Examiners' Report
Lead Examiner Feedback

January 2021

Pearson BTEC Nationals
In Sport and Exercise Science (31824H)
Unit 13: Nitrition for Sport and Exercise Performace

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Introduction

The question paper followed the same format in relation to the questions, client nutritional programme and client details. As the paper had no prerelease materials and research notes were not permitted in the summative assessment, a nutritional principles booklet was provided. This booklet provided information on the food group for some foods in the nutritional programme that learners may not be familiar with. In addition, the kcals for 1 g of each macronutrient were provided, the Harris Benedict equation for BMR And activity factor levels. Lastly, the BMI calculation was provided. This was to support learners so that they did not have to recall specific information to support them with mathematical related interpretations of the nutritional programme and client details. This also allows for foods included in the nutritional programme to have variety over each series without disadvantaging learners that are not familiar with all of the foods in the programme.

Most learners were able to provide detailed interpretations of the nutritional programme and compare grammes of food consumed, many now were able to work out the percentage of calorie intake for each macronutrient which provides a more accurate analysis of nutritional intake. Very few learners now relied on quantities related to the eat well plate which does not provide sufficient evidence for a detailed interpretation of nutritional intake.
There was a wide spread of marks, learners were able to achieve marks across all grade bands with some learners achieving full marks in this series.
The scripts showed that learners could organise their time to complete the initial analysis of the nutritional programme and carry out further related calculations and then go on to answer each question

Individual Questions

Tasks

In this activity learners had to interpret the nutritional programme for Ellie in relation to her health and well being.

Good responses provided nutritional analysis of the percentage of macro nutrients consumed on a daily basis and compare these to recommended amounts.

The table below shows the type of analysis learners could have carried out to inform their analysis of the nutritional intake.

Day	Total Cals	CHO %	CHO g	Fat %	Fat g	Protein %	Protein g	Activity
Monday	1406	34%	120	45%	70	21%	74	
Tuesday	1428	35%	125	45%	72	20%	70	
Wednesday	1566	38%	150	43%	74	19%	75	
Thursday	1610	41%	165	39%	70	20%	80	
Friday	1356	32%	110	45%	68	22%	76	
Saturday	1409	33%	115	44%	69	23%	82	
Sunday	1439	35%	125	44%	71	21%	75	

This analysis clearly shows that carbohydrate intake is too low, fat intake is too high and protein varies across the week, occasionally over the RDA.

In most learners responses, there were some links to health and wellbeing which is the focus for the first question. Where learners did relate this to health and wellbeing it was usually related to eating excess fat and a link to Coronary heart disease.

Some learners did note that the client had high levels of caffeine intake from the quantity of diet cola consumed on a daily basis, but relatively few were able to relate these concerns to health and wellbeing. Many learners however referred to high levels of sugar or in fact 'fat' in the cola which was incorrect as

the nutritional programme indicated that the drink was of the 'diet' variety so did not contain high levels of sugar. It is

Very few were able to comment on the limited fruit and vegetable intake in relation to reduced vitamin intake and links to potential deficiencies and also reduced fiber intake and the links to health and wellbeing such as reduce the potential for suffering from constipation or the long term impact of helping to prevent bowel cancer.

The other key aspect of the diet was the low calorie intake related to BMR and BMR adjusted for activity levels.

Many learners did work out the BMI but not all then went on to provide the category that this would be placed in.

Basal metabolic rate could then be worked out using the Harris Benedict equation to work out the calorie intake for the person based on their specific details:

BMR = 655.1 + (9.563 x weight in kg) + (1.85 x height in cm) – (4.676 x age in years)
= 655.1 + (9.563 x 58) + (1.85 x 170) – (4.676 x 18)
= 655.1 + 554.66 + 314.5 – 84.2
= 1440

5 activity sessions a week

X 1.55 Moderately active 3-5 sessions per week

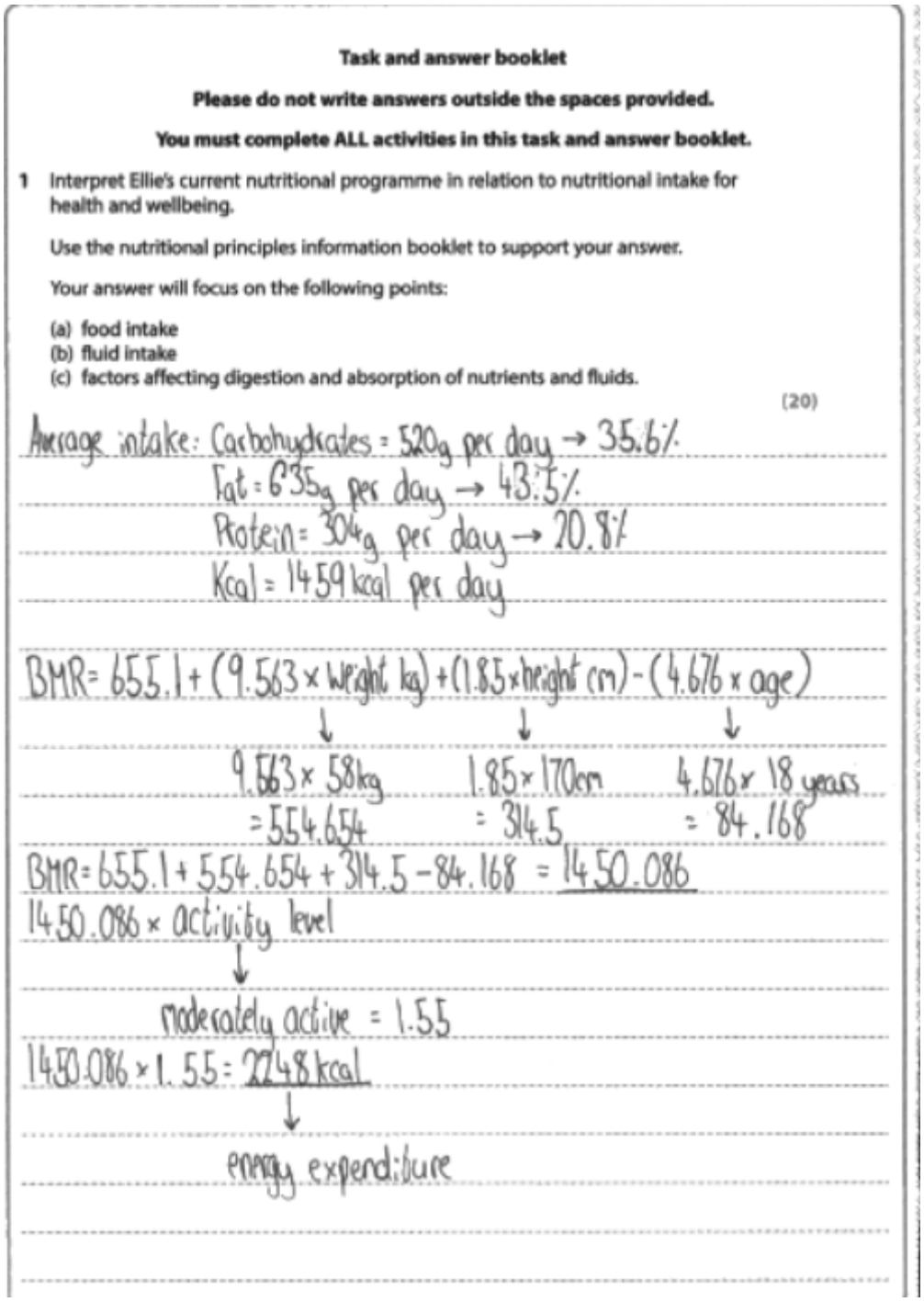
1440 x 1.55 = 2232
Responses that were rounded up or down were credited.

