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.

7 Year 8 Term 2 Week 7 Homework

7.1 Topic 1 — Analysising Data

Exercise 7.1.1 The data below shows the mass in kg of 40 parcels that are to be sent by rail freight to various destinations within NSW:

21	*13*	*19*	*9*	*14*	*23*	*7*	*28*	*12*	*12*
25	*4*	*26*	*17*	*8*	*14*	*23*	*9*	*18*	*13*
16	*15*	*3*	*22*	*29*	*19*	*17*	*14*	*11*	*20*
2	*7*	*16*	*25*	*8*	*28*	*15*	*12*	*15*	*10*

1. *Complete this frequency distribution table for the given data.*

Class	Class centre (x)	Tally	Frequency (f)	fx
1–5	3	III	3	9
6–10	8			
11–15				
16–20				
21–25				
26–30				

2. *Why would it be inappropriate to tabulate this data as individual scores?*

3. *What does $\sum fx$ represent in a grouped data distribution table?*

4. *How will this affect the calculation of the mean?*

5. *Find the approximate mean, correct to 1 decimal place.*

Exercise 7.1.2

1. *The mean of a set of 21 scores is 12. Find the new mean, correct to 1 decimal place, when a score of 34 is added to the set.*

2. *The mean of a set of 11 scores is 27. After a new score is added, the mean falls to 25. find the score that was added.*

3. *The mean of a set of 18 scores is 14. After one of the score is taken out, the mean falls to 12. Find the score that was taken out.*

4. *The mean of 5 consecutive scores is 23.5. Form an equation and solve it to find the scores.*

Exercise 7.1.3

1. *How many scores are there in a distribution if the number of scores is odd and the median lies in the 26th position?*

2. *How many scores are there in a distribution if the number of scores is even and the median lies between the 36th and 37th scores?*

3. *The mean of 5 numbers is 14. If four of the numbers are 10, 7, 19 and 18, find the median.*

7.2 Topic 2 — Probability

7.2.1 Probability Properties (Review)

1. For any event E, $0 \leq P(E) \leq 1$
2. Union Rule for Probability
   For any events E and F from a sample space S,
   $$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$
3. Union Rule for Mutually Exclusive Events
   For mutually exclusive events E and F,
   $$P(E \cup F) = P(E) + P(F)$$
4. Complement Rule
   $$P(E) = 1 - P(\bar{E}) \text{ and } P(\bar{E}) = 1 - P(E)$$

Exercise 7.2.1 The chance of a new light globe being defective is $\frac{1}{25}$.

1. *What is the probability that a new light globe will not be defective?*

2. *If 150 new light globes were checked, how many would you expect to be defective?*

Exercise 7.2.2 When breeding Labradors, the probability of breeding a black dog is $\frac{2}{9}$.

1. *What is the probability of breeding a dog that is not black?*

2. *If you breed 63 dogs, how many would you expect to be not black?*

Exercise 7.2.3 If three coins are tossed.

1. *Find the probability of tossing an odd number of tails.*

2. *Find the probability of tossing even number of tails.*

3. *Find the probability of tossing either all heads or all tails.*

Exercise 7.2.4 A card is randomly selected from a pack of cards.

1. *What is the probability that the card is either red card or a face card?*

2. *What is the probability that the card is either black card or a number card?*

3. *What is the probability that the card is either an ace or a face card?*

4. *Find the probability of selecting either a face card or a number card.*

7.3 Multi-Stage Experiments

7.3.1 Two-stage Experiments — The Product Rule:

If A and B are independent events in successive stages of a two-stage experiment, then

$$P(AB) = P(A) \times P(B)$$

7.3.2 Multi-stage Experiments — The Product Rule

If $A_1, A_2, ...A_n$ are independent events, then

$$P(AB) = P(A_1) \times P(A_2) \times ... \times P(A_n)$$

7.3.3 Sampling Without Replacement — An extension of the Product Rule

The product rule can be extended to following question, where the two stages of the experiment are not independent.

Example 7.3.1 A box contains five discs numbered 1, 2, 3, 4 and 5. Two numbers are drawn in succession, without replacement. What is the probability that both are even?

The probability that the first number is even is $\frac{2}{5}$.
The probability that the second number is also even is $\frac{1}{4}$.
$\therefore P(both\, even) = \frac{2}{5} \times \frac{1}{4} = \frac{1}{10}$

Example 7.3.2 Throw a die, then toss a coin. What is the probability of obtaining at least two on the die followed by a head?

Let A be the number at least two, and B be the a head of the coin.
$P(A) = \frac{5}{6}$ *and* $P(B) = \frac{1}{2}$
$P(AB) = P(A) \times P(B) = \frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$

Exercise 7.3.1 A box contains twelve red and ten green discs. Three discs are selected, one at a time without replacement.

