How Likely is it?

Summary

This activity explores the concept of probability and chance. It will show many different ways of expressing a ratio and what it means when connected with probability.

Main Core Tie

Mathematics Grade 6

Strand: STATISTICS AND PROBABILITY (6.SP) Standard 6.SP.5

Materials

Math Journals

- Question of the Day/ Probability Meter? (pdf)

Adding machine tape

Clear gallon bag

10 Yellow and 20 orange centimeter cubes/counters

Pencil

Additional Resources

Books

- *Do You Wanna Bet?*
  , by Jean Cushman; ISBN 0-395-56516-2
- *Navigation Through Data Analysis and Probability*
  , NCTM, Navigations Series; ISBN 0- 87353-523-5
- *Math Matters*
  , by Suzanne H. Chapin; ISBN 0941356268

Background for Teachers

There is a misconception that the chance of an event occurring is on a scale from 1 to 100. Probability is expressed as a ratio (7 out of 10), a decimal (0.7), a fraction (7/10), or a percent (70%). The first number (numerator) represents the chances of the event happening. The second number (denominator) is the number of attempts made. Which means it is really a fraction from 0 to 1. How likely or unlikely is an event to happen? The "Invitation to Learn" will give you an idea of what students understand about probability.

Instructional Procedures

Invitation to Learn

Provide a copy of the activity worksheet *Question of the Day/ Probability Meter* for each group or have one on an overhead. After each student has had a chance to write in a journal, or on a piece of paper, the 'Question of the Day','What is probability and how it is measured?" discuss and share. Students will also follow the directions provided to start creating their probability meters.

Instructional Procedures

Prepare a probability meter on the board using directions from *Question of the Day/Probability Meter*. The ELL students and others that may struggle can follow along with you now if they were unable to complete this on their own.

Put 10 yellow counters in a clear gallon bag. Ask, "What are the chances of pulling a orange marker out of the bag?" 0 or impossible. Do a few tests so the students see what happens. Write a "0" and "impossible" on the left end of your meter (paper). Ask students to brainstorm any synonyms. Next ask, "What are the chances of pulling a yellow counter out of the bag?" It is

certain or 1. Do 2 or 3 tests (events) to show what happens. Write a "1" and "certain" on the right end of your meter (paper).

Next, place 10 orange counters in the gallon bag with the 10 yellow counters. Ask, "What are the chances of pulling a orange counter out of the bag?" Have the students brainstorm what the chances are could be. The teacher may suggest, only if students have not come up with anything, "It may or may not happen, a 50-50 likelihood." Ask where this chance would go on their probability meter and why. Do a few tests (events) to see what happens. On the center fold write "1/2", and "equally likely to happen and not happen."

Take out 5 of the orange counters, now there are 5 orange and 10 yellow, 15 total. Ask, "What are the chances of pulling a orange counter out of the bag?" Let the students brainstorm first. If no students respond then the teacher could suggest, "Is it impossible, 50-50 (1/2), certain or Unlikely?" On the fold between the 0 and 1/2, write "¼" and "unlikely".

Put 15 orange counters in the bag, making 20 orange and 10 yellow, with a total of 30 counters. Ask the same question, "What are the chances of pulling a orange marker out?" Possible answers could be 50-50 or likely (3/4) an orange will come out. On the fold between the 1/2 and 1, write ¾ and likely.

Discuss a few situations so students have a chance to practice measuring and explaining probability. As you go through these situations bring in percentages (0%, 25%, 50%, 75%, 100%) and where they would go on the meter. Use the following examples:

It will rain tomorrow. (50:50, 50% chance)

The sun will rise in the morning. (Certain, 100%)

Two students will be absent tomorrow.

You will have two birthdays this year. (0, 0%)

You will get tails if you toss a coin

The earth revolves around the sun.

In a new box of crayons at least one will be blue.

You will be in school tomorrow.

When you grow up you will be 9 feet tall.

Review what probability is and how it is measured. Probability-- the chance or amount an event will happen out of the tries of the event. Probability is measured by using words, fractions, ratios, and percents, all between 0 and 1. Students can now add to or alter their journal entries from invitation to learn. Ask students to write a couple of examples in their journals.

Extensions

Working the whole activity with a partner.

Create other fractions on the meter such as, 1/3, 2/3, etc.

Use this in science with happenings in astronomy. e.g., The sun is the center of our solar system, the order of the planets, etc.

Family Connections

Have students share the probability meter with their families and work together to come up with 4-5 situations to bring back to class the next day.

Assessment Plan

Using each measurement on their meters, they will write a situation to show they understand each measurement. e.g., Certain -- the sun will go down in the west. From there they will put them up on a class probability meter.

Design an experiment (in partners or a small group) for another group to try and measure on their probability meters.

Bibliography

Chapin, S.H., & Johnson, A. (2000). Math Matters. Sausalito: Math Solutions Publications.
Chapter 13 of Math Matters it talks about probability, types of probability, and ways to look at probability. The authors let teachers know that students need to experiment with probability to develop an understanding.
Ma, L., (1999). Knowing and Teaching Elementary Mathematics. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
This research emphasizes the importance of teachers understanding the content they are teaching before students can learn. We expect students to understand what they learn, so should we, as teachers understand what we teach. It compares the understanding of fundamental mathematics with the U.S. teachers and China's teachers.

Authors

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