

Probability

Name: _____

Date: _____

Concepts

- Conditional Probability
- Geometric Probability - Secondary 4
- Mathematical Expectation
- The Odds For and the Odds Against
- The Types of Probability - Secondary 4 and 5
- Types of Events - Secondary 4 and 5

Conditional Probability

1. A climbing gym surveyed all 240 of its members. Each member was recorded as a morning climber or an evening climber, and as holding a lead-climbing certificate or not.

	Certificate	No certificate
Morning climbers	72	24
Evening climbers	54	90

One member is chosen at random. Knowing that this member holds a lead-climbing certificate, what is the probability that the member is a morning climber?

Geometric Probability — Secondary 4

2. A rectangular skate park measures 30 m by 18 m. Inside it, a circular bowl of radius 6 m is cut into the concrete. A leaf blown by the wind lands at a point chosen at random in the park, every point being equally likely. Find the probability that the leaf lands in the bowl, to the nearest thousandth.

Mathematical Expectation

3. At a maple festival booth, a player pays \$3 to spin a wheel once. The wheel pays \$10 with probability 0.1, pays \$4 with probability 0.3, and pays nothing with probability 0.6. Find the mathematical expectation of a player's net gain for one spin, and say whether the game is fair.

The Odds For and the Odds Against

- 4.** On a busy route, the odds that a ferry leaves on time are 9 : 5 for.
- a) What is the probability that the ferry leaves on time?
 - b) State the odds against the ferry leaving on time.

The Types of Probability — Secondary 4 and 5

- 5.** For each statement, say whether the probability given is theoretical, experimental (frequency-based) or subjective, and justify your choice in one line.
- a) “This 12-sided die is perfectly balanced, so the probability of rolling a multiple of 4 is $\frac{1}{4}$.”
 - b) “Of the 500 loaves we baked last month, 35 came out underbaked, so the probability that the next loaf is underbaked is 0.07.”
 - c) “I think our team has a 70% chance of winning Saturday — the players looked confident at practice.”

Types of Events — Secondary 4 and 5

6. A box contains 20 tokens numbered from 1 to 20, and one token is drawn at random. Consider the events A : “the number is even”, B : “the number is a multiple of 5”, C : “the number is greater than 20”.

- a) Are A and B compatible or incompatible? Justify with the outcomes.
- b) What type of event is C , and what is its probability?
- c) Describe the complement of A in words and give $P(A')$.

Synthesis — drawing on several sheets in this topic

7. At a community fair, a beanbag is tossed onto a square target board measuring 1 m by 1 m; it lands at a point chosen at random on the board. A circular zone centred on the board pays the player \$6; anywhere else pays nothing. Each throw costs \$2.

- a) The circular zone has radius 0.3 m. Find the organizer’s expected profit per throw, to the nearest cent.
- b) The organizer now wants the odds against a player winning the \$6 to be exactly 3 : 1. Find the radius of the zone he must use, to the nearest centimetre, and state his expected profit per throw when the odds are exactly 3 : 1.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Probability — with the reasoning written out in full — are available at tutorinmontreal.ca.