

Practice Book *UNIT 5 Probability*

## Answers

## 5.1 Probabilities

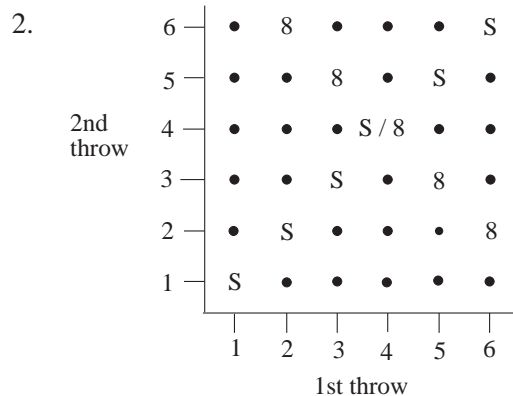
1. (a) Very unlikely (b) possible (c), (e) and (f) answers could vary (g) possible
2. About 25 times 3. (a) 10 (b) 10 (c) 30

## 5.2 Simple Probability

1.  $\frac{9}{10}$  2.  $\frac{5}{6}$  3. (a)  $\frac{3}{5}$  (b) Not to rain
4. 0.95 5. 0.8 6. They could draw.
7. All probabilities must lie between 0 and 1 inclusive.
8. 0.45
9. (a) 0.3 (b) 24
10. 0.45

## 5.3 Outcome of Two Events

1. H1 H2 H3 H4 H5 H6 T1 T2 T3 T4 T5 T6



3. (a) (i)  $\frac{1}{5}$  (ii)  $\frac{4}{5}$  (b) 2 + 5, 3 + 4, 4 + 3, 5 + 2

4. (a)  $\frac{2}{3}$  (b) 0.7 (c) B1 B2 B3 R1 R2 R3 G1 G2 G3

5. HHHH HHHT HHTH HTHH THHH  
HHTT HTTH TTHH HTHT THTH THHT  
TTTH TTHT THTT HTTT TTTT

## 5.4

## Answers

## 5.4 Finding Probabilities Using Relative Frequencies

- $\frac{150}{365}$  ; Look at individual months / look at figures for previous years.
- About 20. The die is not fair because 1 and 6 appear more often than expected.  
Estimated probabilities:

No.	1	2	3	4	5	6
Probability	$\frac{31}{120}$	$\frac{15}{120}$	$\frac{14}{120}$	$\frac{16}{120}$	$\frac{15}{120}$	$\frac{29}{120}$

- (a)

	Hockey	Tennis	Total
Girls	8	12	20
Boys	18	6	24
Total	26	18	44

- $\frac{5}{11}$
- $\frac{2}{5}$

- | Result    | Win | Lose | Draw | Total |
|-----------|-----|------|------|-------|
| Frequency | 11  | 9    | 4    | 24    |

- Each of the possible results - win, lose or draw - are not equally likely.
  - $\frac{1}{6}$
- 0.1

- (a)  $9.1\dot{6}\left(9\frac{1}{6}\right)$

- 9.17 ; 0.3 - But this is not necessarily a good estimate as more than one accident could occur on a single day. Also, the time of the year is important.

- 16
  - Plot at (80, 0.375)
  - Yes, because the probability of C is 0.25, so C should have occurred 20 times in 80 spins.

## 5.5 Determining Probabilities

- $\frac{1}{5}$
- $\frac{6}{11}$
  - $\frac{5}{11}$
- $\frac{1}{4}$
  - $\frac{5}{8}$

- $\frac{7}{36}$
  - $\frac{17}{36}$
- $\frac{1}{200}, \frac{9}{200}, \frac{1}{50}$

- $\frac{1}{11}$
  - $\frac{2}{11}$
  - $\frac{4}{11}$
  - $\frac{7}{11}$
- $\frac{1}{5}$
  - $\frac{1}{10}$

## 5.5

## Answers

8. (a)  $\frac{3}{20}$  (b)  $\frac{2}{5}$

9. (a) 0.2 (b) 0.7 (c) About 20

10. (a)  $\frac{1}{2}$  (b)  $\frac{1}{2}$  (c)  $\frac{7}{25}$

11. (a) 50 is not a multiple of 4, or 50 is not a multiple of 20 (b)  $\frac{3}{10}$

12. (a) (i) 0.3 (ii) 0 (b) 50 times

13. (a)  $x = 0.25$  (b) 60 times

## 5.6 Probability of Two Events

1. (a)  $\frac{1}{36}$  (b)  $\frac{5}{18}$  2. (a)  $\frac{1}{27}$  (b)  $\frac{20}{27}$  3. (a)  $\frac{1}{4}$  (b)  $\frac{1}{6}$  (c)  $\frac{1}{6}$

4. (a)  $\frac{1}{2}$  (b)  $\frac{1}{3}$

5.

