

## Exciting careers await mathematicians

BY ARVIND GUPTA, FOR CANWEST NEWS SERVICE; VANCOUVER SUN APRIL 18, 2009

One question I often get asked is, "What careers could I have with a math degree?" In this year's CareerCast JobsRated.com survey of 200 occupations, the top three jobs were mathematician, actuary, and statistician. And, in a sign of what the future holds, five of the next seven top jobs all require strong mathematical skills. These rankings, developed by analyzing a large number of factors including working conditions, competitiveness, hiring outlook and physical exertion, underscore the transformation underway in our society to one in which the generation and application of knowledge are increasingly highly prized. Those with quantitative skills will increasingly be in a position to garner the best careers leading to the highest rate of job satisfaction.

But if you're under the impression that jobs that use mathematics are the ones that are dry and dull, you'll be surprised to discover the vast array of opportunities available. Consider these interesting options:

### ASTRONAUT

In addition to incredible physical and mental endurance, space exploration requires sophisticated geometric, spatial and other mathematical skills. Who can forget those nail-biting moments in the film Apollo 13 when Tom Hanks and mission control at NASA were frantically making the calculations and adjustments to get the crippled spaceship back to Earth?

### BASEBALL ANALYST

Major league baseball teams often hire mathematicians -- known as sabermetricians -- to develop statistical analyses of player records to optimize the resources available to the team. Sabermetricians advise coaches on the best possible batting orders and game strategies based on models of players' strengths, pitcher tendencies and other quantifiable factors.

### CLIMATOLOGIST

Interpreting the rich sources of data that make up weather patterns and climate trends is a critical field for understanding the world we live in, and how it is likely to change in the future. This is a field with far-reaching connections to the environment, agriculture, oceanography, and even archeology, in which geochronologists date archeological sites and reconstruct past climates.

### CRIMINOLOGIST

Mathematics provides a host of powerful tools for understanding and fighting crime. This ranges from quantifying the reasons that people become criminals in the first place to understanding how neighbourhood design can encourage or discourage criminal activity. Criminology professors Paul and Patricia Brantingham at Simon Fraser University work with the School of Computing Science and the mathematical modellers at the Interdisciplinary Research in the Mathematical and Computational Sciences Centre to maintain a repository of past and current crime data to answer questions and identify patterns in crime around Vancouver and other real and simulated urban environments.

### CRYPTOGRAPHER

Cryptographers build or break codes for applications in defence, Internet security, and financial transactions. In the Second World War, Alan Turing and his fellow British mathematicians developed mathematical technology that broke the Nazi code using the famous Enigma machine, thus playing a major role in the outcome of the war and also laying the foundations for modern computing.

### VIDEO GAME DESIGNER

Do you or your children line up at Future Shop in the wee hours, eagerly awaiting the release of the

latest gaming platform? Computer-based animation for video games combines mathematics, computer science, art, physics and biomechanics. It is all those calculations that make the movement of characters, explosions, smoke and substances required to ooze seem so real.

#### CITY PLANNER

Achieving a balance between urban esthetics, public safety, transportation, building and renewal in our cities is the job of city planners.

Using software and complex calculations, these behind-the-scenes folks work with elected officials on the best ways to improve upon, and build, our cities. Using forecasting -- you guessed it, more math -- planners shed light on future population growth in different areas of a city, which guides the development of transit services, community centres and other essential infrastructure.

#### PLAYWRIGHT/ACTOR/ENTERTAINER

Entertainment is laced with mathematics on the screen and behind the scenes, from the mathematicians who consult for the show *Numb3rs*, to CBC TV host Jennifer Gardy, Bill Nye the Science Guy, and the stars of *Mythbusters*. A phenomenal example: John Mighton, Canadian playwright, author, mathematician, and educator, has written several math-themed plays. He was in the movie *Good Will Hunting* with Robin Williams and Matt Damon. And lately his acclaimed program *Jump Math* has shown that all kids can do mathematics. Of science and art, Mighton has said, "If the two worlds communicated more, we'd have much richer art and science as a result."

#### PYROTECHNICS EXPERT

Blowing things up can be fun and exciting, but it requires a high degree of precision and accuracy. From fireworks displays, to the controlled demolition of buildings, to special effects for movie stunts, lives hang in the balance of the calculations made before the fuses are lit.

#### TRANSPORTATION DESIGNER

Transportation design is a part of the growing field of industrial and commercial design, which combines art and engineering to enhance the form and the function of the objects and machines that we use in our everyday lives. Designing efficient and elegant cars, airplanes, and other modes of transportation requires great creativity, as well as a strong grasp of the numbers and logic of physics.

And this is just the tip of the iceberg. The ability to reason about our world by logically analyzing information and then making the decision that has the best chance of giving an optimal result is not limited to any one profession. So the next time your child asks you "Why should I study math?" find out what he wants to do when he grows up, and point out how he'll need the very skills math brings to the job. I know that this list of jobs will continue to grow.

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Gupta is a mathematician and scientific director of MITACS, a national research network focused on connecting university-based math researchers with companies and other organizations to solve real-world challenges.

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