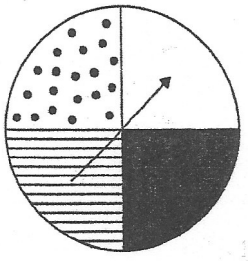
7.6 Tree Diagrams

Quick Review

Two events are **independent** if the result of one event does not depend on the result of the other event. For example, tossing a coin and spinning the pointer on a spinner is an experiment with two independent events.

The outcomes of tossing a coin are: heads, tails



The outcomes of spinning the pointer on this spinner are: white, black, striped, dotted

You can use a tree diagram to show the outcomes of an experiment with 2 independent events.

List the outcomes of spinning the pointer. For each spinner outcome, list the outcomes of tossing the coin.

Spinner	Coin	Outcomes
White	Heads	White, Heads
	Tails	White, Tails
Black	Heads	Black, Heads
	Tails	Black, Tails
Striped	Heads	Striped, Heads
	Tails	Striped, Tails
Dotted	Heads	Dotted, Heads
	Tails	Dotted, Tails

There are 8 possible outcomes.
This set of outcomes is the **sample space.**

The **theoretical probability** of the pointer landing on a striped sector and the coin showing tails is: $\frac{1}{8}$

Ernesto carried out this experiment 100 times.

The event of the pointer landing on a striped sector and the coin showing tails occurred 11 times.
So, the **experimental probability** of this event is: $\frac{11}{100}$

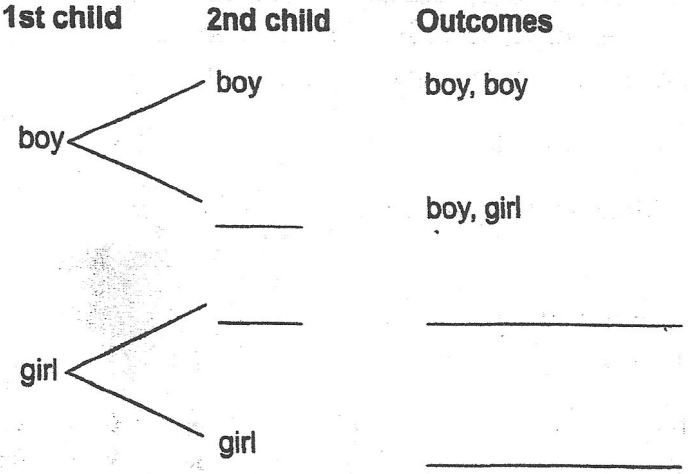
The fraction $\frac{1}{8}$ is close to the fraction $\frac{11}{100}$, so the experimental probability is close to the theoretical probability.

The greater the number of times an experiment is carried out, the closer the experimental probability may be to the theoretical probability.

Practice

1. The theoretical probability that a new-born child is a boy is 50%, and the probability that the child is a girl is 50%.

a) Complete the tree diagram to show the outcomes for the births of two children.



b) List the outcomes from part a.

_____

c) How many outcomes are there? _____

d) What is the theoretical probability of having a boy and a girl? _____

e) What is the theoretical probability of having two girls? _____

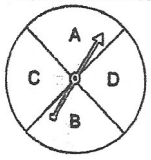
f) In a survey of 100 families with two children, it was found that 24 families had two girls.

What is the experimental probability of having two girls? _____

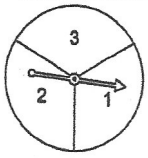
2. List the sample space for each experiment.

a) tossing a coin and rolling a tetrahedron labelled 1 to 4

b) spinning the pointer on Spinner 1 and spinning the pointer on Spinner 2



Spinner 1



Spinner 2

3. At the cafeteria, the lunch choices of the day are:

- a cheese sandwich or a peanut butter sandwich
- grapes or a banana or an apple
- milk or juice

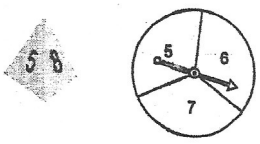
a) Make a tree diagram to show all possible lunch orders.

b) Suppose choices are made at random.
What is the probability that an order will include:

i) a peanut butter sandwich? _____ **ii)** a banana and juice? _____

iii) a bologna sandwich? _____ **iv)** a cheese sandwich, grapes, and milk _____

4. A tetrahedron is labelled 5, 6, 7, 8.
The tetrahedron is rolled and the pointer on this spinner is spun.



a) Draw a tree diagram to show the possible outcomes.

b) Find the theoretical probability of getting different numbers on the tetrahedron and the spinner. _____

c) Find the theoretical probability of getting the same number on both the tetrahedron and the spinner. _____

d) This experiment is carried out 50 times.
There were 11 outcomes where the numbers were the same.
What is the experimental probability of getting two numbers the same? ____

e) How does the experimental probability in part d compare with the theoretical probability in part c? Explain.

_____