

Probability

Name: _____

Date: _____

Concepts

- Conditional Probability
- 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 hydroponic greenhouse receives 15 seedling trays, and 6 of them carry a root fungus. An inspector examines two trays chosen at random, one after the other, *without replacement*.
- a) Given that the first tray examined carries the fungus, what is the probability that the second one does too?
 - b) Find the probability that both trays carry the fungus.
 - c) Find the probability that exactly one of the two trays carries it.

Mathematical Expectation

2. A food truck records how many catering contracts it books in a week.

Contracts booked	0	1	2	3	4
Probability	0.10	0.25	0.30	0.25	0.10

- a) Find the mathematical expectation of the number of contracts per week.
- b) Each contract brings in a profit of \$420, and the truck has fixed weekly costs of \$500. Find the expected weekly profit.

The Odds For and the Odds Against

- 3.** Two teams are trying to reach the final of a robotics tournament.
- a) The odds against team Volt reaching the final are 7 : 3. Find the probability that Volt reaches the final.
 - b) Team Nimbus reaches the final with probability 0.35. State the odds for Nimbus reaching the final, in lowest terms.
 - c) Which team is more likely to reach the final?

The Types of Probability — Secondary 4 and 5

- 4.** A maintenance team publishes three figures about one wind turbine.
- a) “The blade monitor has 4 channels built to the same specification, one of which is the icing channel, so a randomly triggered channel is the icing channel with probability $\frac{1}{4}$.”
 - b) “Over the last 800 operating hours the turbine was stopped 56 times, so the probability that it stops during a given hour is about 0.07.”
 - c) “The chief engineer puts the chance that the new gearbox needs service before spring at 15%.”

Name the type of probability used in each, and say which of the three would be expected to change if a further 800 hours of data were collected.

Types of Events — Secondary 4 and 5

5. At a conservatory, all 300 students play the piano, the violin, or both: 190 play the piano and 160 play the violin. One student is chosen at random.

- a) How many students play both instruments?
- b) Are the events “plays the piano” and “plays the violin” compatible or incompatible? Justify.
- c) Are these two events independent? Support your answer with a calculation.
- d) Describe the complement of “plays the piano” in words and give its probability.

Synthesis — drawing on several sheets in this topic

6. A repair shop charges a flat \$60 diagnostic fee on every tablet brought in. A quarter of the tablets received are water-damaged; the rest are not. A water-damaged tablet turns out to be repairable with probability 0.4, a tablet that is not water-damaged with probability 0.9. A repair earns the shop a further \$140; a tablet that cannot be repaired is returned with \$20 of the diagnostic fee refunded.

- a) Find the probability that a tablet brought in is repairable.
- b) A tablet turns out not to be repairable. Find the probability that it was water-damaged.
- c) State the odds against a tablet being repairable, in lowest terms.
- d) Find the shop’s expected revenue per tablet received.

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.