From this information, learners should have been able to interpret that energy intake is below BMR plus activity levels so the person would start to lose body weight if they continued to eat and exercise as per the nutritional program and also not have sufficient energy to be able to take part in daily activities as well as all the physical activity.

Fluid intake was referred to by many learners in relation to recommended daily amounts and types of fluids consumed, many learners stated that the client was drinking enough water and could relate this to the RDA for water intake.

Lastly, the factors affecting digestion and absorption of nutrients and fluids should have been commented on in relation to the nutritional programme for the individual with some reference to the timings of food intake and activity levels and timings of the individual.

This response was awarded 19 marks out of 20



Task and answer booklet

Please do not write answers outside the spaces provided.

You must complete ALL activities in this task and answer booklet.

1 Interpret Ellie's current nutritional programme in relation to nutritional intake for health and wellbeing.

Use the nutritional principles information booklet to support your answer.

Your answer will focus on the following points:

(a) food intake
(b) fluid intake
(c) factors affecting digestion and absorption of nutrients and fluids.

(20)

Average intake: Carbohydrates = 520g per day → 35.6%
Fat = 635g per day → 43.5%
Protein = 304g per day → 20.8%
Kcal = 1459 kcal per day

BMR = 655.1 + (9.563 × weight kg) + (1.85 × height cm) − (4.676 × age)

9.563 × 58kg = 554.654
1.85 × 170cm = 314.5
4.676 × 18 years = 84.168

BMR = 655.1 + 554.654 + 314.5 − 84.168 = 1450.086

1450.086 × activity level

moderately active = 1.55

1450.086 × 1.55 = 2248 kcal

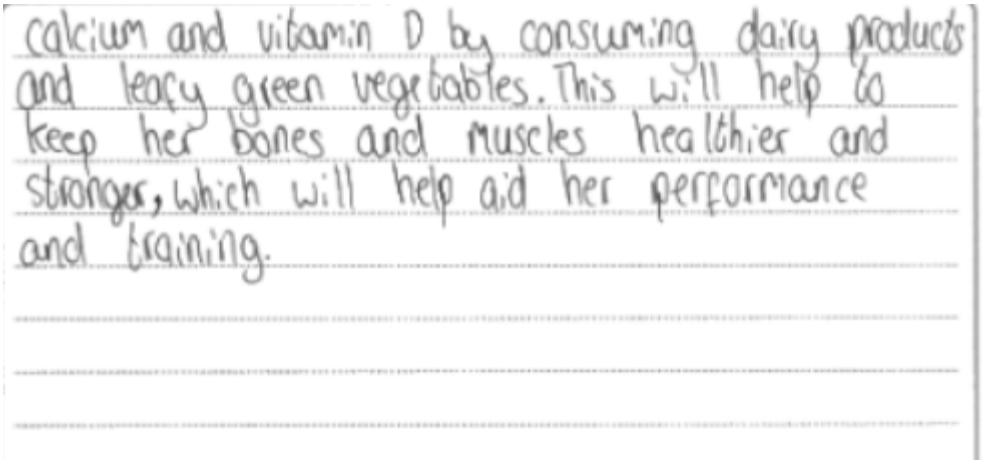
energy expenditure

BMI = Weight kg / Height m^2 = 58kg / 1.70^2 = 20.07 → Healthy

Firstly, Ellie's current nutritional programme has resulted in a negative energy balance meaning that she is using more calories than what she is consuming. This negative energy balance will result in a gradual decrease in her weight overtime and although her BMI currently states she is in the healthy range, over time this will change due to her negative energy balance. Secondly, when comparing Ellie's macronutrient intake to the recommended intake for health and wellbeing, it shows that she is way off what is suggested. It is recommended that you should have 50% carbohydrates, 30%-35% fat's and 20% proteins or 0.75g per 1kg of body weight. However, with Ellie's current nutritional programme she is currently consuming 35.6% of carbohydrates (nearly 15% to low), 43.5% of fats (nearly 15% to high) and 20.8% of protein which is what she should be having in relation to nutritional intake for health and wellbeing. Furthermore, Ellie's excessive consumption of fat is worse due to the type of fat she is consuming mainly being saturated. This greatly increases her cholesterol level and also increases the risk of cardiovascular/heart disease.

