# Mathematics: Essential

## Practical Application 1 – 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:**

12% of the school mark for this pair of units

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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.

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.

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 Practical Application 1 – 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** | |
| Calories  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)  14.9% | |
| **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) = 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** | |
| 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** | |
|  | |
| **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** | |
|  | |
| **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  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** |