



## Western Australian Certificate of Education ATAR course examination, 2016

### Question/Answer booklet

# FOOD SCIENCE AND TECHNOLOGY

Please place your student identification label in this box

Student number: In figures

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In words

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### Time allowed for this paper

Reading time before commencing work: ten minutes  
Working time: three hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer booklet  
Multiple-choice answer sheet

Number of additional  
answer booklets used  
(if applicable):

#### *To be provided by the candidate*

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener,  
correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in this examination

### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	15	15	15	15	15
Section Two Short answer	8	8	95	74	55
Section Three Extended answer	3	2	70	40	30
<b>Total</b>					100

## Instructions to candidates

1. The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the *Year 12 Information Handbook 2016*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer booklet.

3. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

**Section One: Multiple-choice****15% (15 Marks)**

This section has **15** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 15 minutes.

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1. A food allergy is
  - (a) a catalyst to food absorption.
  - (b) an abnormal reaction to a food protein.
  - (c) a sensitivity to certain foods.
  - (d) an inability to digest lactose.
  
2. The spoilage and decomposition of fats, fatty acids and oils through exposure to oxygen is known as
  - (a) emulsification.
  - (b) aeration.
  - (c) rancidity.
  - (d) denaturation.
  
3. The role of Food Standards Australia New Zealand (FSANZ) in the recall of unsafe food products is to
  - (a) maintain networks of international food product recall issues.
  - (b) publish research for consumers to enable better product choices.
  - (c) coordinate all aspects of food product recalls nationally.
  - (d) develop and protect resources for sustainable development.
  
4. The Australian Dietary Guidelines
  - (a) advise on foods to consume daily for optimum health and wellbeing.
  - (b) are a visual guide to the proportions of foods to eat for good health.
  - (c) indicate a variety of foods needed to provide the daily nutrient intake.
  - (d) encourage increased consumption of only fruit and vegetables daily.
  
5. Food manufacturers control moisture levels in baked goods by adding
  - (a) thickeners.
  - (b) antioxidants.
  - (c) preservatives.
  - (d) humectants.

**See next page**

6. Gelatinisation occurs in the making of
- (a) gravy, cake and egg custard.
  - (b) risotto, egg custard and jelly.
  - (c) jelly, white sauce and cake.
  - (d) risotto, white sauce and gravy.
7. If a cup of flour weighs 135 grams and a cake recipe requires  $2\frac{1}{3}$  cups, how many grams of flour are required to make five cakes?
- (a) 675
  - (b) 1350
  - (c) 1575
  - (d) 1750
8. The labelling of food produced using gene technology **must** state
- (a) 'genetically modified' next to the name of the food or ingredient.
  - (b) 'gene technology' next to the numerical code of the additive.
  - (c) 'genetically modified' with the numerical code of the additive.
  - (d) 'gene technology' with the name of the food or ingredient.
9. A qualitative analysis of a new food product conducted by a food manufacturer will evaluate the
- (a) physical properties of the product.
  - (b) sensory properties of the product.
  - (c) functional properties of the product.
  - (d) chemical properties of the product.
10. A free trade agreement allows trade
- (a) without the use of barriers such as tariffs, subsidies and embargoes.
  - (b) with farmers in developing countries offering a fair price for crops.
  - (c) without tariffs or taxes added to the cost of exported goods only.
  - (d) to secure income and support sustainable farming practices.
11. Commercial food producers are legally obliged to produce food that is
- (a) consistently available and convenient.
  - (b) safe to consume and labelled correctly.
  - (c) labelled correctly and consistently available.
  - (d) safe to consume and convenient.

12. The production of functional foods
- (a) reduces the production of fresh foods.
  - (b) reduces food contamination and spoilage.
  - (c) increases the shelf life of processed foods.
  - (d) increases the availability of food commodities.
13. Strategies that reduce the amount of waste from food manufacturing and improve the sustainability of food production systems include
- (a) reducing the manufacture of foods that produce greenhouse gases.
  - (b) discounting the price of unsold food and donating it to charity.
  - (c) developing new food products from the waste left from food processing.
  - (d) increasing the use of waste as fertiliser for organic farming.
14. Chemical digestion of macronutrients is caused by the action of
- (a) saliva.
  - (b) bacteria.
  - (c) amylase.
  - (d) enzymes.
15. Political factors that influence food consumption patterns in Australia include
- (a) sustainability, humanitarian values and the distribution of aid.
  - (b) the distribution of aid, food regulations and imports.
  - (c) economic downturns, humanitarian values and food regulations.
  - (d) sustainability, imports and economic downturns.