	1	2	3	4	5	6
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

(a)  $\frac{1}{36}$  (b)  $\frac{35}{36}$  (c)  $\frac{1}{6}$  (d)  $\frac{5}{12}$

6. (a)  $\frac{1}{3}$  (b)  $\frac{2}{3}$  (c)  $\frac{16}{81}$  (d)  $\frac{52}{81}$

7. (a) 0.75 (b) 0.15 (c) (i) 6 and 4, 5 and 5, 4 and 6 - 3 ways (ii)  $\frac{1}{16}$

8.  $\frac{3}{5}$

9.  $\frac{2}{9}$

## 5.7

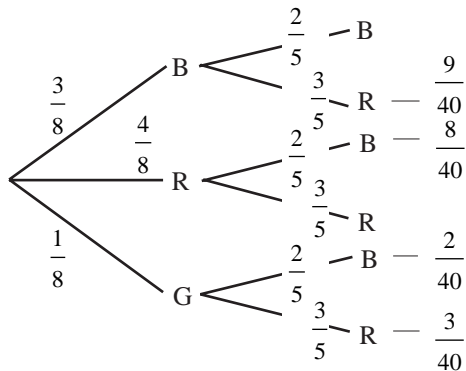
## Answers

## 5.7 Use of Tree Diagrams

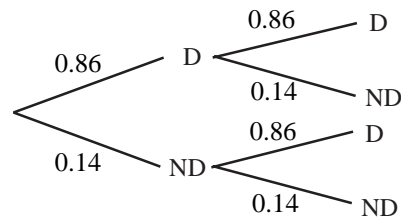
1. (a)  $\frac{3}{8}$  (b)  $\frac{1}{2}$  2. 0.28175 3. (a)  $\frac{1}{9}$  (b)  $\frac{4}{9}$  (c)  $\frac{1}{27}$  (d)  $\frac{8}{27}$

4. (a)  $\frac{1}{15}$  (b)  $\frac{1}{15}$  (c)  $\frac{2}{15}$  (d)  $\frac{2}{5}$

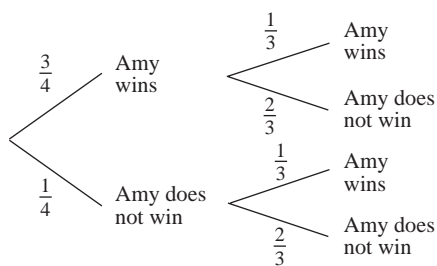
5. (a) Rob Sarah (b)  $\frac{6}{40} = \frac{3}{20}$  (c)  $\frac{11}{20}$



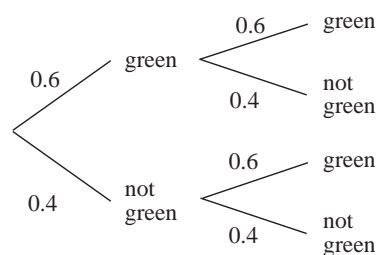
6. (a) 0.14 (b) 1st letter 2nd letter (c)  $0.7396 \approx 0.74$



7. (a) Snooker Billiards (b)  $\frac{7}{12}$  (c) 84 Fridays



8. (a) 0.15 (b) 24 (c) (i) First counter Second counter (ii) 0.84



## 5.8

## Answers

## 5.8 Multiplication for Independent Events

1.  $\frac{1}{4}$
2. (a)  $\frac{1}{216}$  (b)  $\frac{1}{72}$  (c)  $\frac{1}{36}$
3.  $\frac{11}{16}$
4.  $\frac{80}{81}$
5.  $\frac{32}{323}$
6. (a)  $\frac{1}{216}$  (b)  $\frac{5}{216}$  (c)  $\frac{15}{216} = \frac{5}{72}$  (d)  $\frac{16}{216} = \frac{2}{7}$
7.  $\frac{29}{48}$
8. (a) 0.7 (b) 0.28 (c) 0.54
9. (a) (i) 1st:  $\frac{1}{4}$  2nd:  $\frac{1}{4}$  3rd:  $\frac{1}{4}$  4th:  $\frac{1}{4}$  (ii) 1st:  $\frac{1}{4}$  2nd:  $\frac{3}{16}$  3rd:  $\frac{9}{64}$  4th:  $\frac{27}{256}$   
 (b)
 

