Mark Scheme 4751
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Section A

1	40	2	M1 subst of 3 for *x* or attempt at long divn with $x^3 - 3x^2$ seen in working; 0 for attempt at factors by inspection	2
2	$[x =]\dfrac{6y}{3+m}$ as final answer	3	M1 for $3x + mx = y + 5y$ o.e. and M1 for $x(3 + m)$ or ft sign error	3
3	*n* + 1 and *n* + 2 both seen 3*n* + 3 =3(*n* + 1) o.e.	1 M1 A1	condone e.g. *a* instead of *n* for last 2 marks or starting again with full method for middle number = *y* etc or 3 a factor of both terms so divisible by 3	3
4	−0.6 o.e. (4, 0) (0, 12/5) o.e.	2 1 1	M1 for 0.6 or −0.6*x* o.e. or rearrangement to '*y* =' form [need not be correct] condone values of *x* and *y* given	4
5	$8 - 12x + 6x^2 - x^3$ isw	4	B3 for 3 terms correct or all correct except for signs; B2 for two terms correct including at least one of $-12x$ and $6x^2$; B1 for 1 3 3 1 soi or for 8 and $-x^3$	4
6	(i) 1 (ii) a^8 cao (iii) $\dfrac{1}{3a^3b}$ or $\tfrac{1}{3}a^{-3}b^{-1}$ isw	1 1 3	M2 for two 'terms' correct or M1 for $3a^3b$ or $\dfrac{1}{(9a^6b^2)^{\frac{1}{2}}}$ or $\dfrac{1}{\sqrt{9a^6b^2}}$; ignore ±	5
7	(i) $3\sqrt{6}$ or $\sqrt{54}$ isw (ii) $10 + 2\sqrt{7}$	2 3	M1 for $\sqrt{(4\times6)}$ or $2\sqrt{6}$ or $3\sqrt{2}\sqrt{3}$ seen M1 for attempt to multiply num. and denom. by $5 + \sqrt{7}$ and M1 for 18 or $25 - 7$ seen	5
8	$x(30 - 2x) = 112$ $x(15 - x) = 56$ or $30x - 2x^2 = 112$ $(x - 7)(x - 8)$ *x* = 7 or 8 7 by 16 or 8 by 14	M1 A1 1 1 1	allow M1 for length = $30 - 2x$ soi NB answer given 0 for formula or completing sq etc must be explicit; both values required allow for 16 and 14 found following 7 and 8; both required	5
9	$[y=] 3x + 2 = 3x^2 - 7x + 1$ $[0 =] 3x^2 - 10x - 1$ or $-3x^2 + 10x + 1$ $x = \dfrac{10 \pm \sqrt{100+12}}{6}$ $= \dfrac{10 \pm \sqrt{112}}{6}$ or $\dfrac{5 \pm \sqrt{28}}{3}$ o.e. isw	M1 M1 M1 A2	or rearrangement of linear and subst for *x* in quadratic attempted condone one error; dep on first M1 attempt at formula [dep. on first M1 and quadratic = 0]; M2 for whole method for completing square or M1 to stage before taking roots A1 for two of three 'terms' correct [with correct fraction line] or for one root	5

Section B

10	i	$(x - 4)^2 + 9$	3	B1 for 4, B2 for 9 or M1 for $25 - 16$	3
	ii	(4, 9) or ft	1+1		
		parabola right way up	G1	condone stopping at y axis	
		25 at intersection on y-axis (mark intent)	G1	ignore posn of min: can ft theirs	4
	iii	$x > 7$ or $x < 1$	3	M1 for $x^2 - 8x + 7$ [> 0] and M1 for $(x - 7)(x - 1)$ [>0] or M1 for $(x - 4)^2$ [>] 9 and M1 for $x - 4 > 3$ and $x - 4 < -3$ or B2 for 1 and 7	3
	iv	$[y =] x^2 - 8x + 5$	1	or $[y =] (x - 4)^2 - 11$	1
11	i	$(6 - 0)^2 + (10 - 2)^2$	M1		
		AC = 10	A1		
		AB = $\sqrt{98}$ and BC = $\sqrt{2}$	1	or 1 for grad AB = 1 and grad BC = -1 and 1 for comment/ showing $m_1 m_2 = -1$ o.e.	
		clear correct use of Pythagoras's theorem	1		4
	ii	[angle in a semicircle so]AC diameter [so radius = 5]	1	d or diameter needed; NB ans given	
		midpt of AC = (6/2, [10+2]/2)	1	method must be shown; NB ans givn	
		$(x - 3)^2 + (y - 6)^2 = 5^2$ o.e. isw	2	B1 for one side correct	4
	iii	[grad AC =] 8/6 or 4/3	1		
		grad tgt = $-3/4$	M1	for grad tgt = -1/their grad AC	
		$y - 10 = [-3/4](x - 6)$ o.e.	M1	or M1 for $y =$ their $m x + c$ then subst (6, 10) to find c	
		[e.g. $3x + 4y = 58$] or ft			
		(58/3, 0) and (0, 58/4) o.e. isw	A2	1 each cao; condone not as coords	5
12	i	$(x + 1)(x - 2)(x - 5)$	M1		
		$(x + 1)(x^2 - 7x + 10)$	A1	o.e. with two other factors; condone	
		correct step shown towards completion [answer given]	A1	missing brackets if expanded correctly; A2 for $x^3 - 5x^2 - 2x^2 + x^2 + 10x - 5x - 2x + 10$	3
	ii	cubic the right way up	G1	must extend beyond $x = -1$ and 5	
		-1, 2 and 5 indicated on x axis	G1	at intersections of curve and axis	
		10 indicated at intn on y axis	G1		3
	iii	f(4) attempted	M1	or f(4) + 10; '4 a root implies $(x - 4)$ a factor' or vv	
		= $64 - 96 + 12 + 10$	A1	or $5 \times 2 \times -1$ etc or correct long division if first M1 earned	
		attempt at long division of $x^3 - 6x^2 + 3x + 20$ by $x - 4$ as far as $x^3 - 4x^2$ in working	M2	or M2 for $(x - 4)(x^2 + .. - 5)$ or $(x - 4)(x^2 - 2x + k)$ seen; M1 for realising long divn by $x - 4$ needed but not doing it	
		$x^2 - 2x - 5 = 0$	A2	A1 for $x^2 - 2x - 5$ SC2 for finding f(x) ÷ $(x - 4) = x^2 - 2x - 5$ rem -10 without further explanation	6