**End of Section One**

**See next page**

## Section Two: Short answer

55% (74 Marks)

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 95 minutes.

## Question 16

(9 marks)

Read the recipe below.

## Lasagne

Ingredients	Method
<p><i>Meat sauce</i>            1 tablespoon oil            1 onion, sliced            1 clove garlic, crushed            250 g minced beef            2 tomatoes, peeled and diced            salt, pepper            ½ cup beef stock            1 tablespoon tomato paste            5 g butter            200 g white lasagne sheets            20 g grated tasty cheese (extra)</p>	<ol style="list-style-type: none"> <li>1. Heat oil, fry onion and garlic.</li> <li>2. Add mince, tomatoes, salt, pepper, stock and simmer for 10 minutes.</li> <li>3. Add tomato paste, simmer until thickened.</li> <li>4. Grease the base of a shallow baking dish with butter.</li> <li>5. Place a layer of lasagne sheets on the base of the baking dish, then a layer of meat sauce. Repeat the layers, making the top layer lasagna.</li> <li>6. Cover with cheese sauce and sprinkle top with extra grated cheese.</li> </ol>
<p><i>Cheese sauce</i>            1 tablespoon butter            1½ tablespoons flour            1 cup milk            salt, pepper            60 g grated tasty cheese</p>	<ol style="list-style-type: none"> <li>1. Melt butter. Remove from heat. Add flour, use a wooden spoon to stir until smooth.</li> <li>2. Return to heat and cook slowly for 1 minute, stirring continuously.</li> <li>3. Add milk gradually and stir until smooth.</li> <li>4. Add cheese, salt, pepper and stir until melted.</li> </ol>

Describe **three** adaptations to the commodities used in the recipe that would improve the nutritional value of the lasagne. State how **each** adaptation improves nutritional value.

One: \_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

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Two: \_\_\_\_\_

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Three: \_\_\_\_\_

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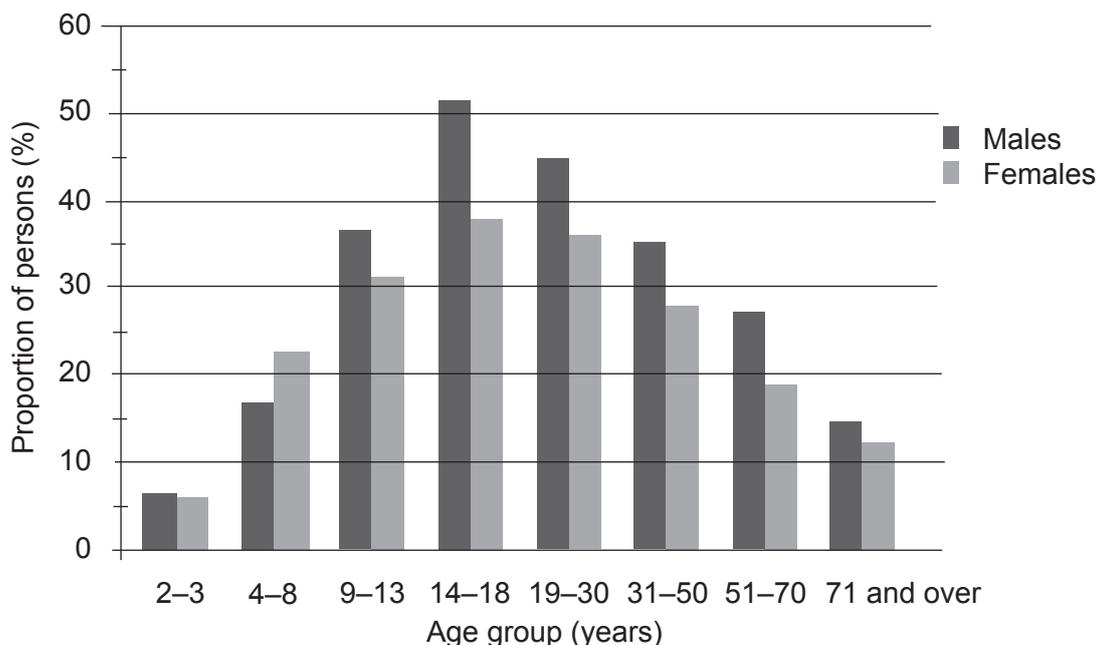
Question 17

(10 marks)

Health professionals are concerned about the consumption levels of foods containing added sugar. Some lobby groups want the government to follow the recommendation of the World Health Organisation and introduce a tax on sugary drinks. In countries where a tax has been introduced consumption of these beverages has reduced significantly. Research is currently being undertaken to determine the health benefits that result from this action.

