

On average the calories required for an individual per day are as follows:

→ Male – 2500 Kcal
→ Female – 2000 Kcal



Factors Affecting Optimum Weight

- _____
- _____
- _____
- _____

Carbohydrates:

- Stored in the muscles and liver as _____, can be converted into glucose to provide energy _____
- Can be split into two categories

Complex Carbohydrates:

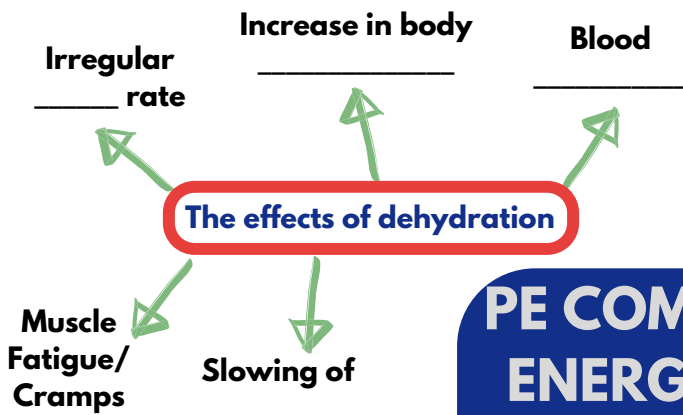
- Provides energy for a long time - good for long distance runners
- Found in _____, rice & brown bread

Simple Carbohydrates:

- Provide energy _____ - good for sprinters
- Sugars - found in _____ form in fruit and refined form in cakes



The effects of dehydration



PE COMPONENT 2 - ENERGY USE, DIET & NUTRITION

A balanced diet should include:

55 – 60% of Carbohydrates
25-30% of Fat
15-20% Protein
A small amount of Vitamins & Minerals



Water

- Water intake/ hydration must be regular in order to prevent dehydration

Fibre

- Adds bulk to your food and also aids _____
- Found in cereal & nuts

Vitamins & Minerals:

- Maintain efficient working of body & ensure good _____ - good for all performers
- Found in fruits & _____

Fats:

- Release energy _____ and insulation, good for marathon runners
- Found in cheese, nuts & avocado

Protein:

- Important for growing muscle & repairing damaged _____ - good for weightlifters
- Found in _____, eggs & nuts





Name _____

Class _____

Energy Use, Diet, Nutrition and Hydration



Topic	Description from Specification	Pupil comments – How confident do you feel on this topic?
1.3.1	The nutritional requirements and ratio of nutrients for a balanced diet to maintain a healthy lifestyle and optimise specific performances in physical activity and sport	
1.3.2	The role and importance of macronutrients (carbohydrates, proteins and fats) for performers/players in physical activities and sports, carbohydrate loading for endurance athletes, and timing of protein intake for power athletes	
1.3.3	The role and importance of micronutrients (vitamins and minerals), water and fibre for performers/players in physical activities and sports	
1.3.4	The factors affecting optimum weight: sex, height, bone structure and muscle girth	
1.3.5	The variation in optimum weight according to roles in specific physical activities and sports	
1.3.6	The correct energy balance to maintain a healthy weight	
1.3.7	Hydration for physical activity and sport: why it is important, and how correct levels can be maintained during physical activity and sport	

A Balanced Diet:

A balanced diet can vary between individuals depending on their sport and to optimise performance. However a balanced diet should always include:

Carbohydrates

Fats

Proteins

Vitamins

Minerals

Water

Fibre

Next to each of the above, give an example of a food type which falls into this category.

Macronutrients are the foods which are required in large amounts in your diet. These include:

- Carbohydrates

- Fats

- Protein

Carbohydrates are important because they give you energy. There are two types:



Complex Carbohydrates (starch):

These are found in natural foods such as _____

Simple Carbohydrates (sugars):

These are found in their natural form in _____ and _____. They are found in their refined form in _____.

Carbohydrates are stored in the _____ and _____ as glycogen. This can be converted into glucose to provide _____ quickly. Energy produced by _____ will last for longer than energy produced by _____. Examples of sports performers who require lots of carbohydrates are _____.

Fats are important because they provide _____ slowly. They are also important for insulation. Fats are found in foods such as _____.
Examples of sports performers who require lots of fats are _____.

