

DEPARTMENT OF MATHEMATICS

ONE-DAY PROFESSIONAL DEVELOPMENT COURSE

INFINITY: HISTORY, PHILOSOPHY, MATHEMATICS

For Mathematics and Other Teachers, ACT Secondary Colleges and High Schools

When: Friday 3 November, 9.30am – 4.00pm

Where: Arndt Lecture Theatre 1, Arndt Building,
ANU campus end of Kingsley Street, off Barry Drive

Cost: \$25 (morning tea, lunch and afternoon tea provided).

Organised by the Department of Mathematics, ANU

INFINITY – the infinitely large and the infinitesimally small, the potentially infinite and the actually infinite – has been a source of philosophical speculation since the Ancient Greeks.

With mathematics one can make sense of this. There is a hierarchy of infinities, indeed an infinite hierarchy. Following Cantor in the late 19th century, Gödel and Cohen in the 20th century, we will enter the 'transfinite paradise'.

We will discuss the history of infinity, and the role of infinity in mathematical models. We will look at the game of dodge ball and use it to show that the infinity of the irrational numbers is larger than the infinity of the rational numbers.

We will discuss the foundations of the real number system, talk about infinitesimals as used by Leibniz and Newton in their development of calculus, show how Cauchy made these ideas rigorous. We will discuss how in the 1960s a new approach to calculus was invented by Abraham Robinson in which there are 'hyperreals', both infinitely small and infinitely large, and how dy/dx can be seen as a ratio of two infinitely small hyperreals.

Preliminary Reading: See 'Professional Development Workshops for Teachers' at www.maths.anu.edu.au/DoM/secondary/ closer to the date of the workshop.

ANU SECONDARY COLLEGE: Infinity is a major topic in the second of the four half units in the new maths minor course for selected Years 11 and 12 students. The texts are *The Heart of Mathematics* by Burger and Starbird and the notes *An Introduction to Contemporary Mathematics* (latest version via the above website).

The teachers involved will discuss their experiences with the course. There will also be time for discussion of pedagogy.

We are planning two more such courses in 2007: Geometry and Topology; Chaos and Fractals.

Reaching for Infinity



The Ancient of Days, William Blake, 1794

MORE INFORMATION

Registration, Administrative information, parking vouchers, E: Katie.Lau@maths.anu.edu.au
(Please register early; we would like an early estimate and may need to restrict numbers)

Course Information, E: John.Hutchinson@anu.edu.au