CHURCHILL COLLEGE
CAMBRIDGE

Mathematics Aptitude Test – Sample Paper

Duration: 1 hour

Name:

Instructions in actual test

Attempt all the questions in Section A (questions 1 to 10) and not more than five questions from Section B (questions 11 to 20). Write the letter corresponding to each chosen answer in the box provided. Use of calculators is ***not*** *allowed.*

In Section A, one mark will be awarded for each correct answer. In Section B, two marks will be awarded for each correct answer.

This document is shorter than the actual test and contains a sample set of questions.

Section A

1. How many real values of x satisfy

$$x^3 = 2x?$$

A. 0 B. 1 C. 2 D. 3 E. 4

2. A box contains 4 blue, 2 red and 3 purple pens. Three pens are drawn at random from the box, without replacement. What is the probability of drawing two blue pens followed by one purple pen?

A. $\frac{1}{7}$ B. $\frac{1}{14}$ C. $\frac{4}{81}$ D. $\frac{1}{3}$ E. $\frac{1}{2}$

3. What is the last digit of 2^{2018}?

A. 2
B. 4
C. 6
D. 8
E. None of the above

Section B

4. Given the expression $\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots$, which one of the following expresses $\log\left(\frac{1+x^2}{1+x}\right)$?

A. $-x + \frac{3x^2}{2} - \frac{x^3}{3} + \ldots$ B. $-x + \frac{x^2}{2} - \frac{7x^3}{3} + \ldots$ C. $x + \frac{x^2}{2} + \frac{x^3}{3} + \ldots$

D. $\frac{x^2}{1+x} - \frac{x^4}{2(1+x)^2} + \frac{x^6}{3(1+x)3} - \ldots$ E. $\frac{1+x^2}{1+x} - \frac{(1+x^2)^2}{2(1+x)^2} + \frac{(1+x^2)^3}{3(1+x)^3} - \ldots$

5. How many solutions are there to the equation

$$(x^2 - 5x + 5)^{(x^2-11x+30)} = 1?$$

A. 0 B. 2 C. 4 D. 6 E. Infinite

End of test