Proteins are important for _____ muscle and _____ damaged tissue. If all carbohydrate and fat resources have been used up, protein can also be used as _____.
Examples of sports performers who require a lot of protein include _____.

Micro-nutrients are the part of your food that you need for normal growth, but only in small amounts. They include:

- Vitamins
- Minerals

Vitamins help the body to function properly. Research the following vitamins in order to fill out the table below:

Vitamin	Foods found in	What it helps with
A		
B1		
C		
D		
E		



Minerals are essential for a healthy body. . Research the following minerals in order to fill out the table below:

Mineral	Foods found in	What it helps with
Calcium		
Iron		
Sodium		
Potassium		
Zinc		



Water and Fibre

Water accounts for approximately half of your body weight. It helps to transport **nutrients, waste and hormones**.

Water is also important for controlling body _____ and helps to replace _____ after sweating during exercise. Athletes must take on water regularly in order to prevent dehydration.

Why do boxers and jockeys sometimes take part in heavy exercise which causes sweating, but then choose not to take on water?

What are the dangers of doing this?

Fibre (also known as roughage) adds bulk to your food and also **aids digestion**.

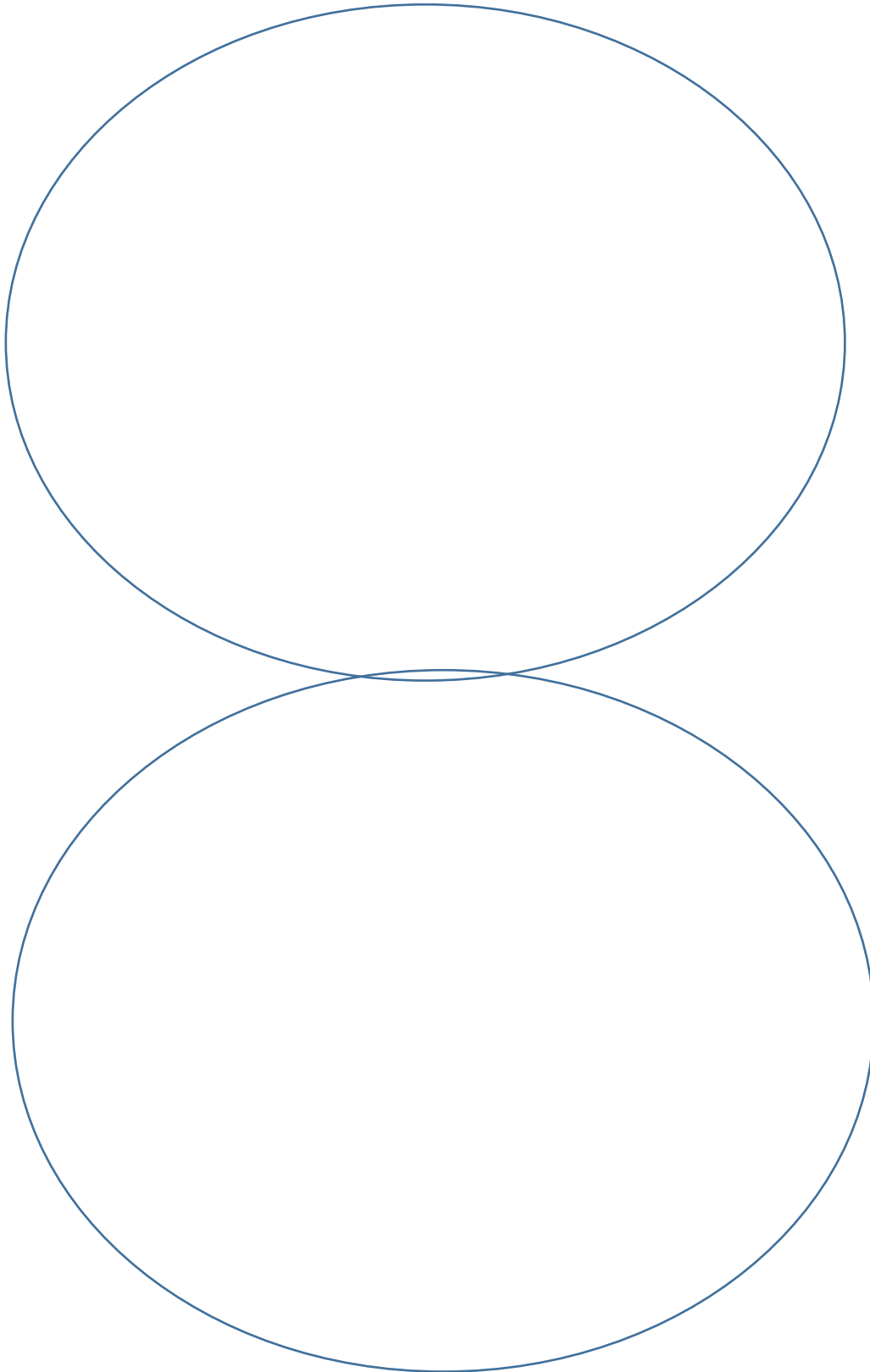
Name 3 types of food that are high in fibre:

