

Probability is the likelihood that an event can occur. To find it, we use the formula:

$$\text{Probability} = \frac{\text{Number of times that it can occur}}{\text{Total number of outcomes}}$$

Example 1: Determine the probability of drawing the following cards from a standard deck of well-shuffled cards.

a) a spade $\frac{13}{52} = \frac{1}{4}$

(b) a red $\frac{26}{52} = \frac{1}{2}$

c) an ace $\frac{4}{52} = \frac{1}{13}$

(d) a face card $\frac{12}{52} = \frac{3}{13}$

Example 2: Using the word PROBABILITY find:

a) P(R) $\frac{1}{11}$

(b) P(B) $\frac{2}{11}$

(c) P(C) $\frac{0}{11}$

If we are finding the probability of two consecutive events we multiply the individual probabilities.

Example 3: A box has 4 purple stones, 5 green stones, and 3 blue stones. A stone is drawn, put back, and another stone is drawn. Express the following probabilities as a fraction, decimal, percent, and words.

a) P(G, P)
 $= \left(\frac{5}{12}\right)\left(\frac{4}{12}\right)$
 $= \frac{5}{36}$

(b) P(G, G)
 $= \left(\frac{5}{12}\right)\left(\frac{5}{12}\right)$
 $= \frac{25}{144}$

The likelihood of an event occurring is not always expressed using probability. The likelihood of an event occurring can be expressed in terms of “odds in favour” or “odds against” it occurring. The odds of an event happening are found by comparing the number of desired outcomes to the number of undesired outcomes. It is always written with a colon (:) as opposed to a fraction.

Example 4: When rolling a six-sided die, determine the odds in favour of rolling a 4.
What is the probability of rolling a 4?

$$\text{odds: } 1:5 \qquad \text{probability: } \frac{1}{6}$$

Example 5: When drawing a card from a well-shuffled deck of playing cards, determine the odds in favour of drawing a diamond.

$$13:39 \\ (1:3)$$

Example 6: A wallet contains three \$5.00 bills, two \$10.00 bills, and one \$20.00 bill.
What are the odds against drawing out a \$10.00 bill?

$$4:2 \\ (2:1)$$

Example 7: A survey of 320 students in Abbotsford Senior shows that 240 of them listen to radio station CYYV. Find the odds against randomly selecting a student who listens to this station.

$$80:240 \\ (1:3)$$

Example 8: Suppose that the odds in favour of an event are 5:3. Determine the probability of the event happening.

$$\frac{5}{8} \leftarrow \text{total}$$