

Year 8 Term 2 Homework

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

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5 Year 8 Term 2 Week 5 Homework

5.1 Topic 1 — Organising Data

5.1.1 Find the mean from a frequency table

The calculator can be used to calculate the mean from a frequency table.

Example 5.1.1 Use the calculator find the mean of the given frequency table:

Score	1	2	3	4	5
Frequency	2	5	6	4	1

- Press **MODE** **2** (for stats)
- Press **1**
- Press **SHIFT** **MODE**
- Press the **Down Arrow** on the **REPLAY** button then press **3**
- Press **1** (for frequency ON)
the display should look like this.



- Now press **1** **=** **2** **=** **3** **=** **4** **=** **5** **=**
- Now put frequency by moving the cursor to the Freq column
- Add each frequency followed by **=**
- Press **AC** then
- Press **SHIFT** **1** **5** **2** **=** and the display should read 2.833333333 (for fx-82AU)
- Press **SHIFT** **1** **4** **2** **=** and the display should read 2.833333333 (for fx-82AU PLUS)

Exercise 5.1.1 Use your calculator as shown in the example, to evaluate the mean for the scores in the tables shown below:

1. mean: _____

<i>Outcome</i>	<i>Frequency</i>
5	3
6	7
7	8
8	9
9	3
10	2

2. mean: _____

<i>Outcome</i>	<i>Frequency</i>
11	3
12	6
13	8
14	11
15	7
16	2

3. mean: _____

<i>Outcome</i>	5.0	5.2	5.4	5.6	5.8	6.0
<i>Frequency</i>	7	8	11	16	12	10

5.2 Topic 2 — Analysing Data

5.2.1 Collecting Data

Exercise 5.2.1 Consolidation

1. Jane is a telemarketer who wishes to choose a sample of 200 people from the residential section of the Sydney White Pages telephone directory in order to conduct a marketing survey.

(a) How could she choose the names in such a way that the sample is unbiased?

(b) How could she choose a biased sample?

2. In a sports club raffle with 20 prizes, 250 red tickets, 150 blue tickets and 100 green tickets were sold. How many prizes would you expect to be won by someone holding:

(a) a red ticket? _____

(b) a blue ticket? _____

(c) a green ticket? _____

3. The table below shows the number of students in each group at a high school. The principal wants to conduct a survey into the use of technology in the school by using a stratified sample of 100 students.

Year group	7	8	9	10	11	12
Number of students	155	172	167	143	130	109

(a) How many students attended the school? _____

(b) How many students from each year group should be chosen to participate in the survey?

5.2.2 The mean, the median, the mode and the range

- The **mean** is what we typically think of as the average.

$$\bar{x} = \frac{\sum x}{n} \quad \text{or} \quad \bar{x} = \frac{\sum fx}{\sum f}$$

- When a set of n scores have been arranged in an ascending order, the **median** is:
 - the $(\frac{n+1}{2})$ score if n is odd
 - the average of the $(\frac{n}{2})$ and the $(\frac{n}{2} + 1)$ scores if n is even.
- The **mode** is the score with the highest frequency.
- The **range** is the difference between the highest and lowest

Exercise 5.2.2 Consolidation

- The mean of 5 numbers is 14. If four of the numbers are 18, 11, 10 and 15, find the median.

- Alex has the following scores in 10 rounds of golf.

78, 79, 82, 77, 78, 95, 82, 79, 82, 79.

- Find the mean, mode and median of these scores.

- Which is the best measure of his performance?

- For one month Raymond recorded the number of hours he spent each weeknight doing homework.

The results are shown below:

2	5	1	4	0	3	4	1
1	4	2	3	1	2	2	4
1	0	2	5	0	3	3	2

- Find the mode homework time.

