Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE ASSESSMENT TASKS

MATHEMATICS ESSENTIAL
GENERAL YEAR 11

Sample assessment task

Mathematics Essential

Task 8 – Unit 2

Assessment type: Response

Conditions:
Time for the task: 15 minutes
In class, calculator permitted

Marks: 7 marks

Task weighting:
1% of the school mark for this pair of units

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1. The following nutrition information is shown on the packaging of a loaf of bread.
   Serving size – 2 slices (80 g)
   Protein 7 g
   Fat 3.5 g
   Carbohydrates 33 g

   (a) What is the ratio (in the simplest form) of protein to fat? (1 mark)

   (b) What percentage of the serving size is fat? (1 mark)

2. The profit from a family business was shared by three brothers, Paul, Greg and John, in the ratio of 3 : 2 : 1 respectively. If the total profit was $48 000, what was each brother's share?

   (2 marks)

3. A magazine listed fuel consumption rates for the following small cars:

Model	Fuel Consumption
Car 1	6.2 L/100km
Car 2	6.6 L/100km
Car 3	5.7 L/100km

(a) How much fuel would Car 1 use in travelling a distance of 200 km? (1 mark)

(b) How much fuel would Car 2 use in travelling a distance of 150 km? (1 mark)

(c) How much fuel would Car 3 use in travelling a distance of 486 km? (1 mark)

Marking key for sample assessment task 8 – Unit 2

1. The following nutrition information is shown on the packaging of a loaf of bread.
   Serving size – 2 slices (80 g)
   Protein 7 g
   Fat 3.5 g
   Carbohydrates 33 g

   (a) What is the ratio (in simplest form) of protein to fat?

Solution	
Ratio is 7:3.5 = 2:1	
Specific behaviours	**Marks**
Determines the ratio in simplest form	1
Total	**/1**

   (b) What percentage of the serving size is fat?

Solution	
Percentage of serving size = $\frac{3.5}{80} \times 100 = 4.38\%$	
Specific behaviours	**Marks**
Determines the percentage of serving size	1
Total	**/1**

2. The profit from a family business was shared by three brothers, Paul, Greg and John, in the ratio of 3 : 2 : 1 respectively. If the total profit was $48 000, what was each brother's share?

Solution	
A ratio of 3 : 2 : 1 involves 6 parts with each part $8000 Paul's share – $24 000 Greg's share – $16 000 John's share – $8 000	
Specific behaviours	**Marks**
Determines 1 unit share	1
Determines correct breakdown of profit for three brothers	1
Total	**/2**

3. A magazine listed fuel consumption rates for the following small cars:

Model	Fuel Consumption
Car 1	6.2 L/100km
Car 2	6.6 L/100km
Car 3	5.7 L/100km

(a) How much fuel would Car 1 use in travelling a distance of 200 km?

Solution	
$2 \times 6.2 = 12.4$ L for 200 km	
Specific behaviours	**Marks**
Uses factor of 2 to correctly determine fuel consumption	1
Total	**/1**

(b) How much fuel would Car 2 use in travelling a distance of 150 km?

Solution	
$1.5 \times 6.6 = 9.9$ L	
Specific behaviours	**Marks**
Uses factor of 1.5 to correctly determine fuel consumption	1
Total	**/1**

(c) How much fuel would Car 3 use in travelling a distance of 486 km?

Solution	
$4.86 \times 5.7 = 27.7$ L	
Specific behaviours	**Marks**
Uses factor of 4.86 to correctly determine fuel consumption	1
Total	**/1**

Sample assessment task

Mathematics: Essential

Task 2 – Unit 1

Assessment type: Practical application

Conditions:
Time for the task: 50 minutes
In class under test conditions, calculator permitted

Marks: 25 marks

Task weighting:
6% of the school mark for this pair of units

The Basal Metabolic Rate (BMR) is the **minimum** amount of energy, in kilojoules, that your body requires to fuel its normal metabolic activity, at rest.

