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Saturday, November 25, 2006

Math Factor: Probability

It's an uncertain world we live in, and much of our lives depend on probability or chance. This program reviews the basics of probability and shows how permutations can be used to solve probability problems in which order plays a role. New technology in the field of DNA fingerprinting is just one of the applications featured. Go to United Streaming . Choose **Math Factor: Probability**. Choose the above video title and watch the clips. Grade Level: from Gr. 8 to Adult; Run Time: 29:15.

Below is a list of 5 mathematical concepts taught in the video. Beneath each list the content and math strand as well as how this relates to a science standard.

Concept	Content Strands	Relation to Science Standard
How to use counting techniques, such as tree, Venn & table diagrams, to find the number of possible outcomes (calculate sample space) of an experimental probability and make predictions about events	*Statistics & Probability*: Probability, Organization and display of data, Analysis of data, Predictions from data; *Number Sense & Operations:* Number systems; *Algebra:* Patterns, Relations & Functions	NYS MST Standard 1: Scientific Inquiry – Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. Scientific inquiry and observation requires hypothesis and expression. All phenomenons have a mathematical expression. The study of probability and the strategies for predicting outcomes has a direct connection with analysis of scientific data. The expression, collection, organization, display and analysis of data are paramount to scientific research. Experimental studies seek to validate hypotheses and the
Probability Expressions i.e., P (E) = # of Outcomes in the Event ÷ # of Outcomes in Sample Space. The result must be a Real Number, $0 \leq P(E) \geq 1$, where 0 is an impossible outcome and 1 is a certain outcome	*Statistics & Probability*: Probability, Predictions from data; *Algebra:* Variables & expressions; Functions	
Calculate the probability of a series of independent events using expressions for P (A and B) and the multiplication rule.	*Statistics & Probability:* Probability, Predictions from data; *Number Sense & Operations:* Operations; *Algebra:* Variables & expressions, Equations & inequalities	
Calculate the probability of a series of dependent events using expressions for P (A or B) and diagrams.	*Statistics & Probability:* Probability, Predictions from data; *Number Sense*	

Concept	Content Strands	Relation to Science Standard
	& Operations: Operations; *Algebra:* Variables & expressions, Equations & inequalities	scientist needs to analyze data and make predictions for practical application. It allows for identifying subsets and narrowing outcomes to determine the certainty or likeliness of a given outcome. The study of probability helps students to accomplish those tasks and make connections between mathematics and science.
How to use permutations to calculate probabilities.	*Statistics & Probability:* Probability, Predictions from data; *Number Sense & Operations:* Operations; *Algebra:* Variables & expressions, Equations & inequalities, Functions	

Below is my review of this video.

This video examined the basic terminology of probability and the use of Fundamental Counting Principals for solving experimental probability. The video demonstrated how to create and use tree diagram and charts for calculating sample space and solving problems using those techniques. Venn diagrams were also introduced for calculating probabilities that multiple subsets. While the information was presented quickly, by slowing and stopping the video, it was relatively simple to recreate the diagrams and apply these strategies.

As problems were introduced, the methodology for representing probability equations was also introduced and their application to the experiential was extended to the theoretical models. The video went on to discuss when and how to use permutations to solve probability problems. Students without prior knowledge of how to calculate permutations and theoretical combinations would not be able to apply this information.

I found that sections A and B provided ample information to understand the basic concepts and could be used with students of varying degrees of mathematical knowledge. Section C could only be used with students who have more advanced training and understandings.

Choose one of the topics above and explain how you might teach it to your students. Explain what physical objects or teacher materials you might use to explain the concept(s) taught.

With a pair of dice and chart paper, I could replicate the use of a table to introduce and teach basic probability vocabulary and solve experimental probability problems. Once the chart has been established, students will have a visual reference for sample space, outcomes, subsets, and impossible outcomes. Problems using this information can be solved and correct representation introduced. The class could experiment using the dice and compare results between the theoretical and experimental data.

In fact, I would start such a class by posing some questions about how likely is it that you would roll a pair of 6's or roll a 7. In groups students could roll dice and record results. Then I would prepare the chart with student participation and proceed with the lesson, allowing some additional time for students to compare that data as outlined above. The larger the set of actual or experimental results, the closer the results will be to matching the theoretical data.