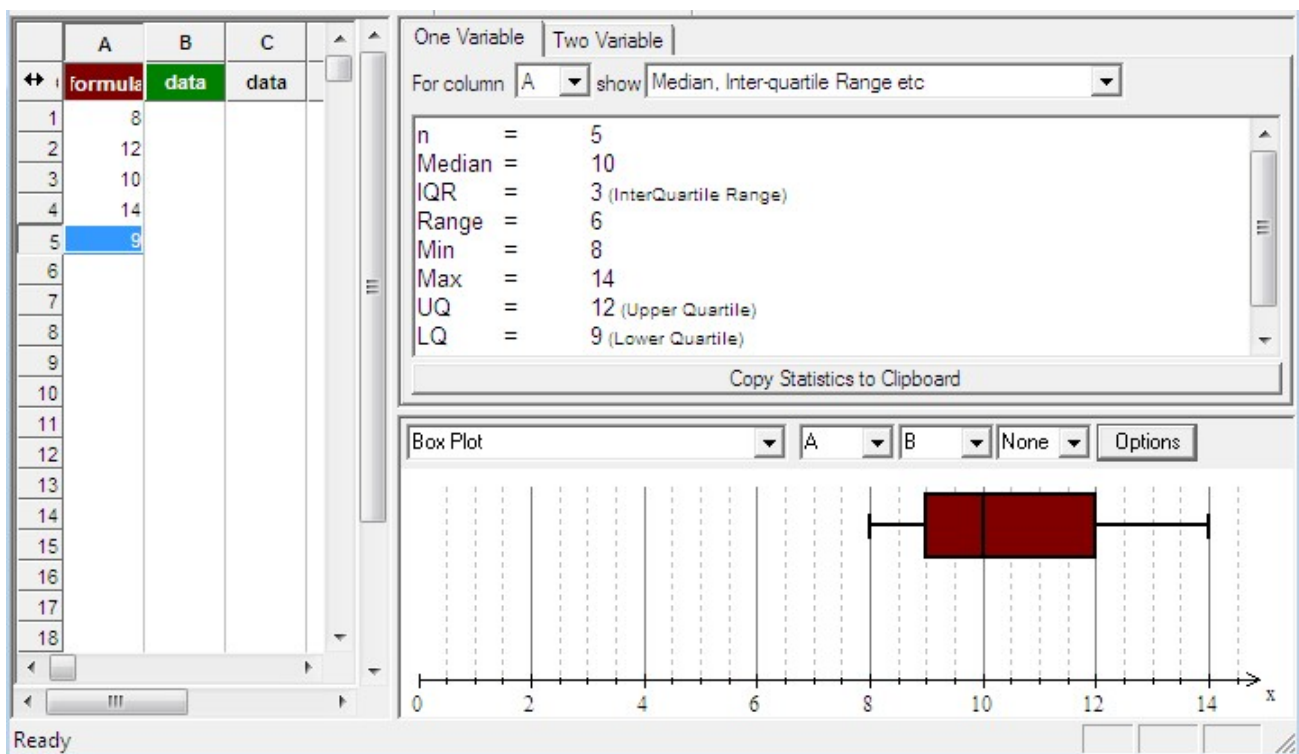
- Determine the mean of these homework times.

5.2.3 Box-and-Whisker Plot (Box-Plot)

1. The score that lies halfway between the lowest score and the median is called the **lower quartile**.
2. The score that lies halfway between the median and the highest score is called **upper quartile**.
3. The difference between the upper quartile and lower quartile is called the **inter-quartile range**.

Example 5.2.1 For the following scores 8, 12, 10, 14, 9.

1. Arrange the scores in ascending order: 8, 9, 10, 12, 14
2. Find the median: the median is 10
3. Find the upper and lower quartiles:
the upper quartile is 12 and the lower quartile is 9
4. Find the inter-quartile range: the inter-quartile range is 3



Note: You may need to go to **Tool** → **System Options** and select **Include Median** to get a correct answer.

Exercise 5.2.3 For each set of scores below:

1. Rearrange the scores in ascending order
2. Find the median
3. Find the upper and lower quartiles
4. Find the inter-quartile range.