1. *What is the probability that the discs selected are red, green, red in that order?*

2. *What is the probability of this event if the disc is replaced after each draw?*

7.4 Miscellaneous Exercises

Exercise 7.4.1 Of 1200 students at Kendall High School, 200 students were chosen at random and shown three new uniforms. they were then asked to vote for the uniform which they preferred. The number of students who chose each uniform is shown in the table. Using these results, estimate the number students in the whole school who would most likely prefer each uniform.

Uniform	*A*	*B*	*C*
Number of students	*105*	*65*	*30*

Exercise 7.4.2 A lifestyle magazine conducted a survey to discover the most popular style of restaurant food enjoyed by its readers. Only small number of people replied to the survey. The result are shown in the table below:

Cuisine	*Italian*	*Korean*	*Chinese*	*Thai*	*Mexican*	*Japanese*
Number of responses	*14*	*8*	*25*	*17*	*9*	*7*

1. *Is the data quantitative or categorical?*

2. *Is it appropriate to try to find the mean for this data? Why?*

Exercise 7.4.3 For each set of scores below find the upper and lower quartiles:

1. *10, 7, 5, 22, 29, 21, 14, 19, 24*

2. *39, 33, 24, 26, 29, 28, 43, 27, 22*

3. *17, 31, 20, 23, 15, 27, 19*

Exercise 7.4.4 A bag contains 7 green discs, 9 red discs and 6 blue discs.

1. *If one disc is drawn at random, find the probability that it is:*

   (a) *a red*

   (b) *not red*

   (c) *blue or green*

   (d) *neither red nor green*

2. *If two discs are drawn one at a time without replacement, find the probability that they are:*

   (a) *First is red and second is blue*

   (b) *First is red and second is not blue*

   (c) *both are red*

   (d) *both are not red*

Exercise 7.4.5 Two marbles are picked at random, one from a bag containing three red and four blue marbles, and the other from a bag containing five red and two blue marbles. Find the probability of drawing:

1. *two red marbles,*

2. *two blue marbles,*

3. *a red marble from the first bag and a blue marble from the second.*

Exercise 7.4.6 From a standard pack of 52 cards, two cards drawn at random without replacement. Find the probability of drawing:

1. *a spade then a heart,*

2. *two clubs,*

3. *the ace of hearts and the king of clubs.*

Exercise 7.4.7 Further Applications

1. *Ray has some jelly beans in two bags, In one bag he has 4 black, 2 orange and 2 white jelly beans. In the other bag he has 4 black, 5 orange and 3 white jelly beans. If Ray takes one jelly bean out of each bag, find the probability that neither one is black?*

2. *If Tom gets on a bus with 2 women and 6 men already on it, How probable is it that the person he sits next to is a woman?*

3. *Jack took the bus to work in the morning and back home in the afternoon. In the morning there were 4 women and 2 men on the bus before he got on. In the afternoon 6 women and 3 men. On both rides, he sat next to someone. How likely is it that he didn't even sit next to a woman?*

4. *Michael has some socks in two drawers, In one drawer he has 3 green, 1 yellow and 5 black socks. In the other drawer he has 6 green, 4 yellow and 2 black socks. If Michael takes one sock out of each drawer, what is the probability that both will be green socks?*

7.5 Maths challenge

Exercise 7.5.1

1. *Express the extended fraction shown below as simple fraction in lowest terms.*

$$\frac{3}{4+\frac{3}{4+\frac{3}{4}}}$$

2. *During a trip, Sam passed kilometre marker 142 on the highway at 9:10 a.m. and kilometre marker 152 at 9:25 a.m. His speed was constant for the whole trip. At what time a.m. did he pass kilometre 166?*

3. *On sale, the original price of every jacket in a store is reduced by 20%. Later, this sale price is further reduced by another 20% to create a final price. The store could have reduced the original price directly to the final price by what single percent?*

4. *Bob and John each start saving today. Bob saves 30 cents every day. John saves 1 cent on the first day, 2 cents on the second day, and so on, saving one cent more each day than on the day before. At the end of how many days will they have saved the same total amounts?*

Exercise 7.5.2

1. *Marbles of four different colours are in a bag.* $\frac{2}{5}$ *are red,* $\frac{1}{6}$ *are black,* $\frac{1}{4}$ *are green and there are 22 yellow. How many marbles are in the bag?*

2. *I add up five consecutive odd integers. If the smallest one is* $2m-3$*, them find the sum.*

3. *Evaluate* $\frac{8}{1+\frac{1}{1+\frac{1}{2}}}$.

4. *Evaluate* $(1-\frac{1}{2})(1-\frac{1}{3})(1-\frac{1}{4})\ldots(1-\frac{1}{100})$.

5. *Given that the sum of the first n positive integers, that is* $1+2+3+\ldots+n=\frac{n}{2}(1+n)$. *Find the simplified expression of this sum:* $n+n+1+n+2+\ldots+2n$.