in negative x direction	B1 B1	2	
			6	

7.

12(a)	Sets $3x-2\sqrt{x}=8x-16$		B1	1.1a
	$2\sqrt{x}=16-5x$ $4x=(16-5x)^2 \Rightarrow x=..$	$5x+2\sqrt{x}-16=0$ $\Rightarrow (5\sqrt{x}\pm 8)(\sqrt{x}\pm 2)=0$	M1	3.1a
	$25x^2-164x+256=0$	$(5\sqrt{x}-8)(\sqrt{x}+2)=0$	A1	1.1b
	$(25x-64)(x-4)=0 \Rightarrow x=..$	$\sqrt{x}=\frac{8}{5},(-2) \Rightarrow x=..$	M1	1.1b
	$x=\frac{64}{25}$ only		A1	2.3
			(5)	
(b)	Attempts to solve $3x-2\sqrt{x}=0$		M1	2.1
	Correct solution $x=\frac{4}{9}$		A1	1.1b
	y Ñ $3x-2\sqrt{x}$, $y>8x-16$ x Ö $\frac{4}{9}$		B1ft	1.1b
			(3)	