Examine the data shown in the graph below.

Persons aged 2 years and over – Soft drink consumption, 2011–2012



- (a) Identify **two** trends related to the consumption of soft drink products. Propose **one** cause for each trend. (4 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) Explain **three** impacts on health associated with excessive sugar consumption. (6 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Question 18

(6 marks)

Knowledge of food components is essential to produce high quality products. Understanding properties of food ingredients and the way they react during preparation and processing is essential in producing successful products.

Read the recipe below.

### Master Pizza Dough

Ingredients	Method
<p><i>Base</i></p> <p>5 g butter            170 ml warm water            1½ sachets dry yeast            20 g sugar            300 g bread flour            2 g salt            20 g oil            10 ml milk</p> <p><i>Topping</i></p> <p>40 g tomato paste            80 g grated cheese            10 g fresh basil leaves</p>	<ol style="list-style-type: none"> <li>1. Preheat oven to 200 °C.</li> <li>2. Grease two pizza trays.</li> <li>3. In a small bowl place warm water, yeast and sugar. Mix well with a fork.</li> <li>4. Place in a warm place until frothy.</li> <li>5. In a large bowl sift flour and salt. Make a well in the flour.</li> <li>6. Add yeast mixture and oil. Mix well with hands, adding a little more water if required.</li> <li>7. Knead dough for 10 minutes.</li> <li>8. Place dough in large oiled bowl, cover with plastic wrap.</li> <li>9. Prove in warm place until dough doubles in size.</li> <li>10. Knead for 3 minutes or until smooth on lightly-floured bench.</li> <li>11. Divide dough in half and roll out each half into 30 cm rounds.</li> <li>12. Place on pizza trays.</li> <li>13. Cover and prove until doubled in size.</li> <li>14. Spread pizza bases with tomato paste.</li> <li>15. Top with grated cheese.</li> <li>16. Brush pizza edges with milk.</li> <li>17. Bake 20 minutes or until bases are browned and crisp.</li> <li>18. Serve sprinkled with basil leaves.</li> </ol>

Complete the table below.

Describe the purpose of **each** of the natural food components in the Master Pizza Dough.

Natural food component	Purpose
Gluten (bread flour)	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Sugar	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Oil	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

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## Question 19

(8 marks)

Fish is a staple food in many cultures. Australians are encouraged to increase their consumption of fish. It is highly perishable, has a delicate flesh and performs differently according to the food processing technique applied.

Identify **two** food processing techniques that can be used to control the performance of fish. Explain how and why each technique controls the performance of fish. Provide **one** example of a food product made using each technique.

Food processing technique one: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Food product: \_\_\_\_\_

Food processing technique two: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Food product: \_\_\_\_\_

**Question 20****(8 marks)**

The range of functional foods on the market has changed due to public concern about the relationship between diet and health. By being selective in food choices, a consumer can purchase functional foods that will provide specific health benefits.

Complete the table below.

Provide **two** health benefits of consuming each of the functional food products listed.

<b>Functional food products</b>	<b>Health benefits</b>
Yoghurt	One: _____ _____
	Two: _____ _____
Margarine with plant sterols	One: _____ _____
	Two: _____ _____
Bread with Omega 3	One: _____ _____
	Two: _____ _____
Milk with calcium enrichment	One: _____ _____
	Two: _____ _____

**See next page**

Question 21

(11 marks)

Some forms of biotechnology have been used for many years to process food. As understandings of technology and biotechnology increase and are applied to food systems, the range of marketable food products will expand.

- (a) Define the term 'biotechnology' and state why it is used in food systems. (2 marks)

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- (b) Describe **three** ways in which biotechnology is applied in food systems. Provide **one** example of a food product made using each application of biotechnology. (9 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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Three: \_\_\_\_\_

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**Question 22****(12 marks)**

Identify **three** phytochemicals, provide a food source for each and describe a role that each has in promoting health.

