Organising Outcomes and Comparing Probabilities

**Experimental Probability**
- the chance that something will happen based on results from an experiment

**Predicted Probability**
- the chance that something should happen
- favourable outcomes
- all outcomes

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**How can you organize outcomes in Rock, Paper, Scissors?**

Rock, Paper, Scissors is played in pairs.
- Face each other with one hand in a fist.
- Move your fists up and down and count to 3. On 3, change your fist into one of the three hand positions.
- The winner depends on the combination.
  - Rock wins over scissors. *(Rock beats scissors)*
  - Scissors win over paper. *(Scissors cut paper)*
  - Paper wins over rock. *(Paper covers rock)*

1. Create a way of organizing all the possible outcomes for this game.
2. Use your organizer from step 1 to estimate the probability of each hand position winning.
3. Play the game for about 5 min. Record your results. Use your results to find the experimental probability of each hand position winning.
4. Compare your experimental probabilities to the probabilities you predicted in step 1. This is known as a fair game. Explain why.
5. Reflect How well does your organizer show your results? How else could you show your results?
Example: Probability Situations on a Spinner

You and a friend are guests on the "Oh No! Factor" television program. To play the game, you first spin the spinner to find out the "factor." Then, you toss a chip labelled "Your Team" on one side and "Opposing Team" on the other side.

a) Use an organizer to show all the possible outcomes.
b) What is the predicted probability of your team having to pick a loonie from a bucket of worms.
c) Estimate how often the opposing team will get dunked in cold water out of 12 turns.

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P(\text{Your team picks loonie}) = \frac{1}{16}
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P(\text{Opponent dunked}) = \frac{4}{16} = \frac{1}{4}
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Expected times to get dunked = 12 \times \frac{1}{4} = 3 times

Key Ideas

- Results from an experiment are used to find experimental probabilities. Suppose your experimental results from Rock, Paper, Scissors are: rock wins 3 times, paper wins 4 times, and scissors wins 5 times. The experimental probability of rock winning is \( \frac{3}{12} \) or \( \frac{1}{4} \).
- Organizers such as tree diagrams and tables show all of the possible outcomes. For example, the tree diagram here shows the outcomes from the Example.
- Outcome organizers show the predicted probability. From the tree diagram, the probability of your team getting a pie in the face is \( \frac{2}{16} \) or \( \frac{1}{8} \).
- Experimental probability and predicted probability are not always the same. The more you repeat an experiment, however, the closer the experimental probability should get to the predicted probability. For example, the more times you play the game Rock, Paper, Scissors, the closer the experimental probability of each hand position winning should get to \( \frac{1}{3} \).