The Bridge to A level

Test Yourself
Mark Scheme
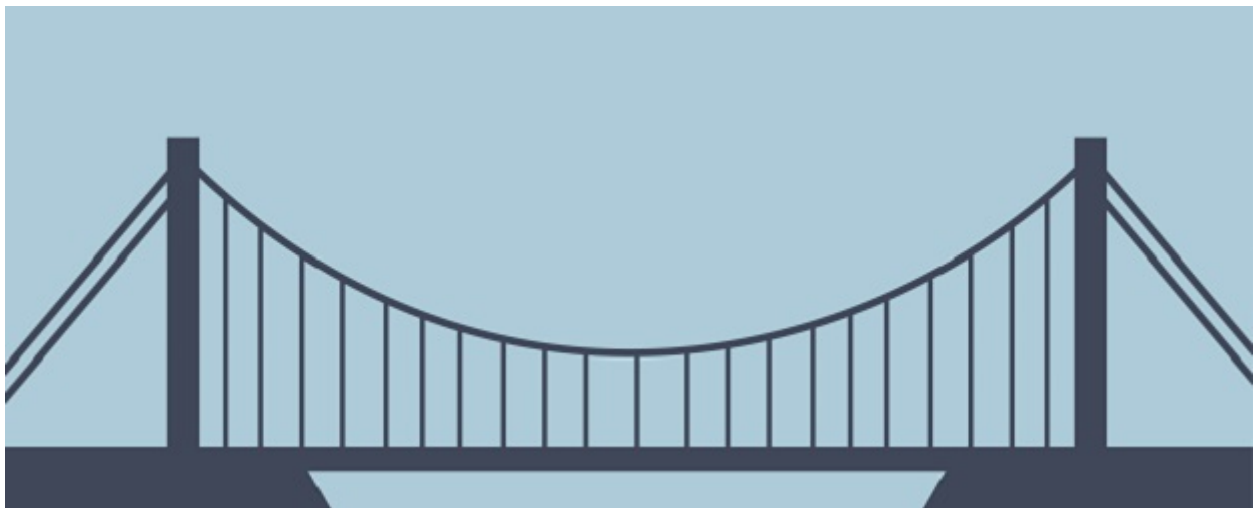
Section	Question	Answer	Marks	Notes
1	1	$x = \pm 3$	M2 M1 A1	Use of quadratic formula (M1) in x^2 (M1) $x^2 = 9$ cao
	2(i)	$4(x-3)^2 - 9$	B1 B1 M1A1	$a = 4$ $b = 3$ $c = -9$
	2(ii)	(3,-9)	B2	B1 for each coordinate
2	1	$t = [\pm]\sqrt{\dfrac{2s}{a}}$ o.e.	B3	B2 for t omitted M1 for constructive first step M1 for finding square root of their 't^2'
	2	$[x =] \dfrac{6y}{3+m}$ as final answer	M1 M1 A1	for $3x + mx = y + 5y$ oe for $x(3 + m)$ or ft sign error
	3	$[x =] \dfrac{2y+3}{y-1}$ o.e. or ft	M1 M1 M1 M1	for multiplying by x-2 for expanding brackets for cllecting x and 'other' terms for factorising and dividing Award all four marks only if fully correct
3	1	$x = \dfrac{7}{11}$ $y = \dfrac{24}{11}$ oe www	B3	B2 for one coordinate correct, or correct solution not erxpressed as coordinates (or) M1 for substitution or elimination of one variable oe
	2	$a = 3$ $b = 32$	M1 A1A1	Equating $5x - a$ and $2x + 18$ and substituting $x = 7$
	3	$x = -0.5$ or 1 $y = 4.25$ or 2	M1 M1 A1 A1	for $7-3x = 2(x^2 - 2x + 3)$ oe for quadratic in x ($2x^2 - x - 1 = 0$ oe) x y
4	1(i)	$3\sqrt{6}$	M1 A1	for $\sqrt{4x6}$ oe seen
	1(ii)	$10 + 2\sqrt{7}$	M1 M1 A1	for attempt to multiply num and denom by $5 + \sqrt{7}$ for 18 or $25 - 7$ seen
	2(i)	$28\sqrt{6}$	M1 A1	for $30\sqrt{6}$ or $2\sqrt{6}$ oe
	2(ii)	$49 - 12\sqrt{5}$	B2 B1	for 49 for $12\sqrt{5}$ If B0, award M1 for 3 correct terms of $4 - 6\sqrt{5} - 6\sqrt{5} + 45$