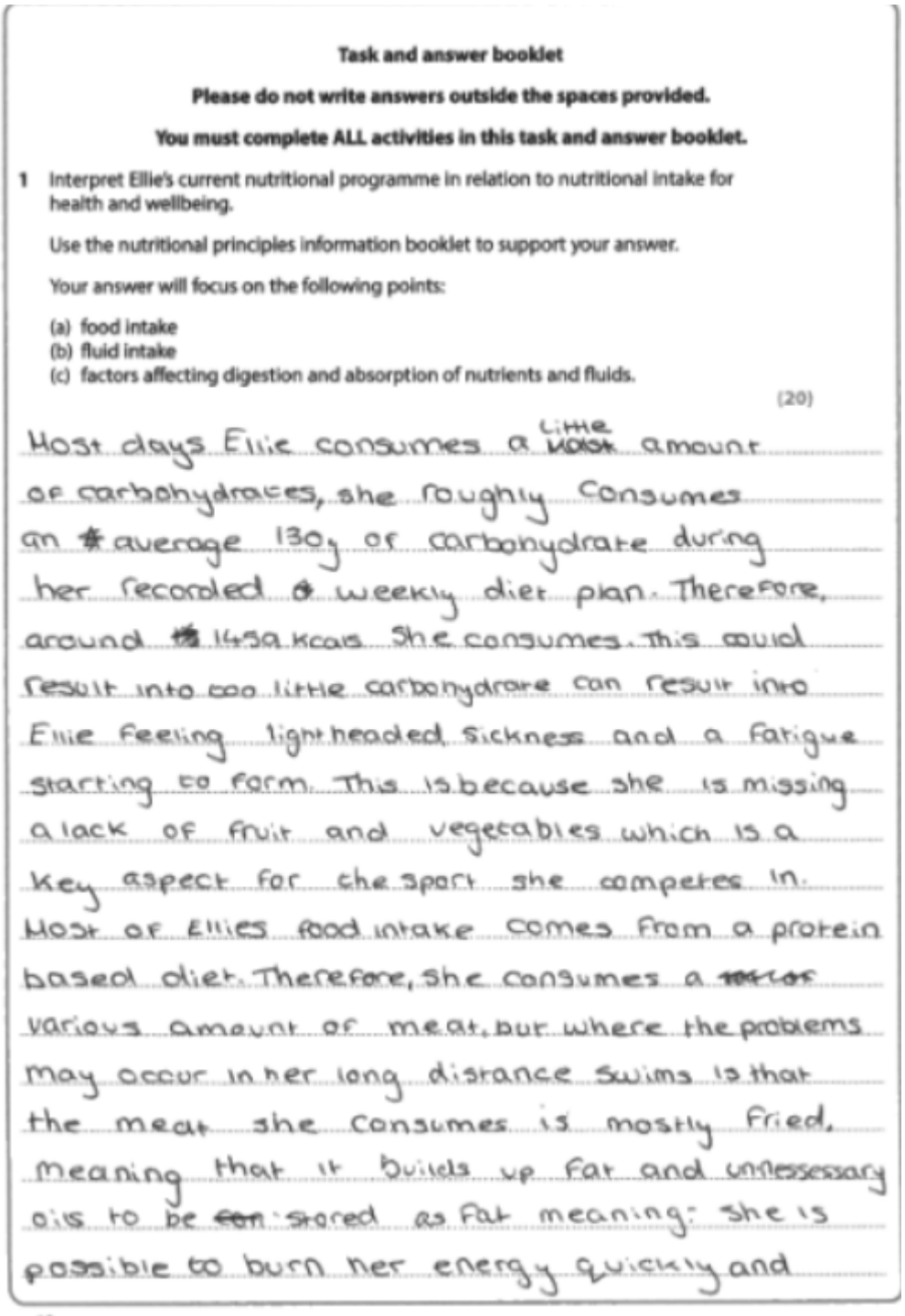
When looking at fluid intake, you should aim to drink atleast 2 litres of water every day and more if you are taking part in sports or physical activity. When looking at Ellie's current nutritional programme it is clear to see that she has a good fluid intake and has exactly 2 litres of water each day. However, Ellie also consumes drinks with high levels of sugar, having 1 glass of orange juice and 2 cans of diet coke every day. This results in a high level of sugar every day which can lead to a greater risk of type 2 diabetes unless less sugar is consummed.

Ellie's current nutritional programme is lacking fibre. This is a problem for Ellie as not enough fibre can greatly damage the digestion of food and liquid which increases the possibility of bowel cancer if she continues. Furthermore, it is important for Ellie to consume the right amount of vitamin B as this helps to turn the food she is consuming into energy. This is important for Ellie as due to her sporting activity she needs the maximum amount of energy possible as it is long distance. Also, it is crucial that Ellie is consuming the correct amount of


calcium and vitamin D by consuming dairy products and leafy green vegetables. This will help to keep her bones and muscles healthier and stronger, which will help aid her performance and training.

The learner provided some information at the start of the response which was credit worthy such as BMR and BMR with activity levels.
Percentage intake of each macronutrient was also worked out as an average intake.
This was then discussed in more detail providing information on what the intake was compared to RDA to provide an overview as to whether the client was consuming appropriate macronutrient intake. Where the intake was not in line with RDA, links to health and wellbeing such as health concerns linked to excess saturated fat consumption.
Fluid intake was assessed and compared to RDA, orange juice intake was linked to high levels of sugar, however, the diet cola was incorrectly linked to having high levels of sugar when the drink does not contain sugar but artificial sweeteners instead.
Minimal intake of fibre was covered and the potential negative effects on health and wellbeing. Where the learener discusses potential concerns with the diet and exercise performance, no credit is given here as the question is asking about nutritional intake for health and wellbeing.

This response was awarded 5 marks



Task and answer booklet

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You must complete ALL activities in this task and answer booklet.