1. The following formulas can be used to estimate the Basal Metabolic Rate (BMR) in Calories (or kilocalories). They are based on height, weight, age and gender.

   $$\text{BMR (female)} = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age(years)} - 161$$
   $$\text{BMR (male)} = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age(years)} + 5$$

   To convert to kilojoules you would multiply the resulting BMR by 4.182

   (a) Use the relevant formula above to show that a 165 cm 15 year old female, weighing 60 kg has an approximate BMR of 1395 Calories or 5835 kilojoules. (2 marks)

   (b) List your weight, height and age and calculate your own BMR in Calories. Convert your answer to kilojoules. (3 marks)

2. Knowing your daily energy needs helps you to make healthy choices of what and how much to eat and drink each day.

   To determine your daily energy needs to maintain your current weight, your personal activity level needs to be factored in with your BMR. The following information outlines scale factors that are applied to the BMR value based on a person's activity level

Activity level	Daily Calorie needs
Sedentary (little or no exercise)	= BMR x 1.2
Lightly active (light exercise/sports 1–3 days/week	= BMR x 1.375
Moderately active (moderate exercise/sports 3–5 days/week	= BMR x 1.55
Very active (hard exercise/sports 6–7 days/week	= BMR x 1.725
Very heavy exercise (twice/day, extra heavy workouts)	= BMR x 1.9

(a) The 15 year old female in Question 1 part (a) has an activity level which is classified as lightly active. Verify that her daily energy needs are approximately 8000 kilojoules.

(2 marks)

(b) Indicate your personal activity level and calculate your daily energy needs (kilojoules) needed to maintain your current weight. (3 marks)

3. Nutritional labelling appears on some packaged foods to help people make informed decisions about what they are eating.

The thumbnail is a graphic representation of how much one serve of a particular food contributes to an average day's intake of food and drink. The percentage daily intake (%DI) values are based on an average male adult's daily energy requirement of 8700kJ.

In the label above the %DI for energy is 10% because 870 kJ is 10% of 8700 kJ.

However the %DI for some people may be higher or lower depending on age, height, weight, gender and how much activity or exercise you do.

(a) What %DI would a serve of this food be for the 15 year old female from Question 1? (3 marks)

(b) What percentage of daily intake (%DI) of energy would a serve of the same food be for you? (3 marks)

4. %DI is based on the recommended amounts of energy and nutrients needed for an average adult male diet to meet their daily nutritional needs. The percentages are calculated based on the values below:

Nutrient	Reference value used in %DI	
Energy	8700 kJ	7500kJ
Protein	50 g	43 g
Fat	70 g	
Saturated fatty acids	24 g	
Carbohydrate	310 g	
Sodium	2300 mg	
Sugars	90 g	
Dietary fibre	30 g	

For a person who has daily energy needs of 7500 kJ, the recommended daily amount of protein would need to be adjusted as in the following calculation.

$\frac{7500}{8700} \times 50 = 43.1$ g

Calculate the recommended daily amount of fat for a person with daily energy needs of 7500 kilojoules. (2 marks)

5. The following information is printed on the take away container for a 200g hamburger.

Energy	Protein	Fat	Saturated fat	Carbohydrate	Total sugars
2010 kJ	25 g	25.5 g	9.7 g	35.0 g	6
23.1%	50%		40.4%	11.3%	6.7%

(a) (i) Verify that %DI values are based on a daily energy level of 8700 kJ. (2 marks)

(ii) What would the %DI for fat be labelled as? (2 marks)

(b) What information about eating this hamburger would you give to a female if she is on a weight loss programme of 5000 kilojoules per day? Include mathematical evidence to support your information. (3 marks)

Marking key for sample assessment task 2 – Unit 1

1. (a) Use the relevant formula to show that a 165 cm 15 year old female, weighing 60 kg has an approximate BMR of 1395 Calories or 5835 kilojoules.

Solution
$\text{BMR (female)} = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age(years)} - 161$ $= 10 \times 60 + 6.25 \times 165 - 5 \times 15 - 161$ $= 139$ Calories $4.182 \times 1395 = 5835$ kilojoules

Specific behaviours	Marks
Uses correct formula for a female	1
Correctly calculates number of calories or kilojoules	1
Total	**/2**

(b) List your weight, height and age and calculate your own BMR in Calories. Convert your answer to kilojoules.