One: \_\_\_\_\_

Food source: \_\_\_\_\_

Health promoting role: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

Food source: \_\_\_\_\_

Health promoting role: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

Food source: \_\_\_\_\_

Health promoting role: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Question 23

(10 marks)

The digestive system is responsible for the digestion, absorption and metabolism of nutrients. In the majority of people, the nutrients needed for growth and optimal health are digested efficiently. However, when the efficiency of the digestive system is compromised, individuals may suffer a range of symptoms that require medical or dietary management.

- (a) Identify **two** health conditions due to the inability of the body to absorb, digest or metabolise nutrients. Explain the cause of each condition. (6 marks)

Health condition one: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Health condition two: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) Describe a dietary approach that can be used to manage **two** health conditions caused by the inability of the body to absorb, digest or metabolise nutrients. (4 marks)

Health condition one: \_\_\_\_\_ (0 marks)

Dietary approach one: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Health condition two: \_\_\_\_\_ (0 marks)

Dietary approach two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**End of Section Two**

**See next page**

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**Section Three: Extended answer****30% (40 Marks)**

This section contains **three (3)** questions. Answer **two (2)** questions only. Write your answers on the pages following Question 26.

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 70 minutes.

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**Question 24****(20 marks)**

The maintenance of a sustainable food supply is an increasing global concern. More than enough food is produced to feed the world's population. However, unequal food distribution has led to global food inequity with the result that many people do not get enough food to maintain good health. Food product developers are influenced by a range of factors that lead them to produce new products that meet consumer demand and increase profits. These products often do little to ease global food inequity.

- (a) Describe **two** consequences of food inequity. (4 marks)
- (b) Describe how the production of biofuels and the demand for meat and dairy foods affect the global food supply. (4 marks)
- (c) Explain the influences each of the following factors has on the development of new food products. Identify a food product developed in response to each factor:
- changing demographics
  - population growth
  - technology
  - convenience.
- (12 marks)

**Question 25****(20 marks)**

Australians are encouraged to eat a variety of foods that make up a nutritionally balanced diet. However, for a range of reasons, some demographic groups have inadequate access to a wide variety of foods. The Australian Government's Department of Health has devised tools to improve food consumption patterns.

- (a) State the purpose of the Recommended Daily Intakes (RDI). Outline **three** ways in which the RDI may be used. (4 marks)
- (b) Identify **one** macronutrient and **one** micronutrient that are required in larger quantities during adolescence. Describe the benefit of each nutrient to adolescent health. (6 marks)
- (c) Provide **two** reasons why people consume micronutrient supplements. Explain **two** advantages and **two** disadvantages of the consumption of micronutrient supplements. (10 marks)

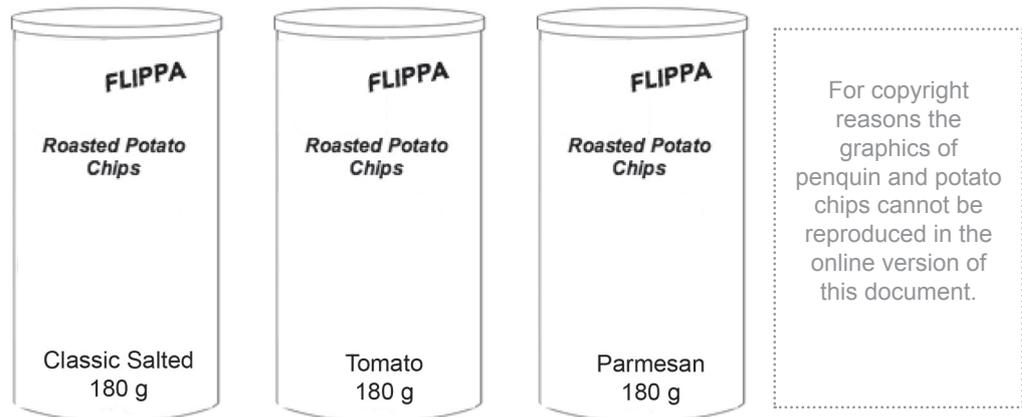
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## Question 26

