Mid-Chapter Review

Frequently Asked Questions

Q: How do experimental and theoretical probabilities compare?

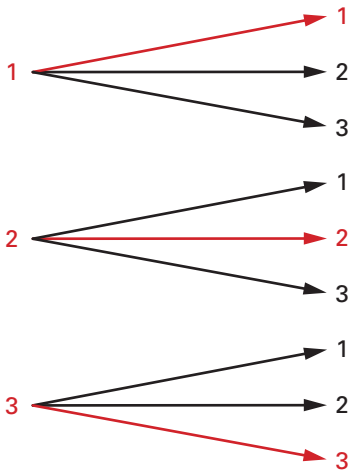
A: The greater the number of trials in an experiment, the closer the theoretical and experimental probabilities should be. The values will not likely be exactly the same, but they should be close.

For example, Ashley wondered whether the numbers 0 to 9 are equally likely to appear in the last position in a business telephone number. If all the numbers are equally likely, the theoretical probability of a business telephone number ending in 1 should be $\frac{1}{10}$. Ashley looked at 100 numbers in the yellow pages of her telephone book. She found 22 numbers that ended in a 1, for an experimental probability of $\frac{22}{100}$, or $\frac{11}{50}$.

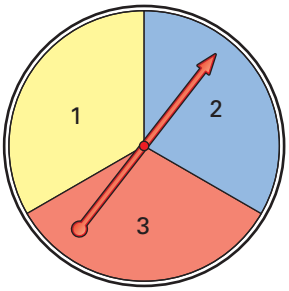
Because the experimental and theoretical probabilities were so different, Ashley decided that the numbers 0 to 9 could not be equally likely in the last position in a business telephone number.

Q: How can you use a tree diagram to calculate a probability?

A: The number of branches tells you the number of equally likely possible outcomes. The denominator of the fraction form of the probability is the number of branches. The numerator is the number of branches that represent favourable outcomes.



For example, two spins of this spinner can be represented by a tree diagram with nine branches, or nine possible outcomes.



What is the probability that the second spin is the same as the first spin?

There are three branches that represent favourable outcomes.

$P(\text{both spins the same}) = \frac{3}{9}$, or $\frac{1}{3}$

Practice Questions

(12.2) **1.** What is the theoretical probability of each event?

a) drawing a queen from a standard deck of 52 cards

b) rolling a 1 using a standard die

c) spinning a 9 with this spinner

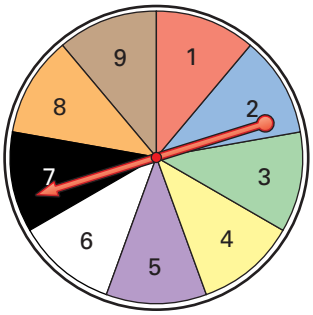
d) drawing a black card from a standard deck of 52 cards

(12.2) **2. a)** Perform an experiment to determine the experimental probability of rolling a 1 using a standard die. Complete 10 trials.

b) Repeat part (a), but complete 30 trials.

c) How do your experimental probabilities compare with the theoretical probability you calculated in question 1(b)?

(12.2) **3.** Both Rick and Dominique spun this spinner 18 times, for a total of 36 spins. Choose the fraction that matches each probability.



$\frac{14}{18}$	$\frac{5}{9}$
$\frac{1}{9}$	$\frac{9}{18}$

a) the theoretical probability of spinning an odd number

b) the theoretical probability of spinning purple

c) an unexpected experimental probability of spinning blue

d) an experimental probability of spinning an even number

4. Jeff rolled a die 600 times. Mary rolled a die 6 times. In which case is it more likely that the experimental probability of rolling a 1 was closest to $\frac{1}{6}$? Why? (12.2)

5. a) Suppose that you are going to roll a four-sided die (with numbers 1 to 4) and a standard six-sided die. Create a tree diagram or an organized list to show all the possible outcomes.

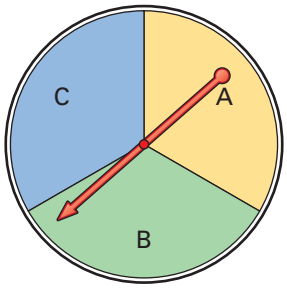
b) Calculate each theoretical probability.

i) P(sum of 2)

ii) P(sum of 3 or 4)

iii) P(sum of neither 3 nor 4) (12.3)

6. Suppose that you roll a 12-sided die (with numbers 1 to 12) and spin this spinner. Which is more likely—rolling an even number and spinning A, or rolling a number that is not a multiple of 3 and not spinning C? (12.3)



7. Judy has three pairs of pants: a blue pair, a black pair, and a brown pair. She has four shirts: one blue, one pink, one white, and one green. She also has three jackets: one black, one white, and one navy blue. (12.3)

a) Use a tree diagram to show all the possible outfits Judy could wear.

b) What is the probability that at least one outfit will include something black?

c) What is the probability that an outfit will not include something blue?