



## Guidance on mathematics by subject

It is expected that students joining the profession should be comfortable with algebraic manipulation. Students should have the following particular mathematical skills:

	CT1	CT2	CT3	CT4	CT5	CT6	CT7	CT8
<b>Pre-calculus</b>								
permutations & combinations; expansion of $(a+x)^n$	Y		Y	Y	Y	Y		
using the sigma notation to express the sum of a series	Y		Y	Y	Y	Y		Y
summing the terms of an arithmetic progression and a geometric progression	Y		Y	Y	Y	Y	Y	
interpolation and local approximation	Y		Y	Y		Y		Y
<b>Elementary calculus</b>								
the idea of a limit	Y		Y	Y	Y	Y		
differentiation of polynomial, exponential and logarithmic functions	Y		Y	Y	Y	Y	Y	Y
product, quotient and "function of a function" rules for differentiation	Y		Y	Y	Y	Y		Y
definite and indefinite integration of polynomial and exponential functions	Y		Y	Y	Y	Y	Y	Y
area under a curve			Y	Y	Y	Y		
methods of numerical integration	Y		Y	Y	Y	Y		Y
integration by substitution and by parts	Y		Y	Y	Y	Y		Y
<b>More advanced calculus</b>								
higher order derivatives	Y		Y	Y		Y		Y
finding turning points of simple functions with polynomial and exponential terms; curve sketching	Y		Y	Y		Y		Y
maximisation under constraints: method of Lagrange multipliers						Y		Y
Taylor's theorem; power series expansion for $\exp(x)$	Y		Y	Y	Y	Y		Y
differentiation of definite integrals: Fundamental Theorem of the Calculus	Y			Y	Y	Y		Y
solving first order differential equations: exact, separable (including logistic), linear				Y	Y			Y
<b>Calculus of two variables</b>								
partial derivatives of functions of two variables	Y		Y	Y	Y	Y		Y
maxima and minima of functions of two variables			Y	Y		Y		Y
double integrals and changing the order of double integrals			Y	Y	Y	Y		Y

	CT1	CT2	CT3	CT4	CT5	CT6	CT7	CT8
<b>Algebra</b>								
matrix addition and multiplication				Y		Y		Y
determinant and inverse of a square matrix				Y				
using matrices and vectors to represent linear equations				Y		Y		Y
solving simultaneous linear equations	Y		Y	Y	Y	Y		Y
complex numbers				Y				
linear difference equations with constant coefficients				Y				Y
<b>Probability</b>								
sample spaces, events			Y	Y		Y		Y
the probability of an event	Y	Y	Y	Y	Y	Y		Y
basic rules of probability	Y		Y	Y	Y	Y	Y	Y
conditional probability			Y	Y	Y	Y		Y
independent events			Y	Y	Y	Y		
Bayes Theorem			Y	Y		Y		

Students should also be familiar with the calculator they are to use in the exam and should be familiar with all its functions. Exam Regulation 7 covers calculators.