Specific behaviours	Marks
Lists personal weight, height and age	1
Uses correct formula for gender	1
Converts BMR to kilojoules	1
Total	**/3**

2. (a) The 15 year old female in Question 1 part (a) has an activity level which is classified as lightly active. Verify that her daily energy needs are approximately 8000 kilojoules.

Solution
Daily energy needs = 5835 x 1.375 = 8023.125 The daily energy needs for the 15 year old female is approximately 8000 kilojoules

Specific behaviours	Marks
Applies the correct activity level factor	1
Correctly calculates daily energy needs	1
Total	**/2**

(b) Indicate your personal activity level and calculate your daily energy needs (kilojoules) needed to maintain your current weight.

Specific behaviours	Marks
States personal activity level	1
Multiplies personal activity level factor to BMR	1
Correctly calculates personal daily energy needs	1
Total	**/3**

3. (a) What %DI would a serve of this food be for the 15 year old female from Question 1?

Solution
15 year old female has daily energy requirements of 5835 kilojoules The serving would provide 870 kilojoules of energy %DI (15 year old female) $= \frac{870}{5835} \times 100$ $= 14.9\% \approx 15\%$

Specific behaviours	Marks
Identifies energy value of 870 kilojoules of energy per serving	1
Applies daily energy needs of 5835 kilojoules to calculation of %DI	1
Calculates %DI per serving for a 15 year old female	1
Total	**/3**

(b) What percentage of daily intake (%DI) of energy would a serve of the same food be for you?

Solution
The serving would provide 870 kilojoules of energy % DI (Personal) = $\frac{870}{\text{Daily energy needs}}$ X 100 = _____%

Specific behaviours	Marks
Uses energy value of 870 kilojoules per serving	1
Applies own daily energy needs to calculation	1
Calculates personal %DI	1
Total	**/3**

4. Calculate the recommended daily amount of fat for a person with daily energy needs of 7500 kilojoules.

Solution
$\frac{7500}{8700} \times 70 = 60.34$ gm

Specific behaviours	Marks
Identifies reference value for fat	1
Calculates the recommended daily value of fat	1
Total	**/2**

5. The following information is printed on the take away container for a 200g hamburger.

Energy	Protein	Fat	Saturated fat	Carbohydrate	Total sugars
2010 kJ	25 g	25.5 g	9.7 g	35.0 g	6
23.1%	50%		40.4%	11.3%	6.7%

(a) (i) Verify that %DI values are based on a daily energy level of 8700 kJ.

Solution	
$\frac{2010}{8700} \times 100 = 23.1\%$	
Specific behaviours	**Marks**
Identifies 8700 kj as base value	1
Calculates %DI of a 2010 kj serving	1
Total	**/2**

(a) (ii) What would the %DI for fat be labelled as?

Solution	
$\frac{25.5}{70} \times 100 = 36.4\%$	
Specific behaviours	**Marks**
Identifies 70 g as the base value	1
Calculates %DI of a 25.5 g serving of fat	1
Total	**/2**

(b) What information about eating this hamburger would you give to a female if she is on a weight loss programme of 5000 kilojoules per day? Include mathematical evidence to support your information.

Sample response	
The female has daily energy needs of 5000 kj per day which are much less than the 8700 kj which the labelling is based on A serving of 2010 kj $= \frac{2010}{5000} \times 100 = 40.2\%$ For this female the hamburger would contribute approximately 40% of her daily energy needs which is greater than the 23.1% indicated on the label. Depending on what she had consumed earlier in the day she may be very close to her 5000 kj daily energy allowance for her weight loss programme. She could be at risk of exceeding her 5000 kj with food and drink she consumes by the end of the day.	
Specific behaviours	**Marks**
Identifies 5000 kj as the daily energy requirements	1
Calculates %DI of energy for a 5000 kj weight loss programme	1
Compares female's serving to total daily intake	1
Total	**/3**

Sample assessment task

Mathematics: Essential

Task 9 – Unit 2

Assessment type: Statistical investigation process

Conditions:
Period allowed for completion of the task: 1 week
Conditions: In class, technology and/or calculator permitted

Maximum number of marks: 24 marks

Task weighting:
13% of the school mark for this pair of units

Are males better drivers?
A student in class has suggested that males are better drivers than females. He went on to say that to be a good driver you need fast reflexes. This promoted some discussion with other students in the class saying the ability to concentrate was also very important.

