

## EDMONTON JOURNAL

### Exciting frontiers for math whizzes; From baseball to police work to pyrotechnics, there are countless career opportunities

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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 think jobs that use mathematics are dry and dull, you'll be surprised to discover the 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 math skills. Who can forget those nail-biting moments in the film Apollo 13 when Tom Hanks and NASA mission control were frantically making calculations and adjustments to get the crippled spaceship back to Earth?

#### BASEBALL ANALYST

Major league baseball teams 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 batting orders and game strategies based on models of players' strengths, pitchers' 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 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 crime data to answer questions and identify patterns in crime around Vancouver and other real and simulated urban environments.

#### 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 math, computer science, art, physics and biomechanics. It is all those calculations that make the movement of characters, explosions, smoke and substances required to make 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 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.

And this is just the tip of the iceberg. The ability to reason about our world by logically analyzing information and 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.

Dr. **Arvind 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.

### Illustration:

- Photo: NASA/JSC, File / Astronauts need sophisticated geometric, spatial and other mathematical skills.

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