5	1(i)	9	M1 A1	for 3^2 oe
	1(ii)	8 (condone -8 or ±8)	M1 A1	for $16^{0.25} = 2$
	2(i)	$4x^4y$	M1 A1	for two elements correct
	2(ii)	32	M1 A1	for 2^5 oe
	3	$\dfrac{4}{27}$	B1 B1	numerator denominator
6	1	Grad of AB = -3 Grad of BC = $\dfrac{1}{3}$ product of gradients = -1	B1 B1	either gradient product of gradients need to equal -1
	2	(3,6)	B1	
	3	Coordinates (0,2) (0.5,0)	M1 M1 A1A1	for y = -4x + c for y = -4x + 14 one mark for each set of coordinates
	4	y = 3x - 7	M1 M1 A1	Gradient = 3 Subst in (4,5) into their 'y = mx + c'
7	1	Cubic the correct way up x-axis cuts at -1, 2, 4 shown y-axis cuts at 8 shown	G1 G1 G1	
	2	Sketch of cubic correct way up Curve through (0,0) Curve touches x-axis at x=3	G1 G1 G1	
	3	Correct graph with clear asymptote at x = 2 (0, -0.5) shown	G2 G1	(G1 for only one branch correct0
	4	10	B1	
8	1	$y = x^2 - 8x + 5$	B1	

	2	$f(x-3) = (x-3)^3 -5(x-3) + 2$
		  $(x^2 - 6x + 9)(x-3)$
		$f(x-3) = x^3 - 3x^2 - 6x^2 + 18x + 9x - 27 - 5x + 15 + 2$
		     $= x^3 - 9x^2 + 22x - 10$
			B1
			B1
			
			A1
			B1
				Substitution
				Partial expansion of cubic term
				
				All correct unsimplified
				Correct consolidation

	3	$f(x-4) = 2(x-4)^3 + 7(x-4)^2 - 7(x-4) - 12$ $2x^3 - 17x^2 + 33x$	M1 M1 M1	Substitution Correct expansion of one pair of brackets correct completion to given answer
	4	$(x + 1 - 3)(x - 2 - 3)(x - 4 - 3)$ ie $(x -2)(x - 5)(x - 7)$	M1 A1	Allow one slip Oe

9	1	Tan 42° = $\frac{opp}{adj}$ 0.9004 = $\frac{height\ of\ pole}{15}$ 13.5(06) m = height of pole	M1 M1 A1	
	2	$\pm\frac{\sqrt{13}}{4}$	B3	B2 for either $-\frac{\sqrt{13}}{4}$ or $\frac{\sqrt{13}}{4}$ or $\pm\frac{\sqrt{13}}{\sqrt{16}}$ oe or M1 for $\sqrt{13}$ seen
	3	(0, 0) (90, 1) (270, -1) (360, 0)	B1 B1 B1 B1	
10	1(i)	C = 141.1….. Bearing = 038. 8 (accept 038.9)	M1 M1 A1 A1	Correct attempt at cosine rule Correct full method for C C Bearing
	1(ii)	3030 to 3050 acceptable	M1 A1	Correct use of 0.5xaxbxsinC
	2	AB = 7.80 (or better, 7.799…) Area = 52.2 to 52.3	M1 A1 M1 A1	Correct use of sine rule AB 2 x 0.5 x 'their AB' x 11.4 x sin 36 Area
11	1	$(x-6)(x+3) < 0$ Critical values x = 6 and x = -3 $-3 < x < 6$	M1 M1 A1	Factorise Solve for x Deduce correct range
	2	(x-4)(x+1) >0 Critical values x = 4 and x = -1 x < 4 and x > 1	M1 M1 A1	Factorise Solve for x Deduce correct range
	3	$3x^2 + 6x - 90 < 0$ (x+6)(x-5) < 0 -6 < x < 5 x positive integer 0<x<5	M1 M1 M1 A1	Construct equation Factorise Deduce correct range Correct interpretation of values
12	1a	2n = multiple of 2 = even therefore 2n+1 must be odd	A1	
	1b	= 4mn + 2n + 2m + 1 = 2 (2mn + n + m) + 1 2 (2mn + n + m) must be even 2 (2mn + n + m) + 1 must be odd because the bracket is even.	M1 M1 M1 A1	Expand and simplify brackets Factorise Explain why bracket is even Deduce result must be odd
	2a	n + (n+1) + (n+2) + (n+3) = 4n+6	M1	Represent numbers algebraically