Investigate the statements made above and produce a report that justifies your answer to the question 'Are males better drivers?'

A completed statistical investigation should include:

- an introduction that outlines the question to be answered and any further questions that could be explored
- selection and application of suitable mathematical and graphical techniques you have studied to analyse the provided data
- interpretation of your results relating your answer to the original problem
- communication of your results and conclusions in a concise systematic manner.

Your investigation report should include the following:

1. Introduction – two or three sentences providing an overview of your investigation. (3 marks)
2. Numerical and graphical analysis
   - choose various statistical measures you have studied to analyse the data (5 marks)
   - consider the most appropriate graphs which represent the data provided. (5 marks)
3. Interpretation of the results of this analysis in relation to the original question (7 marks)
   - describe any trend and pattern in your data (two to three sentences)
   - state how your data relates to the original problem (two to three sentences)
   - use your knowledge and understanding gained in this unit to explain your results in one paragraph.
4. Conclusion (4 marks)
   - Summarise your findings and conclusions in one paragraph.

DATA

A sample of data from the 2013 *Census At School* survey is provided below. The data was generated from a random sample of 60 Year 11 and 12 students who provided information on their reaction time using their dominant hand and their concentration activity.

Female				Male		
	Reaction Time (sec) (dominant hand)	**Concentration Activity (secs)**			**Reaction Time (sec) (dominant hand)**	**Concentration Activity (secs)**
1	0.03	52		1	0.35	35
2	0.38	61		2	0.51	61
3	0.39	34		3	0.35	38
4	0.39	22		4	0.32	43
5	0.44	38		5	0.37	43
6	0.31	24		6	0.38	47
7	0.43	41		7	0.37	48
8	0.34	19		8	0.31	64
9	0.56	59		9	0.37	38
10	0.34	44		10	0.31	43
11	0.38	40		11	0.45	33
12	0.56	41		12	0.37	38
13	0.37	56		13	0.31	31
14	0.44	33		14	0.34	52
15	0.32	50		15	2.61	58
16	0.31	41		16	0.35	34
17	0.35	40		17	0.4	49
18	18.62	60		18	0.31	35
19	0.35	47		19	0.32	47
20	0.34	47		20	0.42	37
21	0.94	50		21	0.35	36
22	0.32	28		22	0.32	38
23	0.35	38		23	0.41	43
24	0.37	40		24	0.31	60
25	0.4	58		25	0.32	36
26	0.45	43		26	0.35	47
27	0.34	34		27	0.3	30
28	0.32	27		28	0.14	35
29	0.3	39		29	0.36	41
30	0.67	77		30	0.27	No Data

Marking key for sample assessment task 9 – Unit 2

Introduction	
After being posed the question are male drivers better than female drivers, I have been asked to investigate this statement. Whilst other factors may affect someone's ability to drive I will use the data provided of reflex and concentration times to try to explore this statement.	
Specific behaviours	**Marks**
Provides a simple introduction of the question	1
Restates question in their own words	1
Mentions reflexes and concentration as two measures of driving ability	1
Total	**/3**

