Chapter 5: Probability

Lesson 5.1: Exploring Probability, page 303

1. e.g., Reverse the rules for Players 1 and 2 on each turn.

2. a) Outcome Table:

		MATT	
P		H	T
A	H	HH	HT
T	T	HT	TT

$P(\text{Matt wins}) = \frac{2}{4}$ $P(\text{Pat wins}) = \frac{2}{4}$

$P(\text{Matt wins}) = \frac{1}{2}$ $P(\text{Pat wins}) = \frac{1}{2}$

Each player has an equal chance of winning, so the game is fair.

b) Sample Space:

H	H	H
H	H	T
H	T	H
H	T	T

T	H	H
T	H	T
T	T	H
T	T	T

$P(\text{Treena wins}) = \frac{1}{8}$ $P(\text{Leena wins}) = \frac{1}{8}$ $P(\text{Gina wins}) = \frac{6}{8}$

This game is not fair. Gina has a 6 in 8 chance of winning.

c) Outcome Table:

		Die 1					
		1	**2**	**3**	**4**	**5**	**6**
Die 2	**1**	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

$P(\text{Ann wins}) = \frac{15}{36}$ $P(\text{Dan wins}) = \frac{15}{36}$

$P(\text{Ann wins}) = \frac{5}{12}$ $P(\text{Dan wins}) = \frac{5}{12}$

Each player has an equal chance of winning, so the game is fair.

3. No. e.g., A certain chance is 100%. 120% > 100%.

4. Sample Space

Product	**1**	**2**	**3**	**4**
1	**1**	**2**	**3**	**4**
2	**2**	**4**	**6**	**8**
3	**3**	**6**	**9**	**12**
4	**4**	**8**	**12**	**16**

Sum	**1**	**2**	**3**	**4**
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8

Point Scoring

	1	2	3	4
1	Player 1	Player 1	Player 1	Player 1
2	Player 1	TIE	Player 2	Player 2
3	Player 1	Player 2	Player 2	Player 2
4	Player 1	Player 2	Player 2	Player 2

The probability of Player 1 winning is now $\frac{7}{16}$, or 43.75%. The probability of Player 2 winning is now $\frac{8}{16}$, or 50%. This is not a fair game. Player 2 has more opportunities to win.

Lesson 5.2: Probability and Odds, page 310

1. a) The odds against Marcia passing the driver's test on the first try are 3 : 5.

b) Let *A* represent Marcia passing her driver's test on the first try.

$P(A) = \frac{5}{5+3}$

$P(A) = \frac{5}{8}$

The probability Marcia will pass her driver's test on the first try is $\frac{5}{8}$, or 0.625.

2. a) The probability the coin is a loonie is $\frac{3}{10}$, or 0.3.

b) The probability the coin is not a loonie is $\frac{7}{10}$, or 0.7.

So, the odds against the coin being a loonie are 7 : 3.

3. a) Let *R* represent a red card being drawn.

$P(R) = \frac{26}{52}$

$P(R) = \frac{1}{2}$

$P(R) = 0.5$

The probability that Lily draws a red card is 0.5.

b) Let *R′* represent a card that is not red being drawn.

$P(B) = \frac{(52-26)}{52}$

$P(B) = \frac{26}{52}$

So, the odds in favour of the card being red are 26 : 26, or 1 : 1.

c) Let *S* represent a spade being drawn.

$P(S) = \frac{13}{52}$ $P(S') = \frac{4-1}{4}$

$P(S) = \frac{1}{4}$ $P(S') = \frac{3}{4}$

The odds against the card being a spade are 3 : 1.