## Topics tested /Not tested in 2013 H2 Math Paper 1

In general, the following topics have not been tested yet. For detailed analysis, please refer to the table below.

## (1) Functions

- (2) Maclaurin Series + Binomial Expansion
- (3) Maxima/Minima + Rate of Change (but seldom tested)
- (4) Transformations/Further Curves Sketching
- (5) Recurrence Sequences
- (6) Vectors (questions on lines, though they usually involve planes with column vectors given)

## (7) Integration - by parts and volume of revolution

S/N	Topics	2013/P1	Remarks
1	Functions and graphs		
1.1	Concept of function, domain and range		Not tested
1.1.1	Find inverse functions		Not tested
1.1.2	Conditions for existence of inverse functions		Not tested
1.1.3	Find composite functions		Not tested
1.1.4	Conditions for existence of composite functions		Not tested
1.1.5	Relationship b/w function and its inverse as reflection in the line $y = x$		Not tested
1.2	Graphing Techniques		
1.2.1	Use of GC to graph a given function		Not tested
1.2.2	Relating the equation of $(x/a)^2 \pm (y/b)^2 = 1$ with its graph	Tested in Q5	

1.2.3	Relating the equation of y = (ax + b)/(cx + d) with its graph	Tested in Q3	
1.2.4	Relating the equation of $y = (ax^2 + bx + c)/(dx + e)$ with its graph	Tested in Q2	
1.2.5	Characteristics of graphs such as symmetry, intersection with axes, turning points and asympotes	Tested in Q3	This is a general concept that may reappear in P2
1.2.6	Determinating equations of asymptotes, axes of symmetry amd restrictions on the possible values of x and/or y	Tested in Q2/3	This is a general concept that may reappear in P2
1.2.7	Effect of transformation on the graphs of $y = f(x)$ as represented by $y = af(x)$		Not tested
1.2.8	Effect of transformation on the graphs of $y = f(x)$ as represented by $y = f(x) + a$		Not tested
1.2.9	Effect of transformation on the graphs of $y = f(x)$ as represented by $y = f(x + a)$		Not tested
1.2.10	Effect of transformation on the graphs of $y = f(x)$ as represented by $y = f(ax)$		Not tested
1.2.11	Relating the graphs of $y =  f(x) $ to $y = f(x)$		Not tested
1.2.12	Relating the graphs of $y = f( x )$ to $y = f(x)$		Not tested
1.2.13	Relating the graphs of $y = 1/f(x)$ to $y = f(x)$		Not tested
1.2.14	Relating the graphs of $y^2 = f(x)$ to $y = f(x)$		Not tested
1.2.15	Simple parametric equations and their graphs	Concept was present in Q11	
1.3	Equations and Inequalities		
1.3.1	Solving inequalities of the form f(x)/g(x) > 0 where f,g are quadratic expressions that are factorisable or always positive	Tested in Q3	
1.3.2	Solving inequalities by graphical methods	Tested in Q3	
1.3.3	Formulating an equation or system of linear equations from a problem situation	SOLE was used in Q1	This is a general concept that may reappear in P2
1.3.4	Finding the numerial solution of equations using a	SOLE was used in Q1	This is a general concept that may

	GC		reappear in P2
2	Sequences and Series		
2.1	Summation of Series		
2.1.1	Relationship between $U_n$ and $S_n$		Not tested
2.1.2	Sequence given by formula for the nth term		Not tested
2.1.3	Sequence generated by recurrance formula of the form $x_{n+1} = f(x_n)$		Not tested
2.1.4	Use of the $\Sigma$ notation	Tested in Q9	
2.1.5	Summation of seies by MOD	Tested in Q9	
2.1.6	Convergence of series and sum to infinity		Not tested
2.1.7	Binomial expansion of $(1 + x)^n$ for any rational n		Not tested
2.1.8	Condition for convergence of a binomial series		Not tested
2.1.9	Proof by method of MI	Tested in Q9	
2.2	Arithmetic and Geometric Series		
2.2.1	Formula for the nth term and the sum of a finite arithmetic series		Not tested
2.2.2	Formula for the nth term and the sum of a finite geometric series	Tested in Q7	
2.2.3	Condition for convergence of an infinite geometric series	Concept was present in Q7	
2.2.4	Formula for the sum to infinity of a convergent geometric series	Tested in Q7	
2.2.5	Solving practical problems involving APs and GPs		Only GP problems were seen in P1
3	Vectors		
3.1	Vectors in 2 and 3 Dimension		
3.1.1	Addition and subtraction of vectors, multiplication of a vector by a scalar, and their geometric	Tested in Q6	This is a general concept that may reappear in P2