1 Interpret Ellie's current nutritional programme in relation to nutritional intake for health and wellbeing.

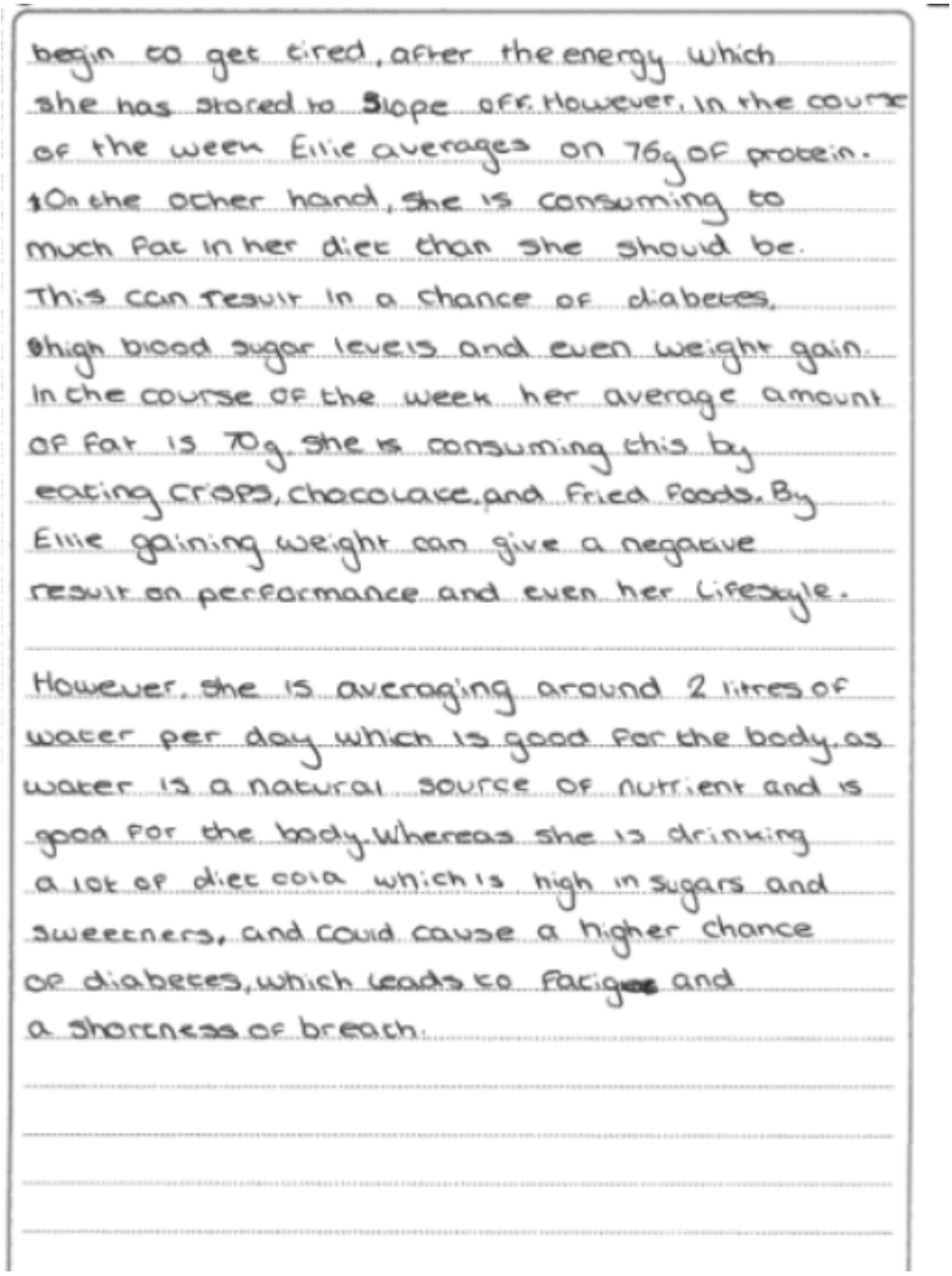
Use the nutritional principles information booklet to support your answer.

Your answer will focus on the following points:

(a) food intake
(b) fluid intake
(c) factors affecting digestion and absorption of nutrients and fluids.

(20)

Most days Ellie consumes a ~~most~~ little amount of carbohydrates, she roughly consumes an ~~*~~ average 130g of carbohydrate during her recorded ~~0~~ weekly diet plan. Therefore, around ~~1~~ 1459 kcals she consumes. This could result into too little carbohydrate can result into Ellie feeling lightheaded, sickness and a fatigue starting to form. This is because she is missing a lack of fruit and vegetables which is a key aspect for the sport she competes in. Most of Ellies food intake comes from a protein based diet. Therefore, she consumes a ~~factor~~ various amount of meat, but where the problems may occur in her long distance swims is that the meat she consumes is mostly fried, meaning that it builds up fat and unnessesary oils to be ~~een~~ stored as fat meaning: she is possible to burn her energy quickly and



begin to get tired, after the energy which she has stored to slope off. However, in the course of the week Ellie averages on 76g of protein. On the other hand, she is consuming to much fat in her diet than she should be. This can result in a chance of diabetes, high blood sugar levels and even weight gain. In the course of the week her average amount of fat is 70g. She is consuming this by eating crisps, chocolate, and fried foods. By Ellie gaining weight can give a negative result on performance and even her lifestyle.

However, she is averaging around 2 litres of water per day which is good for the body as water is a natural source of nutrient and is good for the body. Whereas she is drinking a lot of diet cola which is high in sugars and sweeteners, and could cause a higher chance of diabetes, which leads to fatigue and a shortness of breath.

The response starts to review carbohydrate intake but does not provide any RDA to confirm that the intake is too low. Links to low levels of carbohydrate intake and the effect on health and wellbeing is provided.
Some knowledge of high fat intake and negative affect on health and wellbeing is shown, however high levels of fat intake are linked to diabetes which is inaccurate as high levels of simple carbohydrate intake provoke the insulin response. The learner has stated the fluid intake but not made reference to the RDA so has not justified why it is 'good for the body'.
The learner has confused diet cola with having high levels of sugar which is incorrect, links to caffeine as a diuretic or potential impact on ability to sleep would be credit worthy links to the effect on health and wellbeing.

Activity 2

Nutritional strategies are provided in the unit content in learning Aim D. It is therefore expected that learners will select appropriate strategies for the client based on their event and their current nutritional intake.

Many learners did not perform as well in this activity as they did in activity one. This is due to the fact greater application is required for this activity in relation to addressing the concerns identified in activity one, where, how and why this diet can be modified and how this will be beneficial to improve sporting performance for the clients specific sport.