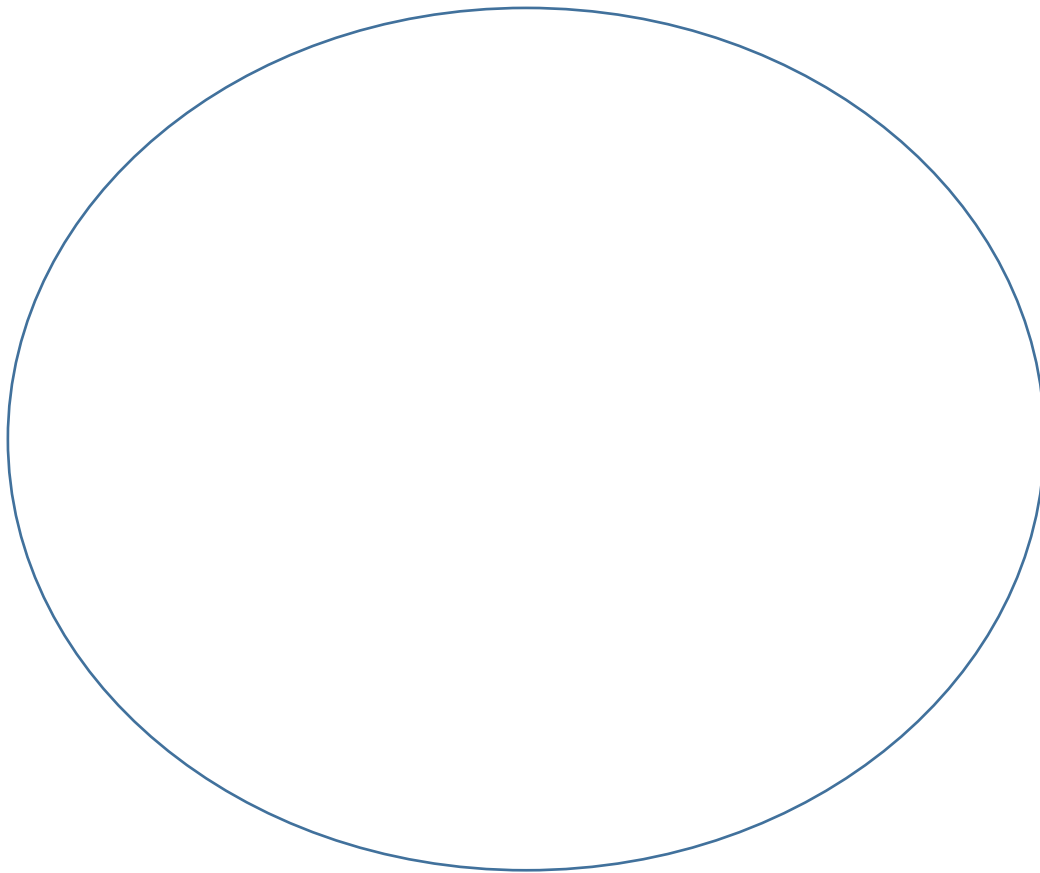
- 1.
- 2.
- 3.



Using the below shapes, create 3 pie charts to show the food types displayed in the following diets:

1. Your diet
2. The diet of a weight lifter
3. The diet of a premier league football player





Carbohydrate Loading & Protein Intake

Use the statements below to fill in the table.