		=2(2n+3) which is a multiple of 2 and therefore even One example of many = 12+13+14+15 = 54 which is even though not divisible by 4 (2)	M1 A1	Factorise Conclusion with reason
	2b	12+13+14+15 = 54 which is even though not divisible by 4	M1 A1	Example Justification
13	1a)	$\overrightarrow{CB} = 2b - 2a$ $\overrightarrow{CN} = \frac{4}{5}(b-a)$ $\overrightarrow{MN} = \overrightarrow{MC} + \overrightarrow{CN}$ $= \frac{4}{5}b - \frac{1}{5}a$	M1 A1 M1 A1	Find CB Find CN Find MN Given in simplest form
	1b)	$\overrightarrow{MN} = \frac{4}{5}b - \frac{1}{5}a \neq$ λb for any value of λ and so the lines are not parallel	A1	Justification relating to parallel vectors being a multiple of one another
	2a	BC = -4b + 8a or 4(2a − b) oe	B1	
	2b	AQ = -4a + 4b + $\frac{1}{3}$(-4b + 8a) AQ = -$\frac{4}{3}$ a + $\frac{8}{3}$ b or $\frac{2}{3}$ (4b − 2a) oe	M1 A1	
	3	$a^2 = 25 + 64$ $|a| = \sqrt{89} = 9.43$	M1 A1	Vector from diagram Use of pythagoras
14	1	TVV $\frac{5}{9} \times \frac{4}{8} \times \frac{3}{7} = \frac{5}{42}$ VTV $\frac{4}{9} \times \frac{5}{8} \times \frac{3}{7} = \frac{5}{42}$ VVT $\frac{4}{9} \times \frac{3}{8} \times \frac{5}{7} = \frac{5}{42}$ VVV $\frac{4}{9} \times \frac{3}{8} \times \frac{2}{7} = \frac{1}{21}$ P(more vegetable) = $\frac{17}{42}$	M1 M1 M1 A1	Correct outcomes chosen Multiplying each probability Adding their probabilities Correct solution
	2a	25, 10, 13, 2	M1 A1	At least 2 correct All correct

	2bi	25+13 19/25 oe	M1 A1	Addition of "their 25 and 13" seen
	Ii	13+2 13/15 oe	M1 A1	Addition of "their 2 and 13" seen
15	1a	50 x 0.7 = (35) 30 x 2.167 = (65)	M1 A1	M1 for at least one calculation A1 both correct
	1b	(181 + 1)/2 = 91 First three bars = 80, need 11 more for median. 11 / 2.2 = 5 70 + 5 = 75 cms	M1 M1 A1	Calculation for where median will lie
	2a	21, 36 and 51 indicated with box 0 and 103 indicated Correct plot	M1 M1 A1	
	b	1 comment each regarding Median IQR	 A1 A1	Median has incresed showing (statement) IQR has increased showing (statement)