1.) 33, 26, 43, 22, 24, 29, 27, 39

(a) median: _____

(b) upper quartile: _____ , lower quartile: _____

(c) inter-quartile range: _____

2.) 10, 7, 5, 22, 29, 21, 14, 19, 24

(a) median: _____

(b) upper quartile: _____ , lower quartile: _____

(c) inter-quartile range: _____

3.) 17, 20, 31, 23, 19, 27, 25

(a) median: _____

(b) upper quartile: _____ , lower quartile: _____

(c) inter-quartile range: _____

Exercise 5.2.4 For the data set given below, find the mean, median, mode and range.

Score	1	2	3	4	5
Frequency	9	11	7	6	4

5.3 Topic 3 — Probability

Probability is a measure of how likely it is that a particular event will occur.

5.3.1 Equally likely possible outcomes

Suppose that the possible results of an experiment can be divided into n equally likely possible outcomes – meaning that one and only one of these n outcomes will occur, and there is no reason to expect one outcome to be more likely than another. Then the probability $\frac{1}{n}$ is assigned to each of these equally likely possible outcomes.

5.3.2 Impossible and Certain Events

- An event has probability 0 if and only if it cannot happen.
- An event has probability 1 if and only if it is certain to happen.
- for any other event, $0 < P(\text{event}) < 1$.

5.3.3 Graphing the Sample Space

Many experiments consist of several stages. For example, when a dice is thrown twice, the two throws can be regarded as two separate stages of the one experiment.

Example 5.3.1 A dice is thrown twice. Find the probability that:

1. *the pair is a double*

since there are 6 doubles, $P(\text{double}) = \frac{6}{36} = \frac{1}{6}$

2. *the sum of the two numbers is six*

since 5 pairs have sum of 6, $P(\text{sum is 6}) = \frac{5}{36}$

3. *at least one number is four*

since 11 pairs contain a 4, $P(\text{at least one is a 4}) = \frac{11}{36}$

4. *the sum of at most four*

since 6 pairs have sum 2, 3, or 4, $P(\text{sum at most 4}) = \frac{6}{36} = \frac{1}{6}$

5. *both numbers are greater than four*

since 4 pairs consist only of 5 or 6, $P(\text{both greater than 4}) = \frac{4}{36} = \frac{1}{9}$

6. *both numbers are even*

since 9 pairs have two even numbers, $P(\text{both even}) = \frac{9}{36} = \frac{1}{4}$

5.3.4 The Fundamental Formula for Probability

$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

Exercise 5.3.1 A card is drawn at random from a pack of playing cards consisting of 52 cards. Find the probability that the card is:

1. the 9 of hearts _____
2. a heart _____
3. a seven _____
4. a red card _____
5. a picture card (Jack, Queen, King) _____
6. red or black _____

Exercise 5.3.2 A book has 150 pages. The book is randomly opened at a page. Find the probability that the page number is:

1. greater than 140 _____
2. an odd number _____
3. a multiple of 20 _____
4. is divisible by 5 _____

5.3.5 Tree Diagram

Listing the sample space of a multi-stage experiment can be difficult. A tree diagram provides a very useful alternative way to display the sample space.

Exercise 5.3.3 From a group of four students, Anna, Bill, Charlie and David, two are chosen at random to be on the student Representative Council. List the sample space and hence find the probability that:

1. Bill and David are chosen _____
2. Anna is chosen _____
3. Charlie is chosen but Bill is not _____
4. neither Anna nor David is selected _____

Exercise 5.3.4 A coin is tossed three times. Draw a tree diagram to illustrate the possible outcomes. Then find the probability of obtaining:

1. three heads _____

2. a head and two tails _____

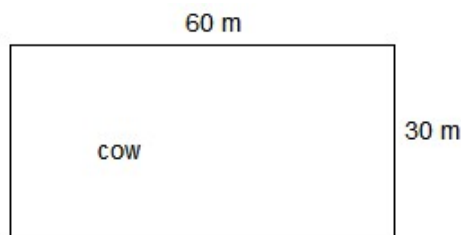
3. at least two tails _____

4. at most one head _____

5. more heads than tails _____

6. a head on the second toss _____

Exercise 5.3.5 A rectangular field is 60 metres long and 30 metres wide. A cow wanders randomly around the field. Find the probability that the cow is:

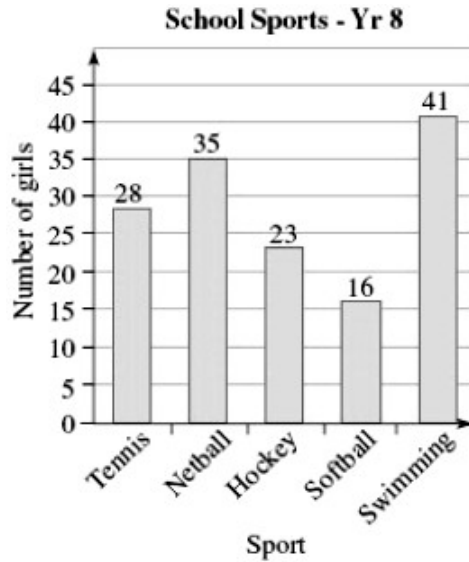


1. more than 10 metres from the edge of the field.

2. not more than 10 metres from a corner of the field.

5.4 Miscellaneous Exercises

Exercise 5.4.1 The column graph shows the sports played by the girls in Year 8 at a certain high school.



1. Is the data quantitative (numerical) or categorical?

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

Exercise 5.4.2 For the data set given below, find the mean, median, mode and range. Answer correct to 1 decimal place.

Score	23	24	25	26	27
Frequency	4	8	11	14	24

Exercise 5.4.3

1. A bag contains 6 red marbles, 5 yellow marbles and 4 green marbles. One marble is drawn at random from the bag. Find the probability that it is:

(a) red or yellow _____

(b) yellow or green _____

(c) green or red _____

2. A regular pack of 52 playing cards is shuffled and one card is then drawn at random. What is the probability that the card is:

(a) The 5 of clubs? _____

(b) a red picture card? _____

(c) a red 6 or a black 9? _____

(d) a number card? _____

3. A die is rolled and a coin is tossed at the same time:

(a) What is the probability of rolling a 4 and tossing a head?

(b) What is the probability of rolling a prime number and tossing a tail?

(c) What is the probability of rolling a 1 or 2 and tossing a tail?

(d) What is the probability of rolling a number less than 5 and tossing a head?

4. How many pairs of tennis players can be chosen from 4 available players?

5.5 Maths challenge

Exercise 5.5.1

1. A certain substance doubles its volume every minute. At 9:00 am a small amount is placed in a container and at 10:00 am the container fills. At what time was the container one quarter full?

2. Jack climbed at a uniform rate up the beanstalk. At 2 o'clock he was one-sixth of the way up and at 4 o'clock he was three quarters of the way up. What fraction of the beanstalk had he climbed up at 3 o'clock?

3. On my car, a particular brand of tyre lasts 40,000 km on a front wheel or 60,000 km on a rear wheel. By interchanging the front and the rear wheels, what is the greatest distance that I can get from a set of four of these tyres?

4. The speedometer on my car reads 10% more than the speed at which the car is travelling. When my speedometer reads 100 km/h, how fast, in kilometres per hour, is my car actually travelling?

Exercise 5.5.2

1. A fast clock gains 12 minutes every normal hour, and the clock shows the correct time at 1 p.m. What is the correct time when the fast clock first registers 3 p.m.?

2. A slow clock loses 10 minutes every normal hour, and the clock shows the correct time at 1 p.m. What is the correct time when the slow clock first registers 3 p.m.?

3. Two candles have different lengths and thicknesses. The longer one can burn for 7 hours and the shorter one for 10 hours. After 4 hours burning, both candles are the same length. what fraction of the longer candle's length was the shorter candle's length?

4. When 24 litres of water are added to a water tank which is $\frac{1}{2}$ full, the tank is now $\frac{2}{3}$ full. What is the capacity of the tank in litres?