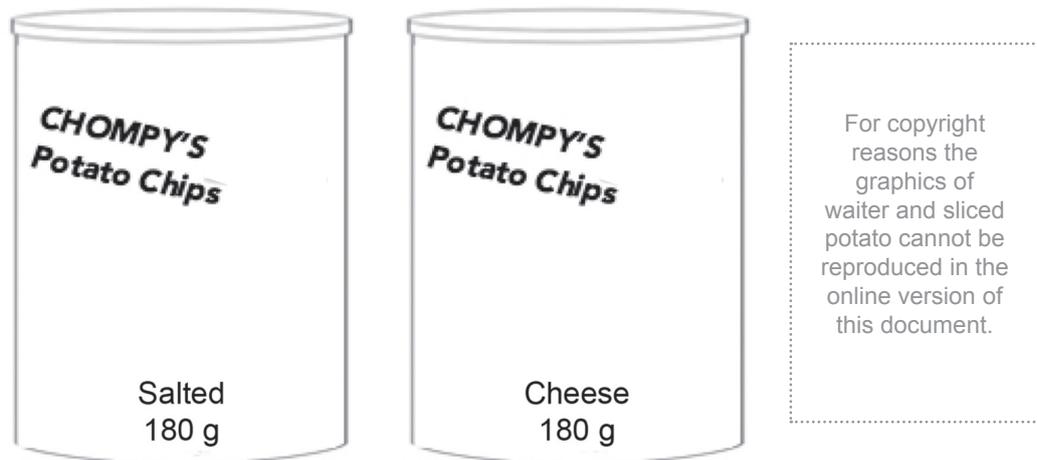
(20 marks)

The variety of food products appearing on supermarket shelves is increasing rapidly. Not all of the products introduced are new. Developing products that address changing market trends and consumer needs requires market research. Food development companies conduct research to collect and assess a wide range of information. This is used to formulate decisions about the development of their own food products and how they will be packaged and marketed.

- (a) Identify the type of product development represented in the illustration below. Provide **three** advantages of this type of food product development. (4 marks)



A competitor has produced a new version of this product to the market. Examine the illustration below.



- (b) Describe **one** implication of the production of the new version of this product on each of the following:
- the consumer
  - the original manufacturer
  - the competitor.
- (6 marks)
- (c) Identify **two** current developments in food packaging and explain how each extends the shelf life of food products. (10 marks)

End of questions

























## ACKNOWLEDGEMENTS

- Question 17(a)** Graph from: Australian Bureau of Statistics. (2015). *Australian health survey: Nutrition first results—foods and nutrients, 2011–12* (Soft drinks and flavoured mineral waters). Retrieved May, 2016, from [www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.007~2011-12~Main%20Features~Non-alcoholic%20beverages~701](http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.007~2011-12~Main%20Features~Non-alcoholic%20beverages~701) Used under Creative Commons Attribution 2.5 Australia licence.
- Question 26(a)** Penguin image from: Tsankov, C. (n.d.). *Vector—waiter penguin serving food on a platter* (Image ID : 29494773). Retrieved May, 2016, from [www.123rf.com/photo\\_29494773\\_stock-photo.html](http://www.123rf.com/photo_29494773_stock-photo.html)
- Black and white potato image from: Willierossin. (2010). *Vegetables series: Potatoes* (Image ID: 412795). Retrieved May, 2016, from <http://graphicleftovers.com/graphic/vegetables-series-potatoes-444/>
- Chef image from: Big Ryan [Ryan Burke]. (2008). *Cartoon chef—illustration*. Retrieved May, 2016, from [www.istockphoto.com/vector/cartoon-chef-gm165555677-6373793?esource=AFF\\_IS\\_IR\\_SP\\_FreelImages\\_246195&asid=FreelImage&cid=IS&irgwc=1](http://www.istockphoto.com/vector/cartoon-chef-gm165555677-6373793?esource=AFF_IS_IR_SP_FreelImages_246195&asid=FreelImage&cid=IS&irgwc=1)
- Colour potato image from: Tribalium. (n.d.). *Stock vector illustration: Sliced potatoes (cut potatoes)*. Retrieved May, 2016, from [www.shutterstock.com/en/pic.mhtml?utm\\_medium=Affiliate&tpl=38919-111120&utm\\_source=38919&id=321546023&irgwc=1&utm\\_campaign=Eezy%20Inc](http://www.shutterstock.com/en/pic.mhtml?utm_medium=Affiliate&tpl=38919-111120&utm_source=38919&id=321546023&irgwc=1&utm_campaign=Eezy%20Inc)

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