Year 8 Term 2 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

Table of contents

This edition was printed on June 20, 2014 with worked solutions.
Camera ready copy was prepared with the LaTeX2e typesetting system.

6 Year 8 Term 2 Week 6 Homework

6.1 Topic 1 — Analysising Data

Exercise 6.1.1 This stem-and-leaf plot shows the results obtained by a group of Year 8 students on their English test, which was marked out of 40.

Stem	*Leaf*
$1^{(5)}$	*6 8 9*
$2^{(0)}$	*0 1 2 2 3 3*
$2^{(5)}$	*5 5 6 8 8 9 9 9*
$3^{(0)}$	*1 3 3 3 4 4*
$3^{(5)}$	*5 6 7 9*

1. *How many students sat for the test?* _____

2. *Find the mean, correct to 1 decimal place.*

   _____

   _____

3. *Find the median.* _____

4. *What is the mode?* _____

5. *Find the range.*

   _____

   _____

6. *How many students scored less than 50%?* _____

6.2 Topic 2 — Probability

6.2.1 Complementary events

- The sum of the probabilities in any situation must always add up to 1.
- Suppose that E is an event with sample space S. Define the complementary event $\overline{E}$ to be the event 'E does not occur'. Then

$$P(\overline{E}) = 1 - P(E)$$

Example 6.2.1 A bag contains 12 discs, 5 of which are red. What is the probability of drawing a disc is not a red disc?

***Solution**: Let A represent the event of drawing a red disc.*

$P(A) = P(red\,disk) = \frac{5}{12}$

$P(\bar{A}) = P(not\,red\,disk) = 1 - P(A) = 1 - \frac{5}{12} = \frac{7}{12}$

Exercise 6.2.1 A bag contains 20 counters, of which 7 are blue. Let E represent the event of drawing a blue counter. If one counter is drawn at random from the bag, find:

1. $P(E)$ = _____
2. $P(\bar{E})$ = _____
3. $P(E) + P(\bar{E})$ = _____

Exercise 6.2.2 A card is drawn at random from a regular pack of playing cards. Find the probability that this card is:

1. *the 8 spades* _____
2. *a diamond* _____
3. *not red* _____
4. *an ace* _____
5. *not an ace* _____
6. *a face card* _____
7. *not a number card* _____
8. *not a diamond* _____

6.2.2 Mutually Exclusive Events and Disjoint Sets

Two events A and B with the same space S are called mutually exclusive if they cannot both occur. Then the event 'A or B' is represented by $A \cup B$

$$P(A\, or\, B) = \text{P(A)} + \text{P(B)}$$

Exercise 6.2.3 A die is thrown. Let A be the event that an even number appears. Let B be the event that a number greater than two appears.

1. *Are A and B mutually exclusive?* _____

2. *Find the probability of:*

   (a) *P(A)* _____

   (b) *P(B)* _____

   (c) *P(A and B)* _____

   (d) *P(A or B)* _____

6.2.3 The event 'A and B' and 'A or B' — the addition Rule

Suppose that **A** and **B** are two events with sample space **S**. then the even 'A and B' is represented by the intersection $A \cap B$ and the event 'A or B' is represented by the union $A \cup B$, and

$$P(A\, or\, B) = P(A) + P(B) - P(A\, and\, B)$$

Example 6.2.2 In a class of 30 girls, 13 play tennis and 23 play netball. If 7 girls play both sports, what is the probability that a girl chosen at random from the class plays neither sport?

***Solution**: let **T** be the event 'she plays **Tennis**' and **N** be the event 'she plays **Netball**'*

then $P(T) = \frac{13}{30}$ *and* $P(N) = \frac{23}{30}$

and $P(T\, and\, N) = \frac{7}{30}$

Hence $P(T\, or\, N) = \frac{13}{30} + \frac{23}{30} - \frac{7}{30} = \frac{29}{30}$

$\therefore\ P(neither\ sport) = 1 - P(T\, and\, N) = 1 - \frac{29}{30} = \frac{1}{30}$

Exercise 6.2.4 A box contains 7 blue marbles, 4 orange marbles and 9 purple marbles. Find the probability that a marble drawn at random from the box is:

1. *blue =* _____

2. *not blue =* _____

3. *neither blue nor orange =* _____

Exercise 6.2.5 The letters in the word PARALLEL are placed in a bag. A letter is then drawn at random. Find the probability of:

1. *drawing a vowel =* _____
2. *drawing a letter L =* _____
3. *not drawing the letter E or P =* _____

Exercise 6.2.6 An integer n is picked at random, where $1 \leq n \leq 20$. The events A, B, C and D are:

A: *an even number is chosen,*

B: *a number greater than 15 is chosen,*

C: *a multiple of 3 is chosen,*

D: *A one-digit number is chosen.*

1. *Are the events A and B mutually exclusive?* _____
   (a) *Find P(A)* _____
   (b) *Find P(B)* _____
   (c) *Find P(A and B)* _____
   (d) *Find P(A or B)* _____
2. *Are the events A and C mutually exclusive?* _____
   (a) *Find P(C)* _____
   (b) *Find P(A and C)* _____
   (c) *Find P(A or C)* _____
3. *Are the events B and D mutually exclusive?* _____
   (a) *Find P(D)* _____
   (b) *Find P(B and D)* _____
   (c) *Find P(B or D)* _____