	interpretation		
	Use of notation such as (x y), (x y z), xi + yj, xi + yj +		This is a general concept that may
3.1.2	z <b>k</b> , AB, <b>a</b>		reappear in P2
			This is a general concept that may
3.1.3	Position vectors and displacement vectors		reappear in P2
			This is a general concept that may
3.1.4	Magnitude of a vector		reappear in P2
			This is a general concept that may
3.1.5	Unit vectors		reappear in P2
3.1.6	Distance b/w 2 points		Not tested
3.1.7	Angle between a vector and the x, y or z axis		Not tested
3.1.8	Use of the ratio theorem in geometrical applications	Tested in Q6	
3.2	The Scalar and Vector Products of Vectors		
	Concepts of scalar products and vector products of	Concept was present in Q6	This is a general concept that may reappear in
3.2.1	vectors	concept was present in Qo	P2
	Calculation of the magnitude of a vector and the		Not tested
3.2.2	angle between 2 directions		Not lested
3.2.3	Calculation of the area of triangle or parallelogram	Tested in Q6	
	Other Geometrical meanings of  a·b  and  a×b		
	where <b>b</b> is a unit vector (eg. Length of projection and		Not tested
3.2.4	perpendicular length)		
2.2	Three Divergetienel Coordenates		
3.3	Three-Dimnesional Geometry		Equations of planas were seen in 01 but
3.3.1	Vector and cartesian equations of lines and planes	Tested in Q1	Equations of planes were seen in Q1 but equations of lines were absent from P1
3.3.1	Finding the distance from a point to a line or to a		
3.3.2	plane		Not tested
۵.۵.۷	Finding the angle b/w 2 lines, b/w a line and a plane,		
3.3.3	or b/w 2 planes		Not tested
3.3.4	Relationship b/w 2 lines (coplanar or skew)		Not tested
5.5.4			

3.3.6Relationship b/w 2 planesTested in Q13.3.7Relationship b/w 3 planesTested in Q13.3.8Finding the intersections of lines and planesTested in Q13.3.8Finding the intersections of lines and planesTested in Q14Complex NumbersConcept was present in Q44Complex numbers expressed in cartesian formConcept was present in Q44.1Complex numbers system from real numbersThis is a general concept that may reappear in P24.1.1to complex numbersConcept of roots was present in Q44.1.2Complex roots of quadratic equationsQ46Concept of roots was present in Q4P24.1.4Equating real and imaginary partsTested in Q46Conjugate roots of a polynomial equation with real coefficientsTested in Q44.1.2Complex numbers expressed in the form r(cos0 + is isin 0) or re <sup>0</sup> where r > 0 and $\neg x < 0 < \pi$ Concept was present in Q84.2.2numbersTested in Q8Tested in Q84.2.3expressed in polar formTested in Q84.2.4diagramTested in Q84.2.5complex numbers in the Argand and g, subtracting, multipling, dividing 2 and of adding, subtracting, multipling, dividing 2 and of adding, subtracting, multipling, dividing 2 and fadding, subtr	3.3.5	Relationship b/w a line and a plane		Not tested
3.3.8   Finding the intersections of lines and planes   Tested in Q1     4   Complex Numbers   Concept was present in Q4     4.1   Complex numbers expressed in cartesian form   Concept was present in Q4     4.1.1   Complex numbers expressed in cartesian form   Concept was present in Q4     4.1.1   to complex numbers   This is a general concept that may reappear in P2     4.1.2   Complex numbers   Concept of roots was present in Q4     4.1.3   the form x + iy   Concept of roots was present in Q4     4.1.4   Equating real and imaginary parts   Tested in Q4     4.1.5   coefficients   Tested in Q4     4.1.5   coefficients   Tested in Q4     4.1.5   coefficients   Concept was present in Q8     4.2.1   complex numbers expressed in the form r(cos0 + isin0) or re <sup>60</sup> where r > 0 and $\neg x < 0 < \pi$ Concept was present in Q8     4.2.2   number   Tested in Q8   Tested in Q8     4.2.2   moder   Tested in Q8   Tested in Q8     4.2.2   moder   Tested in Q8   Tested in Q8     4.2.3   diagram   Tested in Q8   This is a general concept that may reappear in Q2     4.	3.3.6	Relationship b/w 2 planes		Not tested
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4.2.2   number   Multiplication and division of 2 complex numbers     4.2.3   Multiplication and division of 2 complex numbers   Tested in Q8     4.2.3   expressed in polar form   Tested in Q8     4.2.4   Representation of complex numbers in the Argand diagram   Tested in Q8     4.2.4   Geometric effects of conjugating a complex number and of adding, subtracting, multipling, dividing 2   Tested in Q8     4.2.5   complex numbers   Tested in Q8     4.2.5   complex numbers   Tested in Q8     4.2.6   Loci such as  z - c  ≤ r,  z - a  =  z - b  and arg(z - a) =   Not tested			Tested in O8	
4.2.3   expressed in polar form   Tested in Q8     Representation of complex numbers in the Argand diagram   Tested in Q8   This is a general concept that may reappear in P2     4.2.4   Geometric effects of conjugating a complex number and of adding, subtracting, multipling, dividing 2   Tested in Q8   P2     4.2.5   complex numbers   Tested in Q8   Tested in Q8   P2     4.2.5   complex numbers   Tested in Q8   Not tested	4.2.2			
4.2.3   expressed in polar form   Figure 1     Representation of complex numbers in the Argand   Tested in Q8   This is a general concept that may reappear in P2     4.2.4   diagram   Tested in Q8   P2     Geometric effects of conjugating a complex number and of adding, subtracting, multipling, dividing 2   Tested in Q8   P2     4.2.5   complex numbers   Tested in Q8   Tested in Q8     4.2.6   Loci such as $ z - c  \le r$ , $ z - a  =  z - b $ and $arg(z - a) =$ Not tested			Tested in Q8	
4.2.4 diagram Tested in Q8   4.2.4 Geometric effects of conjugating a complex number and of adding, subtracting, multipling, dividing 2 Tested in Q8   4.2.5 complex numbers Tested in Q8   Loci such as  z - c  ≤ r,  z - a  =  z - b  and arg(z - a) = Not tested	4.2.3			
Geometric effects of conjugating a complex number and of adding, subtracting, multipling, dividing 2Tested in Q84.2.5complex numbersLoci such as $ z - c  \le r$ , $ z - a  =  z - b $ and $arg(z - a) =$ Not tested	121		Tested in Q8	
and of adding, subtracting, multipling, dividing 2 complex numbersTested in Q84.2.5Loci such as $ z - c  \le r$ , $ z - a  =  z - b $ and $arg(z - a) =$ Not tested	4.2.4	•		FZ
4.2.5complex numbersLoci such as $ z - c  \le r$ , $ z - a  =  z - b $ and $arg(z - a) =$ Not tested			Tested in O8	
Loci such as $ z - c  \le r$ , $ z - a  =  z - b $ and $arg(z - a) =$ Not tested	425			
Not tested		•		
4.2.6 $  \alpha$	4.2.6			Not tested

