3.4 Lesson 4 Equally likely outcomes and sample space diagrams

Equally likely outcomes all have the same chance of happening.

Sample space diagrams are a way of listing all the equally likely outcomes, so we can see if there are any repeated outcomes, which would make the chance of that outcome more likely.

■ **Exemple 3.2** A count is flipped and a die is rolled.

The sample space diagram shows the twelve equally-likely combinations of outcomes.

		outcome from die					
		1	2	3	4	5	6
outcome	Heads	H1	H2	H3	H4	H5	H6
from coin	Tails	T1	T2	T3	T4	T5	T6

Exercise 9 Answer the questions. Write a sentence and show your workings

1. A fair coin is flipped and a fair six-sided die is rolled. Use the table above to work out :

$P(\text{heads and } 6) = \dots\dots\dots\dots\dots\dots\dots$ $P(\text{heads and factor of } 18) = \dots\dots\dots\dots\dots$

$P(\text{tails and less than } 3) = \dots\dots\dots\dots\dots$ $P(\text{multiple of } 3) = \dots\dots\dots\dots\dots\dots\dots$

$P(\text{H5 or T2}) = \dots\dots\dots\dots\dots\dots\dots\dots\dots$ $P(\text{heads or } 6) = \dots\dots\dots\dots\dots\dots\dots\dots$

2. The two spinners each have 3 equally-sized sectors. The spinners are spun together.

   a) Draw a sample space diagram to show all the possilble combinations of outcomes
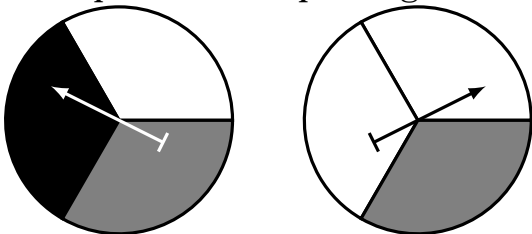
   b) Work out the following probabilities :

   $P(\text{two whites}) = \dots\dots\dots\dots\dots\dots\dots\dots$

   $P(\text{grey and white in either order}) = \dots\dots$

   $P(\text{two identical colors}) = \dots\dots\dots\dots\dots$

   $P(\text{two different colors}) = \dots\dots\dots\dots\dots$

   $P(\text{not both grey}) = \dots\dots\dots\dots\dots\dots$

3. A fair coin is flipped twice.

   a) List all of the possible combinations of outcomes$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

   b) The coin is flipped a third time. List all of the possible combinations of outcomes for all three flips. $\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

   $\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

   $\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

4. Two fair d6 dice are rolled and the scores are added.

   a) Complete the sample space diagram with the total for each combination.

   b) Work out the following probabilities :

   $P(\text{total is } 9) = \dots\dots\dots\dots\dots\dots\dots\dots$

   $P(\text{total is factor of } 9) = \dots\dots\dots\dots\dots$

   $P(\text{total is not } 4) = \dots\dots\dots\dots\dots\dots\dots$

   $P(\text{total is more than } 3) = \dots\dots\dots\dots$

   c) True or false ? 'The probability of getting an even total is 50%'

		Die 1					
		1	2	3	4	5	6
Die 2	1	2	3				
	2						
	3						
	4						
	5						
	6						

5. Two fair d6 dice are rolled and **difference between the scores** is found.

   a) Complete the sample space diagram with the **difference** for each combination.

   b) Work out the following probabilities :

   $P(\text{difference is } 2) = \dots\dots\dots\dots\dots\dots$

   $P(\text{difference is less than } 5) = \dots\dots\dots\dots$

   $P(\text{difference is prime}) = \dots\dots\dots\dots\dots$

   $P(\text{difference is even}) = \dots\dots\dots\dots\dots$

		Die 1					
		1	2	3	4	5	6
Die 2	1	0	1				
	2					3	
	3						
	4						
	5	4					
	6						

6. Chris is wondering whether his local football team will win their next match, and what the wheather will be like on the day.

   He draws the sample space diagram shown and says the probability of a win if it is sunny is therefore $\frac{1}{6}$.

   Explain why this is not correct.

		Result		
		Win	Draw	Lose
Weather	Sunny			
	Windy			