Numerical analysis

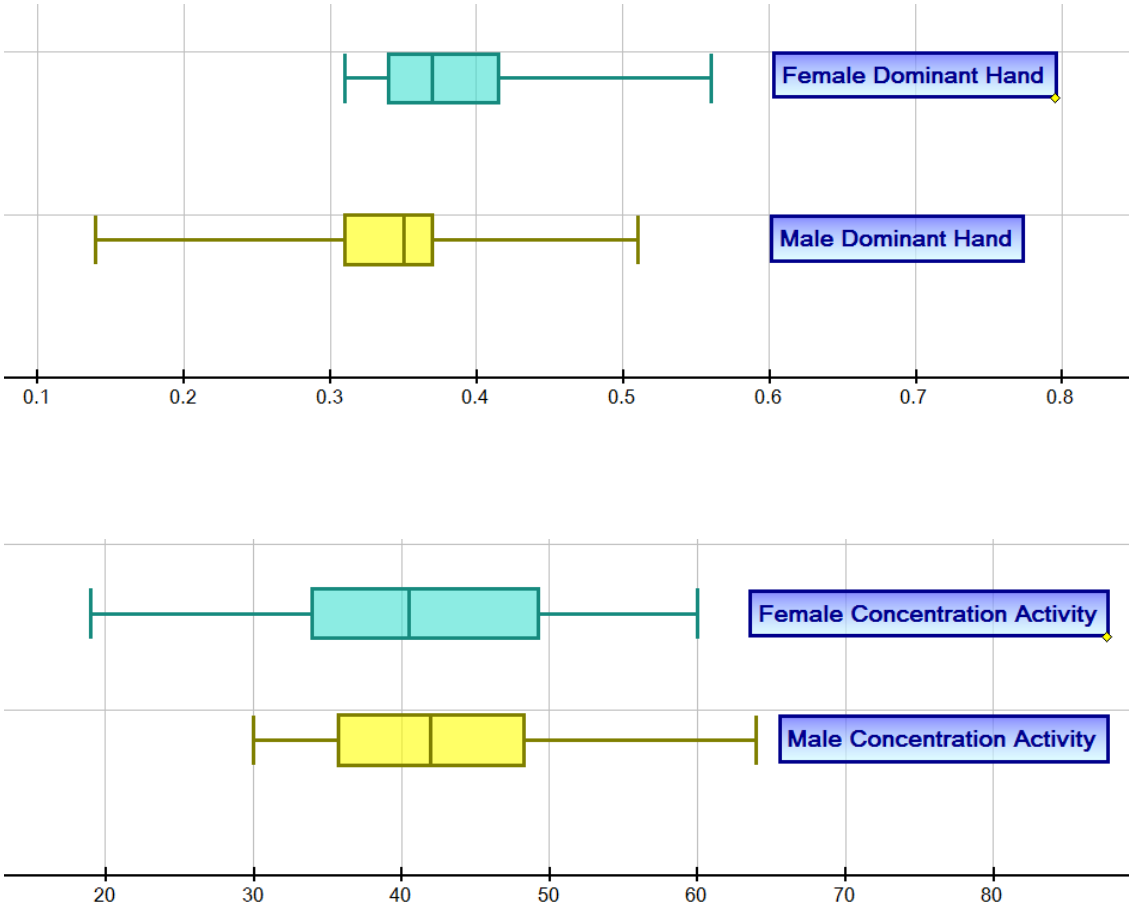
		Dominant Hand	Concentration Activity
Females			
(f)	**Mean**	0.38	42.77
	Median	0.36	41.00
	Standard Deviation	0.07	12.94
Males	**Mean**	0.35	43.33
(m)	**Median**	0.35	42.00
	Standard Deviation	0.06	9.61

	Female dominant	Male dominant	Female concentration	Male concentration
Minimum	0.3	0.14	19	30
Q1	0.34	0.31	34	36
Median	0.37	0.35	40.5	42
Q3	0.43	0.37	47.75	47.75
Maximum	0.56	0.51	61	64

Specific behaviours	Marks
Calculates measures of central tendency including mean, median & mode	1
Calculates mean, median with outliers removed	1
Calculates range	1
Calculates standard deviation or inter-quartile range	1
Calculates standard deviation and IQR	1
Total	**/5**