5	Calculus		
5.1	Differentiation		
	Graphical interpretation of $f'(x) > 0$ , $f'(x) = 0$ and		Not tested
5.1.1	f'(x)< 0		Not tested
5.1.2	Graphical interpretation of $f''(x) > 0$ and $f''(x) < 0$		Not tested
5.1.3	Relating the graph of $y = f'(x)$ to the graph of $y = f(x)$		Not tested
5.1.4	Differentiation of simple functions defined implicitly or parametrically	Tested in Q11	
5.1.5	Finding the numerical value of a derivative at a point using a GC		Not tested
5.1.6	Finding equations of tangents and normals to curves	Tested in Q11	
	Solving practical problems involving differentiation		Not tested
5.1.7	(Max/Min) + rate of change		Not tested
5.2	Maclaurin's Series		
	Derivation of the first few terms of the series expansion of $(1 + x)^n$ , $e^x$ , sin x, $ln(1 + x)$ and other		Not tested
5.2.1	simple functions		Not testeu
51211	Finding the first few terms of the series expansion of		
	sums and products of functions, e.g. e^x cos2x, using		Not tested
5.2.2	standard series		
5.2.3	Sin x $\approx$ x, cos x $\approx$ 1 - 1/2x <sup>2</sup> , tan x $\approx$ x		Not tested
5.2.4	Concepts of convergence and approximation		Not tested
5.3	Integration Techniques		
5.3.1	Integration of f'/f		Not tested
5.3.2	Integration of sin <sup>2</sup> x, cos <sup>2</sup> x and tan <sup>2</sup> x	Concept seen in Q5	
5.3.3	Integration of $1/(a^2 + x^2)$ , $1/(a^2 - x^2)^{0.5}$ , $1/(a^2 - x^2)$ and		Not tested

	1/(x <sup>2</sup> - a <sup>2</sup> )		
5.3.4	Integration by a given substitution	Tested in Q5	
5.3.5	Integration by parts		Not tested
5.4	Definite Integrals		
5.4.1	Concept of definite integral as a limit of sum		
5.4.2	Definite Integrals as the area under a curve	Tested in Q11	
5.4.3	Evaluation of definite integrals	Concept was present in Q11	
5.4.4	Finding the area of a region bounded by a curve and lines parallel to the coordinate axes, b/w a curve and a line or b/w 2 curves	Tested in Q11	
5.4.5	Area below the x-axis		Not tested
5.4.6	Finding the area under a curve parametrically	Tested in Q11	
5.4.7	Finding the volume of revolution about the x or y axes		Not tested
5.4.8	Finding the numerical value of a definite integral using a GC		Not tested
5.5	Differential Equations		
5.5.1	Solving DEs of the form $\dot{y}' = f(x)$	Tested in Q10	
5.5.2	Solving DEs of the form $\dot{y}' = f(y)$	Concept present in Q10	
5.5.3	Solving DEs of the form $\dot{y}'' = f(x)$	Concept present in Q10	
5.5.4	Formulating a DE from a problem situtation	Tested in Q10	
5.5.5	Use of a family of solution curves to represent the general solution of a DE	Tested in Q10	
5.5.6	Use of an initial condition to find a particular solution	Concept present in Q10	
5.5.7	Interpretation of a solution in terms of the problem situation	Concept present in Q10	