For this activity, leaners needed to focus on three main strategies:

- Carbohydrate loading
- Increase carbohydrate intake
- Increase calorie intake

The client was under calories and carbohydrate in their usual diet compared to RDA as well as requiring higher levels due to their sport.
Increases in carbohydrate content up to more than 50% RDA, g per kg of body weight for an endurance athlete were credited.

In addition, fat percentage intake was high in relation to macronutrient intake, so strategies to decrease fat intake would also gain credit.

Caffeine intake could be discussed in either relation to decreasing intake as this could have a dehydration effect and or maintain/increase caffeine intake to mobilize fatty acids as an energy source could have gained credit.
Supplements could have also been discussed to support these nutritional strategies such as

- Energy gels/glucose tablets
- beetroot juice
- Vitamin/mineral supplements – due to limited fruit and vegetable intake, low iron intake affect on performance, B vitamins for energy release from foods, Vitamins (A, C, E and zinc and selenium) to reduce damage caused by free radicals from taking in more oxygen when taking part in aerobic exercise.

Any justification of the modifications related to health and wellbeing were not credit worthy unless there were additional links to the effect on sporting performance.
Good responses provided appropriate modifications which were supported with reasoning for each modification related to the clients sporting event.

This response gained 15 out of 20 marks.

Caffeine, beetroot, Energy juice, Gels Endurance Maintain weight

2 Modify the nutritional programme, based on nutritional strategies, in relation to Ellie's sports event.

Use the nutritional principles information booklet to support your answer.

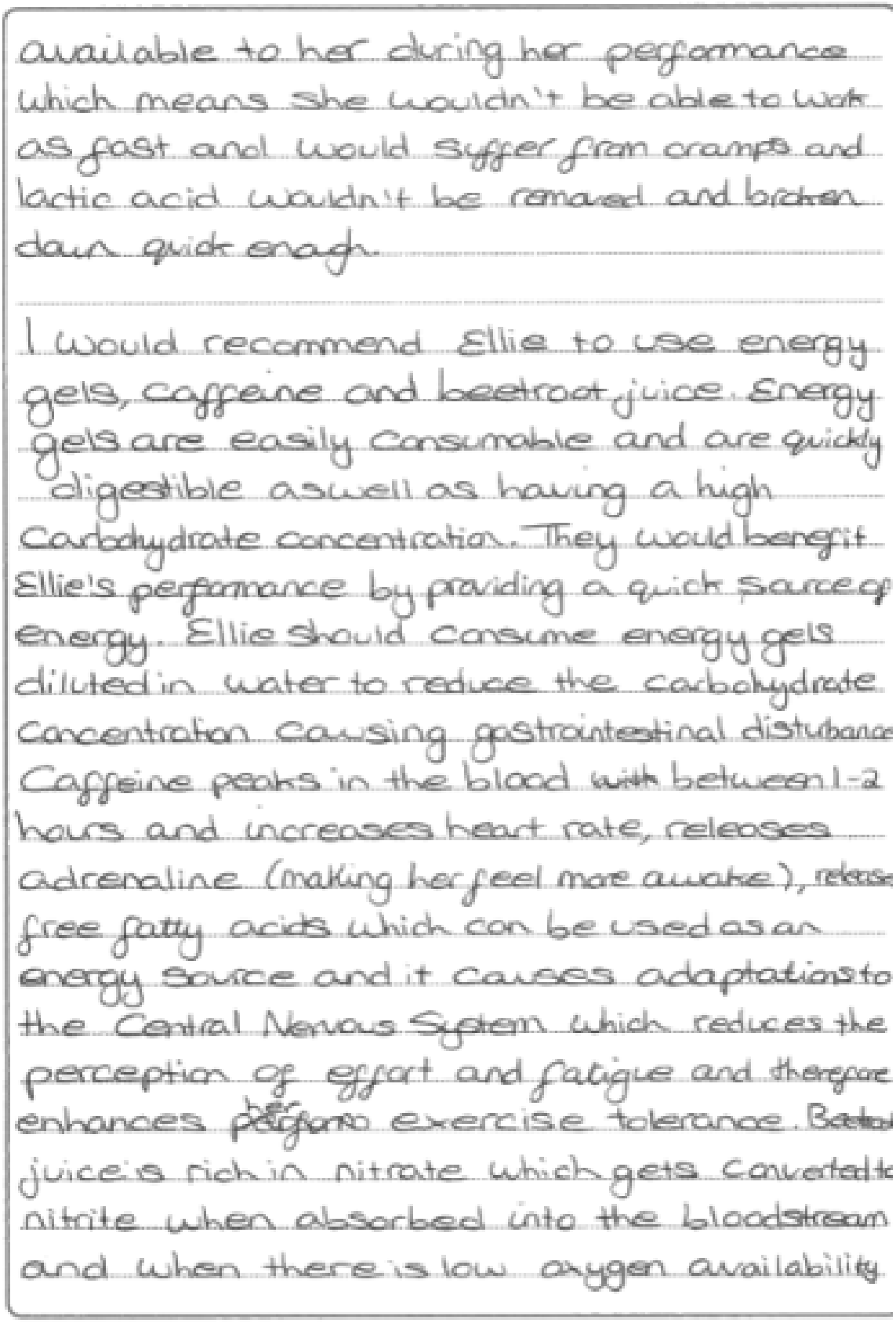
Your answer will focus on the following points:

(a) modifications that are relevant to the sporting event
(b) justifying the modifications
(c) the impact of factors affecting digestion and absorption of nutrients and fluids.