Graphical analysis

Box and Whisker plots



Graphical analysis

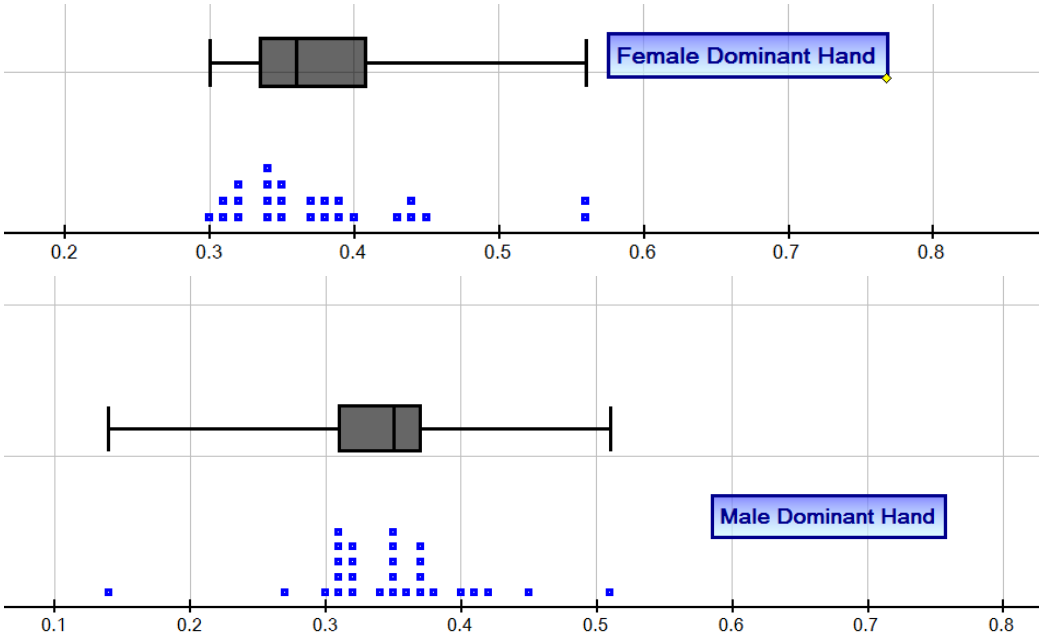
Back to back stem and leaf plots

	Stem And Leaf	
Female Dominant Hand	**seconds**	**Male Dominant Hand**
	0.0	
	0.1	**4**
	0.2	**7**
9 9 8 8 7 7 5 5 5 4 4 4 4 2 2 2 1 1 0	**0.3**	**0 1 1 1 1 1 2 2 2 2 4 5 5 5 5 5 6 7 7 7 7 8**
5 4 4 3 0	**0.4**	**0 1 2 5**
6 6	**0.5**	**1**
7	**0.6**	
	0.8	

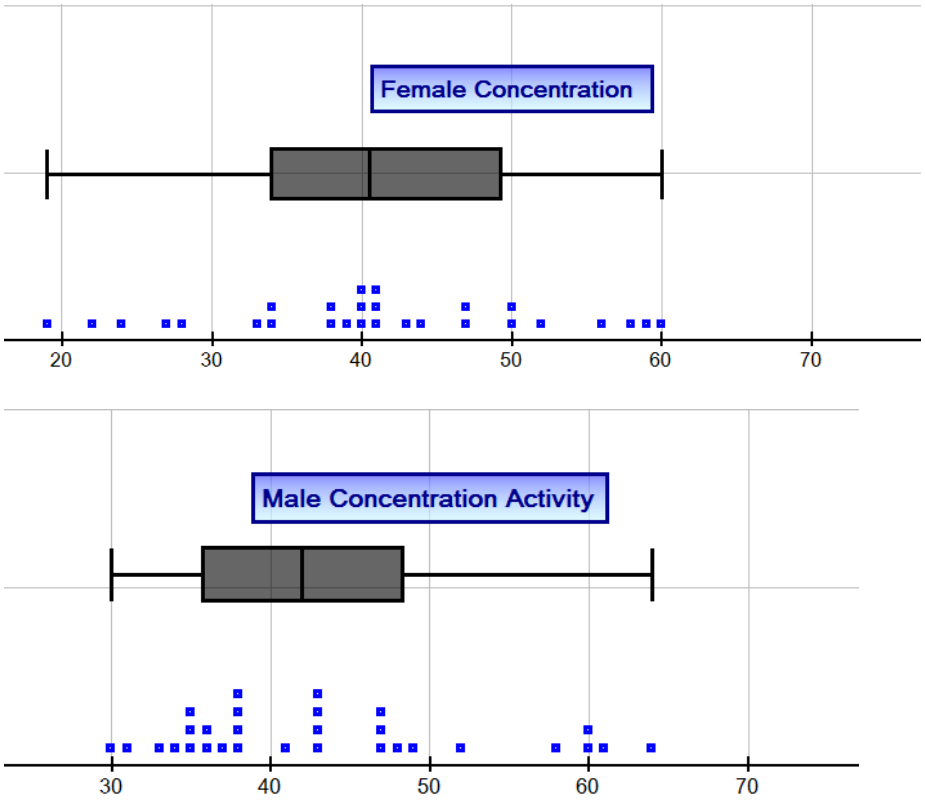
	Stem And Leaf	
Female Concentration Activity	**Seconds**	**Male Concentration Activity**
	0	
9	**10**	
8 7 4 2	**20**	
9 8 8 4 4 3	**30**	**0 1 3 4 5 5 5 6 6 7 8 8 8 8**
7 7 4 3 1 1 1 0 0 0	**40**	**1 3 3 3 3 7 7 7 8 9**
9 8 6 2 0 0	**50**	**2 8**
1 0	**60**	**4**
7	**70**	
	80	