	Carbohydrate-Loading	Protein Intake
Why is it done?		
When is it done?		
Who does it?		

Repair and re-build muscle cells

Marathon Runners

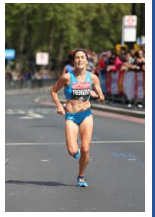
In the days leading up to exercise

Immediately after exercise

Produce extra energy

Weight Lifters

9 Mark Question

This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings present.

Factors affecting optimum weight:

Why is it important for a sports performer to know their optimum weight?

How would the optimum weight differ between a prop forward and a scrum half in rugby?



A **BMI chart**, such as the one below, is one method used to calculate your **optimum weight**. However this doesn't account for the optimum weight required in different sports.

WEIGHT	lbs	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
	kgs	45.5	47.7	50.0	52.3	54.5	56.8	59.1	61.4	63.6	65.9	68.2	70.5	72.7	75.0	77.3	79.5	81.8	84.1	86.4	88.6	90.9	93.2	95.5	97.7
HEIGHT	in/cm	Underweight					Healthy					Overweight					Obese				Extremely Obese				
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'0" -	152.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'1" -	154.9	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40
5'2" -	157.4	18	19	20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39
5'3" -	160.0	17	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38
5'4" -	162.5	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37
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A number of factors affect your optimum body weight. How do the following factors affect your body weight?

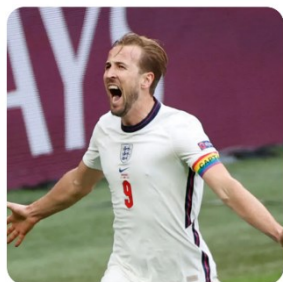
Sex

Height

Bone Structure

Muscle Girth

Harry Kane and N’Golo Kante are both top footballers. Kante weighs 70kg and Kane weighs 86kg. Both could be described to be at their optimum weight. Why does their optimum weight differ?



Use the following table to collate the BMI scores of 7 people in the class. For each person, decide which sport they are most suited to and give reasons for your answers.

Name	BMI Score	BMI Category	Sport/Position suited to	Reasons why

Energy Balance for Maintaining an Optimum Weight

Energy balance is the basis of weight control.

In order to maintain your weight you must take in (through eating) and use up (through exercise) an equal number of calories.

If you take in more calories than you burn off, what will happen?

If you burn off more calories than you take in, what will happen?

Task

Think about the last snack that you ate. Do some research to find out how many calories it contains. Using a piece of cardiovascular equipment in the gym, see how quickly you can burn these calories off.

However we all have our own rate of using up energy, which is known as **metabolic rate**. People with a _____ metabolic rate are able to take on lots of _____ without putting on weight, whereas people with a _____ metabolic rate eat less food but put on _____ very quickly.

Do some research in order to fill in the table below on calorie intake:

Category	Daily Calorie Intake
Average Male	
Average Female	
16 year old male	
16 year old female	
Elite Marathon Runner	
Premier League Football Player	

Hydration

It is important for any sportsman to stay **hydrated** in order to perform at the best of their ability. When you exercise you can lose up to a litre of fluid every hour through _____ and breathing.

Maintaining correct hydration levels:

Before exercise:

Test the colour of your _____. If it is pale, you are _____. If it is dark yellow or orange, you need to take on _____ without delay.

Drink at regular intervals throughout the day. Try to drink 500ml of _____ at least four hours before you exercise.

10-15 minutes before you exercise, aim to take on about 250ml of fluids.

During Exercise:

Stop for regular water _____, particularly in hot weather. If you are thirsty, you are already becoming _____.

Dehydration leads to **dizziness** and **fatigue** which can **negatively impact performance**.

After Exercise:

Take on lots of water immediately after exercise

Avoid **diuretics** such as tea and _____.