[20]

Ellie's sport is long distance swimming which is an endurance event. Ellie's sport requires her to maintain her weight. To do this Ellie needs to increase her daily Calorie intake. Currently Ellie is consuming an average of 1499.14 calories a day where as she needs to be consuming 2232.13 calories a day. Based on Ellie's sport she should be consuming between 348g - 406 grams of Carbohydrates each day. Ellie isn't consuming enough carbohydrates which will cause her to have low energy due to be insufficient glycogen stores. This will decrease her performance as she will lack energy to get her through her 90 minute event. Ellie will also suffer from gluconeogenesis which is the break down of muscle for energy. This will decrease ge her performance as she will have less muscular endurance so will struggle to maintain her performance for the 90 minutes. Based on Ellie's sport she

Should be consuming between 69.6 - 81.2 grams of protein each day. Ellie is having enough protein each day which will benefit her performance because she will be able to repair and grow muscles which will help her to maintain performance for 90 minutes. Ellie eats foods which have been roasted, fried and boiled. Roasting and frying increases the fat content of foods where as boiling leaches vitamins B and C out of foods. Instead Ellie should use methods such as microwaving, stir-frying and steaming to maintain the nutrient content of her food. Ellie is getting enough fluid each day which will benefit her performance as she will remain hydrated. ~~which~~ This will benefit her performance as fluid is needed for muscle contraction, transporting nutrients and oxygen to the muscles and for removing carbon dioxide. Ellie should ensure that she doesn't eat big meals before her event as this will cause postprandial hyperemia. This is where the blood flow is redirected from the working muscles to the digestive system to support the breakdown of food. This would decrease Ellies performance as it decreases the amount of oxygen and nutrients



available to her during her performance which means she wouldn't be able to work as fast and would syffer from cramps and lactic acid wouldn't be removed and broken down quick enough.

I would recommend Ellie to use energy gels, caffeine and beetroot juice. Energy gels are easily consumable and are quickly digestible aswell as having a high Carbohydrate concentration. They would benefit Ellie's performance by providing a quick source of energy. Ellie should consume energy gels diluted in water to reduce the carbohydrate concentration causing gastrointestinal disturbance Caffeine peaks in the blood with between 1-2 hours and increases heart rate, releases adrenaline (making her feel more awake), releases free fatty acids which can be used as an energy source and it causes adaptations to the Central Nervous System which reduces the perception of effort and fatigue and therefore enhances exercise tolerance. Beetroot juice is rich in nitrate which gets converted to nitrite when absorbed into the bloodstream and when there is low oxygen availability

The learner was able to correctly identify an increase in calorie intake and increase in carbohydrate intake was required with justification for each. Links to the

sporting event were also included with reference to insufficient energy from having low glycogen stores. Protein intake is correctly identified as being appropriate with links to the use of protein for muscle repair required for sports performance.
Fluid intake has been covered but the links to sports performance are quite vague and do not gain credit.
A discussion on digestion and absorption of foods related to when foods should be consumed and impact on blood flow gains credit.
The supplements suggested are all appropriate for the client in terms of diet modification and improvements in sports performance.

This response gained 7 out of 20 marks

2 Modify the nutritional programme, based on nutritional strategies, in relation to Ellie's sports event.

Use the nutritional principles information booklet to support your answer.

Your answer will focus on the following points:

(a) modifications that are relevant to the sporting event
(b) justifying the modifications
(c) the impact of factors affecting digestion and absorption of nutrients and fluids.

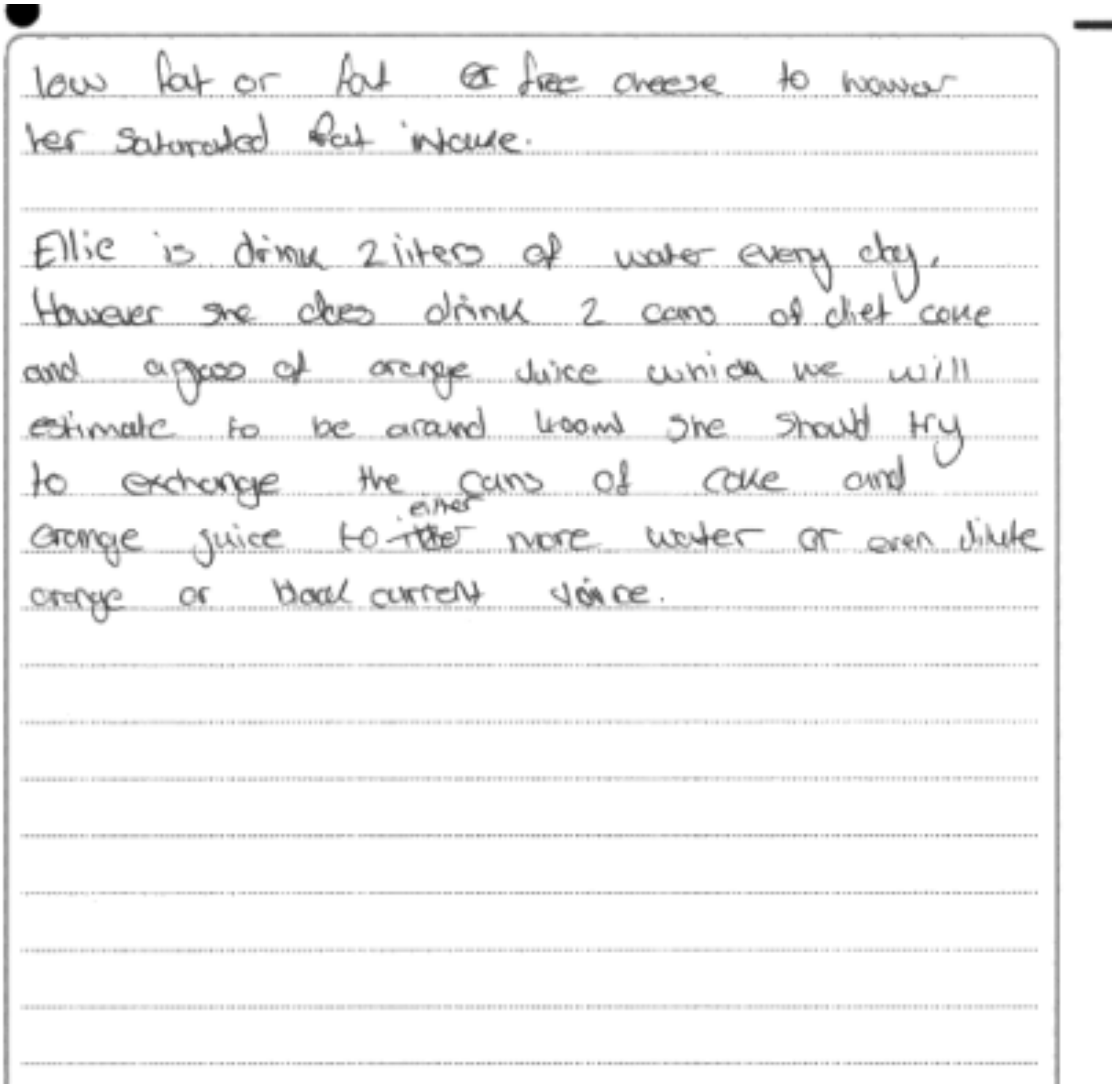
(20)