Graphical analysis

Distributions: Dominant hand



Distribution: Concentration activities



Specific behaviours	Marks
Constructs simple single graphs	1
Shows comparative graphs: stem and leaf, histograms or dot frequency	1
Uses box and whisker plots to compare male and female attributes	1
Presents correct graphs including labelling	2
Total	**/5**

Interpretation	
Discussion of frequency/proportion, measures of central tendency, removal of outliers and measures of spread Sample interpretation: It is clear from looking at measures of central tendency such as mean and median that males performed faster on the reflex activity. Outliers have been removed from six data points as these would have increased the mean and median for female reflexes. Females produced better results on the concentration activity with the mean and median indicating females were faster. The range of scores for males was higher for the reflex activity and higher for females on the concentration activity. The inter-quartile ranges are higher for females in both reaction times and also the concentration activity. On the concentration task there was a greater range for the female results which are confirmed by the larger standard deviation compared with the males. The distribution for females is symmetrical but the male distribution indicates a tail of students with larger times indicating a positive skew in the results.	
Specific behaviours	**Marks**
Discusses frequency	1
Discusses proportion e.g. median	1
Discusses removal of outliers and effects on mean, median	1
Makes comparisons using measures of spread e.g. range, IQR	1
Makes comparisons using central tendency measures: mean and median	1
Discusses clusters of results in the data	1
Interpretation linked to numerical and graphical data	1
Total	**/7**

Conclusion	
Short statement outlining summary of findings Sample conclusion: To summarise , while the mean and median scores were better for males than those for females for the reflex activity, female concentration times were better than males with a cluster of males with slower concentration results and a significant number of females with very good concentration results (with the median being lower than the mean). Reaction times and concentration are important skills for driving but we would need to make a study of other skills or data to answer the question posed. Other skills are important such as general knowledge and adherence to road rules, risk taking behaviour etc. Road accident statistics could also help to answer the question 'Are males better drivers?'	
Specific behaviours	**Marks**
Makes a valid statement about the results	1
Relates conclusion back to the original question	1
Proposes that other data should be collected to help answer question	1
Provides a concise and coherent summary of the analysis	1
Total	**/4**

ACKNOWLEDGEMENTS

Task 2

Question 1 Basal metabolic rate formulas adapted from: *Basal metabolic rate*. (2014). Retrieved April, 2014, from http://en.wikipedia.org/wiki/Basal_metabolic_rate Used under Creative Commons Attribution-ShareAlike licence.

Question 2 Image: Australian Food and Grocery Council. (2011). *Daily intake guide energy thumbnail*. Retrieved April, 2014, from www.mydailyintake.net/

Information from: Australian Food and Grocery Council. (2011). *How do I read DIG labels?* Retrieved April, 2014, from www.mydailyintake.net/

Task 9

Data from: Australian Bureau of Statistics. (2013). [Driver reaction time and concentration activity data]. Retrieved May, 2014, from www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSMa06+ARE+MALES+BETTER+DRIVERS#hello Used under Creative Commons Attribution 2.5 Australia licence.