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
- $\frac{\text{favourable outcomes}}{\text{all outcomes}}$

Nov 20-18:34

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 dulls scissors.)*
  - Scissors win over paper. *(Scissors cut paper.)*
  - Paper wins over rock. *(Paper covers rock.)*

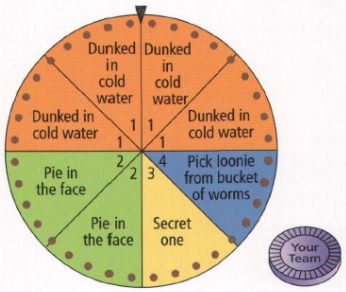
1. Create a way of organizing all the possible outcomes for this game.
2. Use your organizer from step 1 to estimate the probability of each hand position winning.
3. Play the game for about 5 min. Record your results. Use your results to find the **experimental probability** of each hand position winning.
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?

	Rock	Paper	Scissors
Rock	RR	RP	RS
Paper	PR	PP	PS
Scissors	SR	SP	SS

Jan 8-13:39

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.

a)

		Spinner							
		1	1	1	1	2	2	3	4
Chip	Y	Y, 1	Y, 1	Y, 1	Y, 1	Y, 2	Y, 2	Y, 3	Y, 4
	O	O, 1	O, 1	O, 1	O, 1	O, 2	O, 2	O, 3	O, 4

$P(\text{Your team picks loonie}) = \frac{1}{16}$

$P(\text{opponents dunked}) = \frac{4}{16} \left(= \frac{1}{4}\right)$

Expected # of times to get dunked $= 12 \times \frac{1}{4}$

$= 3$ times

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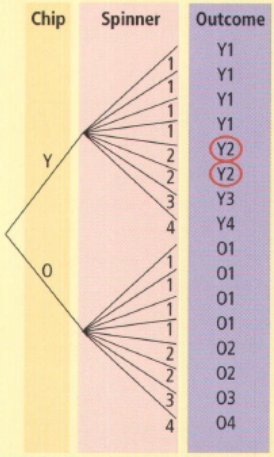
Key Ideas

- 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 win 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 $\frac{1}{3}$.



Legend
Y = your team
O = opposing team
1 = dunked in cold water
2 = pie in the face
3 = secret one
4 = pick loonie from bucket of worms

Page 122 #s 1 - 14

Jan 8-13:52