Attempt	Strategy 1	Strategy 2
1	$\frac{1}{4}$	$\frac{1}{4}$
2	$\frac{1}{2}$	$\frac{7}{16}$
3	$\frac{3}{4}$	$\frac{37}{64}$
4	1	$\frac{175}{256}$

1st strategy is best.
10. (a) 0.4 (b) 0.0049 0.0879
11. (a)  $\frac{1}{216}$  (b) 3
12. (a) AA BA CA DA AB BB CB DB AC BC CC DC AD BD CD DD (b)  $\frac{1}{4}$
13. (a)  $\frac{1}{3}$  (b)  $\frac{1}{3}$  (c) (ii) (1, 6, 5), (2, 5, 5), (2, 6, 4), (3, 4, 5), (3, 5, 4)  
 (3, 6, 3), (5, 2, 5), (5, 3, 4), (5, 4, 3), (5, 6, 1)  
 (d) (i) 3 (ii)  $\frac{5}{108}$

## 5.8

## Answers

14. (a)  $\frac{1}{100}$  (b)  $\frac{1}{20}$

15. (a)  $\frac{1}{7776}$  or  $1.286 \times 10^{-4}$  or equivalent (b)  $1 - \left(\frac{1}{6}\right)^n$

## 5.9 Mutually Exclusive Events

1. (a)  $\frac{1}{12}$  (b)  $\frac{1}{4}$

2. (a)  $\frac{1}{26}$  (b)  $\frac{1}{104}$

3. (a)  $\frac{1}{26}$  (b)  $\frac{1}{26}$  (c)  $\frac{1}{24}$

4. 1

5. (a)  $\frac{4}{15}$  (b)  $\frac{23}{30}$  (c)  $\frac{7}{30}$

6.  $\frac{18}{35}$

7. (a)  $\frac{5}{14}$  (b)  $\frac{2}{7}$

8.  $\frac{40}{81}$

## 5.10 Tree Diagrams and Conditional Probability

1. (a) (i)  $\frac{21}{190}$  (ii)  $\frac{91}{190}$  (b)  $\frac{59}{190}$

2. (a)  $\frac{11}{1105}$  (b)  $\frac{132}{1105}$

3.  $\frac{13}{35}$

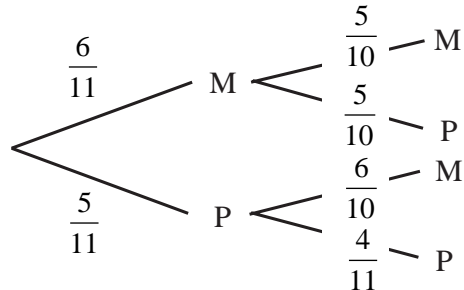
4. (a)  $\frac{95}{235}$  (b)  $\frac{285}{506}$

5.  $\frac{1}{5525}$

## 5.10

## Answers

6. (a)                      1st choice                      2nd choice                      (b)  $\frac{5}{11}$



7. (a)  $\frac{7}{20}$                       (b)  $\frac{83}{100}$

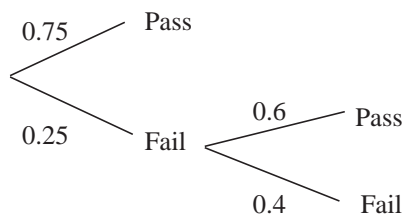
8. (a)  $\frac{5}{12}$                       (b) 8                      (c)  $\frac{5}{23}$

9. (a) (i)  $\frac{1}{3}$                       (ii)  $\frac{1}{10}$                       (b)  $\frac{2}{5}$                       (c)  $\frac{3}{8120}$

10.  $\frac{3}{8}$

11. (a)  $\frac{1}{22}$                       (b)  $\frac{41}{55}$                       (c)  $\frac{3}{11}$                       (d)  $\frac{3}{44}$

13. (a) (i) **1st attempt**                      **2nd attempt**                      (ii) 0.1                      (b) 0.729



## 5.11 Using Venn Diagrams to find Probabilities

1. (a) (i)  $\frac{39}{80}$                       (ii)  $\frac{57}{80}$                       (b) (i)  $\frac{3}{3160}$                       (ii)  $\frac{147}{395}$

2. (a)  $\frac{1}{23}$                       (b)  $\frac{136}{2415}$                       (c)  $\frac{247}{805}$                       (d)  $\frac{28}{345}$

3. (a)  $\frac{1}{15}$                       (b)  $\frac{1}{3}$                       (c) (i)  $\frac{253}{435}$                       (ii)  $\frac{26}{145}$