6.2.4 Tree Diagram

Exercise 6.2.7 Three coins are thrown and the uppermost faces noted. Draw a tree diagram to illustrate this and find the probability that the throw results in:

1. *3 heads*
2. *2 heads*
3. *1 head*
4. *1 head and two tails*
5. *not heads*

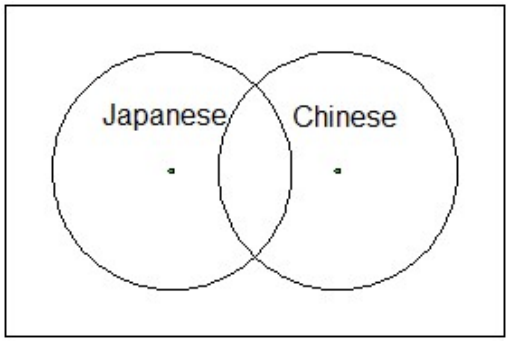
Exercise 6.2.8 Mary has two red socks and three black socks in her top drawer. If she picks out two socks at random, draw a tree diagram and find:

1. *the number of possible combination of pairs of socks she could select.*
2. *the number of combinations that are a matching pair.*
3. *the number of pairs containing a red sock.*
4. *the probability that she chooses:*
   (a) *a pair of red.*
   (b) *a pair of black.*
   (c) *a matching pair.*
   (d) *a pair containing at least one red sock.*

6.2.5 Venn Diagram

A Venn diagram consists of a number of intersecting or non-intersecting circles. It may be used to help answer probability problems.

Exercise 6.2.9 In a class of 30 Year 8 students. 18 students study Japanese, 15 students study Chinese and 4 students study neither language. A student from a class is selected at random. Find the probability that he/she



1. *studies Japanese*

2. *studies both languages*

3. *studies neither language*

4. *studies Chinese but not Japanese*

5. *studies Japanese but not Chinese*

6.3 Miscellaneous Exercises

Exercise 6.3.1 Two die are rolled at the same time.

1. *What is the sample space?*

2. *Find the probability that the numbers are 1 and 3.*

3. *Find the probability that both numbers are even.*

4. *Find the probability that one number is 6 and the other is greater than 3.*

5. *Find the probability that at least one of the numbers is 3.*

6. *Find the probability that neither of the numbers is 3.*

Exercise 6.3.2 The traffic lights at a certain intersection show red 45% of the time, amber 15% of the time and green the rest of the time. If a car drives through this intersection, what is the probability that the lights will be:

1. *red =*
2. *not green =*
3. *green or amber =*
4. *neither red nor green =*

Exercise 6.3.3 The ratio of red to green to yellow balls in a barrel is 4:8:12. If one ball is drawn at random, find the probability that it will be:

1. *a green ball =* _____
2. *a red or a yellow ball =* _____
3. *not a red ball =* _____
4. *neither red nor green =* _____

Exercise 6.3.4 Each student in a music class of 28 students either plays the piano or the violin or both. It is known that 20 students play the piano and 15 play the violin. Find the probability that a student selected at random plays both instruments.

Exercise 6.3.5 Two-digit numbers are to be formed using the digit 1, 2, 3 and 4, with no digit begin used more than once per number.

1. *List the sample space.*

2. *If a number is selected at random, find the probability that the number:*
   (a) *begin with a 3* _____
   (b) *contains the digit 2* _____
   (c) *is an odd number* _____
   (d) *is an even number* _____
   (e) *is a multiple of 3* _____
   (f) *is divisible by 3* _____

Exercise 6.3.6 Expand and simplify the following expressions:

1. $-3(x+3)+3x-4$

2. $-7y-(y-2)-y+3$

3. $-4(x-2)-5(x+3)$

4. $x(x-y)-y(y-x)$

5. $5(3-x)-2(1-x)$

Exercise 6.3.7 Factorising the following expressions:

1. $ab-b+2a-2$.

2. $3x+xy-6-2y$.

3. $a^2+ab-2b^2$.

Exercise 6.3.8

1. *Simplify* $\frac{3x-7}{5} - \frac{5x-3}{4}$.

2. *The lengths in centimetres, of the sides of a triangle are 2x, 3x and 4x. If the perimeter of this triangle is 135 cm. Find the difference between the lengths of the longest and shortest sides.*

3. *Joe makes fuel for his lawnmower by mixing petrol and oil in the ration 40 to 1. What percentage of the fuel is oil?*

4. *If n is a positive integer, an integer which is always divisible by 3 is:*
   A. $(n+1)(n+4)$ *B.* $n(n+2)(n+6)$ *C.* $n(n+3)(n-3)$ *D.* $n(n+2)(n+4)$

5. *An airplane flies at 900 km/h for one quarter of its time and averages 600 km/h for the entire trip. What is the average speed, in kilometres per hour, over the rest of the journey?*