Ellies ~~nutrition~~ nurcitional plan is very low in carbo - hydrates she should look to increase her intake of carbo to also increse her @ Calorie intake. Complex carbs such as whole grain would be perfect to increase calories and ~~Calorie intake~~ carbohydrate intake. things such as porridge for breakfast and eating pasta instead of chips and even fruit or even nuts for added protein instead of simple carbs. suggested to have around 2kg of carbs aday and she could increse her current intake by have extra veggie and fruit.

1

Ellies intake of protein is spot on currently but should try to increase by 20g because she ~~eve~~ needs to increase her overall Calorie intake.

Reducing saturated fat would also be a recommendation for Ellie as cheese and cream should be changed to


low fat or fat @ free cheese to lower her saturated fat intake.

Ellie is drink 2 litres of water every day. However she does drink 2 cans of diet coke and a glass of orange juice which we will estimate to be around 400ml she should try to exchange the cans of coke and orange juice to either more water or even dilute orange or blackcurrent juice.

The learner has identified that the diet is low in carbohydrates and intake needs to be increased, an increase I calorie intake has also been correctly identified with some suggested methods of doing this in terms of changing breakfast foods and eating snacks.
Reducing fat intake has also been recommended with a suggested method of how to do this.
Water intake has been discussed, however the modification provided shows no reasoning as to how it would be beneficial to the client. In addition, no links to how these modifications of the diet will affect the clients sporting performance which is the main focus of the question.

Activity 3

The phase of the event is 'pre event'. It is also stated in the question that this is the time frame on the day before the start of the race.

This means no credit could be given for responses that discussed carbohydrate loading as this takes place a number of days prior to the event.

The learners response should focus on the following key areas:

- Ensure glycogen stores are well stocked
- Ensure blood glucose levels are stable
- Ensure body is well hydrated

Examples of the types of foods, fluids and supplements include:

- Isotonic drinks – rehydration faster, glucose content for energy
- Hypertonic drink – high carbohydrate content
- Energy gels/tablets –drink water with every energy gel consumed to help digestion and maintain hydration/quick and easy to digest
- Foods with high GI eg jelly babies, jaffa cakes, haribo – reduce risk of nausea and stomach cramps as easily digested
- Caffeinated products – moblise fatty acids, spare glycogen stores, 3-15mg per kg body weight has ergogenic effect
- Beetroot juice – 300- 500ml, contains nitrous oxide which vasodilates blood vessels in skeletal muscles - increase delivery of oxygen and nutrients and removal of waste products
- B vitamins before to support energy release

Links to digestion and absopriton could then be covered in relation to timings of food and fluid intake, types of food or fluid and quantities to be consumed:

3-4 hours before the event

- high CHO content meal prior to the event
- 150-300g (3-4 g per kg body weight)
- Low GI (sustained source of energy)

60-30 mins prior to the event

- High GI CHO snack 60-30 mins prior to competition
- 70g CHO

Fluid intake
300-500 ml 10-15 mins before exercise

This response gained 9 marks out of 10

3 Recommend nutritional guidance for Ellie based on her phase of event.

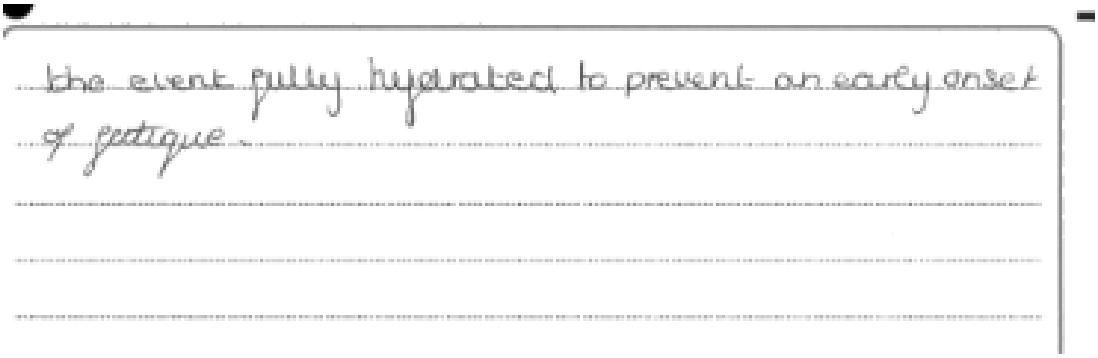
The phase of event is 'pre-event' – the 'pre-event' phase is in the time frame on the day before the start of the race.

Your answer will focus on the following points:

(a) links to the phase of event
(b) impact of factors affecting digestion and absorption of nutrients and fluids.

