



Math Mole

July 12, 2007

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Volume 5, No. 4

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Puzzles:

One: I'm thinking of a number 1,2, or 3. What is one yes or no question that you can ask to figure out the number I'm thinking of?

Two: Each week, Billboard publishes a Top 20 list of pop songs in the United States. If the order is never the same in any two consecutive weeks, and no song ever regains any lost popularity (i.e. no song rises in ranking once it starts to drop in ranking) how many consecutive weeks could the same twenty songs remain on the Top 20 list?

Three: Find a nine digit positive integer, $d_1d_2d_3d_4d_5d_6d_7d_8d_9$ with distinct digits, so that 1 divides d_1 , 2 divides d_1d_2 , 3 divides $d_1d_2d_3$, ... , 8 divides $d_1d_2d_3d_4d_5d_6d_7d_8$, and 9 divides $d_1d_2d_3d_4d_5d_6d_7d_8d_9$.

Mathematician of the Day



Srinivasa Ramanujan, 22 December 1887 - 26 April 1920, India

He was born in Erode, India. As a student, he was so obsessed with math that he neglected other subjects, so he failed to enter college.

In 1913, while working as a clerk, he sent theorems that he had proven to G. H. Hardy of Cambridge University, and was then invited to England. When he died, he left behind notebooks containing around 3500 theorems, identities, and other results, most of which have now been proven to be true.

His most notable works include the infinite series for pi, which is the basis for algorithms used to calculate pi, a formula for the number of partitions of an integer, and the Ramanujan-Petersson conjecture for the eigenvalues of modular forms under Hecke operators.

His results were both original and highly unconventional, have inspired a vast amount of further research, and is applied in crystallography and in string theory.

Source: <http://en.wikipedia.org/wiki/Ramanujan>

Career Spotlight: Mathematician

Mathematics is one of the oldest and most fundamental sciences. Mathematicians use mathematical theory, computational techniques, algorithms, and the latest computer technology to solve economic, scientific, engineering, physics, and business problems. The work of mathematicians falls into two broad classes-theoretical (pure) mathematics and applied mathematics. These classes, however, are not sharply defined and often overlap.

Theoretical mathematicians advance mathematical knowledge by developing new principles and recognizing previously unknown relationships between existing principles of mathematics. Although these workers seek to increase basic knowledge without necessarily considering its practical use, such pure and abstract knowledge has been instrumental in producing or furthering many scientific and engineering achievements. Many theoretical mathematicians are employed as university faculty, dividing their time between teaching and conducting research. (See the statement on teachers-postsecondary elsewhere in the Handbook.)

Applied mathematicians, on the other hand, use theories and techniques, such as mathematical modeling and computational methods, to formulate and solve practical problems in business, government, and engineering and in the physical, life, and social sciences. For example, they may analyze the most efficient way to schedule airline routes between cities, the effects and safety of new drugs, the aerodynamic characteristics of an experimental automobile, or the cost-effectiveness of alternative manufacturing processes. Applied mathematicians working in industrial research and development may develop or enhance mathematical methods when solving a difficult problem. Some mathematicians, called cryptanalysts, analyze and decipher encryption systems designed to transmit military, political, financial, or law enforcement-related information in code.

Significant Points

- * A Ph.D. degree in mathematics usually is the minimum educational requirement, except in the Federal Government.
- * The number of jobs with the title "mathematician" is declining as the workforce becomes increasingly specialized; competition will be keen for the limited number of available jobs.
- * Master's and Ph.D. degree holders with a strong background in mathematics and a related field, such as computer science or engineering, should have better employment opportunities in related occupations.

Employment Information

Mathematicians held about 2,500 jobs in 2004. Many people with mathematical backgrounds also worked in other occupations. For example, about 53,000 persons held positions as postsecondary mathematical science teachers in 2004.

Median annual earnings of mathematicians were \$81,240 in May 2004. The middle 50 percent earned between \$60,050 and \$101,360. The lowest 10 percent had earnings of less than \$43,160, while the highest 10 percent earned over \$120,900.

In early 2005, the average annual salary for mathematicians employed by the Federal Government in supervisory, nonsupervisory, and managerial positions was \$88,194; that for mathematical statisticians was \$91,446; and for cryptanalysts the average was \$70,774.

Info from: <http://www.bls.gov/oco/ocos043.htm>