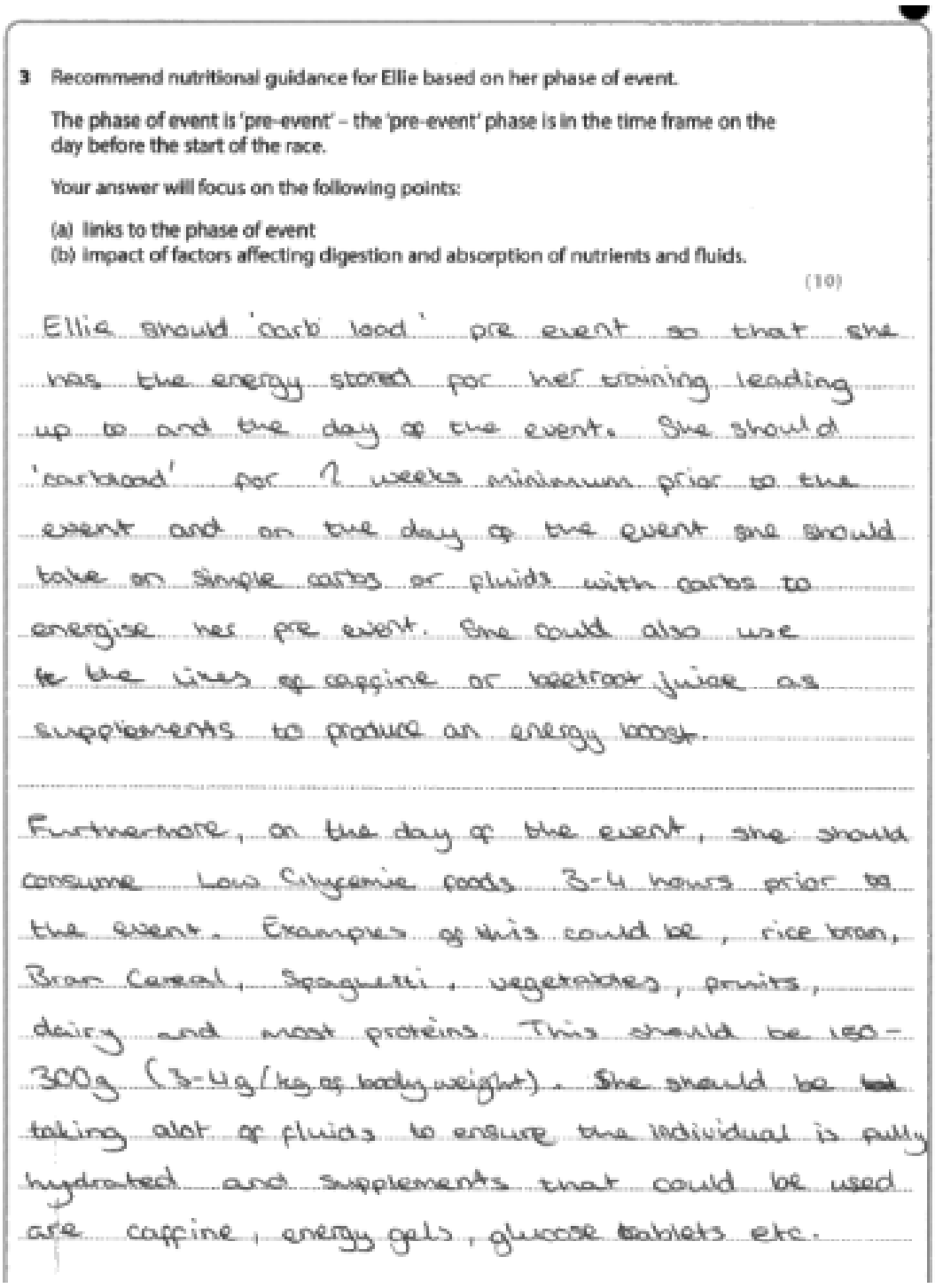
(10)

Ellie wants to keep a diet full of foods she is familiar with. A meal of solid foods should be consumed 2 hours before the event to allow for digestion of the foods and should be made up of rich in carbohydrate, low in fat and fibre and moderate amount of protein. A rich CHO diet will allow her to elevate her glycogen and liver stores and maximise them as much as possible before swimming. Maximised glycogen stores will provide the fuel needed for the aerobic energy system providing energy for Ellie to swim.
Liquids must be taken 30-60 mins before an event unless supplements like beetroot juice which should be taken 2-3hrs prior event. Ellie can drink beetroot juice the morning of the race therefore allowing time for digestion and absorption and giving her the advantage of improved blood flow. In addition, beetroot juice makes Cardio vascular System more efficient as it can improve lung volume which is highly beneficial for Ellie as a swimmer. Prior the event, Ellie should consume 300-500ml of water 10-15 minutes before to ensure she starts



The learner has provided a clear justification for the reasons why carbohydrates are important for the event and the time frame in which they should be consumed.
Fluid intake has also been covered with time frame and quantities that should be consumed. Beetroot juice has been named as a supplement with timings for intake and the link to improving blood flow.

This response gained 5 marks out of 10.



3 Recommend nutritional guidance for Ellie based on her phase of event.

The phase of event is 'pre-event' – the 'pre-event' phase is in the time frame on the day before the start of the race.

Your answer will focus on the following points:

(a) links to the phase of event
(b) impact of factors affecting digestion and absorption of nutrients and fluids.

(10)

Ellie should 'carb load' pre event so that she has the energy stored for her training leading up to and the day of the event. She should 'carbload' for 2 weeks minimum prior to the event and on the day of the event she should take on simple carbs or fluids with carbs to energise her pre event. She could also use be the likes of caffeine or beetroot juice as supplements to produce an energy boost.

Furthermore, on the day of the event, she should consume low glycemic foods 3-4 hours prior to the event. Examples of this could be, rice bran, Bran cereal, Spaghetti, vegetables, fruits, dairy and meat proteins. This should be 150-300g (3-4g/kg of body weight). She should be ~~be~~ taking alot of fluids to ensure the individual is fully hydrated and supplements that could be used are caffine, energy gels, glucose tablets etc.

This response starts by discussing carbohydrate loading which is not credit worthy due to the time frame indicated in the pre event.
The content on the 'day of the event' however gains credit with reference to types of carbohydrate food, timings of intake and quantities. Fluid intake has been referenced and a number of appropriate supplements have been identified.

Summary

Learners are encouraged to:

- Read and analyse the nutritional programme in relation to macro nutrient content. Percentage intake for each macronutrient should be assessed in relation to RDAs.
- Expect to carry out calculations in relation to BMI and BMR of the client and use this information in the activities to justify the interpretation of nutritional programme and modifications.
- When answering questions refer to the nutritional programme and individual as much as possible and make sure that the content referred to is actually in the case study.
- Ensure only the correct phase of the event is discussed in question 3, any other phases that are covered that are not asked about in the question will not gain credit.
- Use the assessment criteria in the mark scheme for each activity to guide them and ensure they cover all the content needed for each activity.