Key Terms:

Macronutrients – The foods which you need in large amounts – Carbohydrates, Protein and Fat

Micronutrients – The food that you need in small amounts for normal growth; vitamins and minerals

Carbohydrate-loading – Taking on extra carbohydrates in the lead up to an endurance event

Optimum Weight – The most favourable weight to produce the best performance in sport

Metabolic Rate – The rate at which the body uses up energy

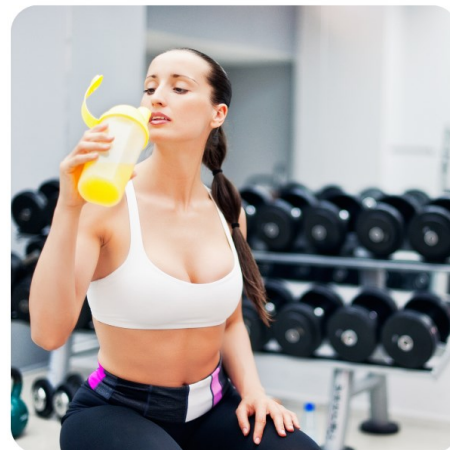
Hydrate – Take on water

Energy balance – The amount of calories taken in minus the amount 'burned off'



Teacher Answer Booklet

Energy Use, Diet, Nutrition and Hydration



Topic	Description from Specification	Pupil comments – How confident do you feel on this topic?
1.3.1	The nutritional requirements and ratio of nutrients for a balanced diet to maintain a healthy lifestyle and optimise specific performances in physical activity and sport	
1.3.2	The role and importance of macronutrients (carbohydrates, proteins and fats) for performers/players in physical activities and sports, carbohydrate loading for endurance athletes, and timing of protein intake for power athletes	
1.3.3	The role and importance of micronutrients (vitamins and minerals), water and fibre for performers/players in physical activities and sports	
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1.3.7	Hydration for physical activity and sport: why it is important, and how correct levels can be maintained during physical activity and sport	

A Balanced Diet:

A balanced diet can vary between individuals depending on their sport and to optimise performance. However a balanced diet should always include:

Carbohydrates – Bread, pasta, rice

Fats – Nuts, avocado, cheese

Proteins – Meat, fish

Vitamins – Fruits, vegetables

Minerals – Milk (calcium), red meat (iron), bananas (potassium)

Water - Water

Fibre – Oats, cereal

Next to each of the above, give an example of a food type which falls into this category.

Macronutrients are the foods which are required in large amounts in your diet. These include:

- Carbohydrates

- Proteins

- Fats

Carbohydrates are important because they give you energy. There are two types:

Complex Carbohydrates (starch):

These are found in natural foods such as pasta, rice and brown bread.



Simple Carbohydrates (sugars):

These are found in their natural form in fruit and vegetables. They are found in their refined form in chocolate/sweets.

Carbohydrates are stored in the muscles and liver as glycogen. This can be converted into glucose to provide energy quickly. Energy produced by complex carbohydrates will last for longer than energy produced by simple carbohydrates. Examples of sports performers who require lots of carbohydrates are footballers/800m runners.

Fats are important because they provide **energy** slowly. They are also important for insulation. Fats are found in foods such as **cheese, nuts, avocados**.

Examples of sports performers who require lots of fats are **marathon runners**.

Proteins are important for **growing** muscle and **repairing** damaged tissue. If all carbohydrate and fat resources have been used up, protein can also be used as **energy**.

Examples of sports performers who require a lot of protein include **weight lifters/rugby players**.

Micro-nutrients are the part of your food that you need for normal growth, but only in small amounts. They include:

- **Vitamins**

- **Minerals**

Vitamins help the body to function properly. Research the following vitamins in order to fill out the table below:

Vitamin	Foods found in	What it helps with
A	Carrots	Maintains healthy skin and teeth. Helps with night vision.
B1	Cereal, beans, nuts	Dietary supplement, digestions and memory
C	Oranges, berries, tomatoes	Antioxidant. Protects cells from damage. Forms and maintains tissue.
D	Fatty fish e.g. tuna. Cheese.	Absorb calcium and promote bone growth.
E	Spinach	Metabolism and can prevent cancer



Minerals are essential for a healthy body. . Research the following minerals in order to fill out the table below:

Mineral	Foods found in	What it helps with
Calcium	Milk, yoghurt, cheese	Strengthening bones
Iron	Red meat	Red blood cell production
Sodium	Salad dressing, bacon, table salt	Water balance
Potassium	Salmon, bananas, avocado	Flush excess waste from your cells
Zinc	Spinach, cereal, sea food	Immunity



Water and Fibre

Water accounts for approximately half of your body weight. It helps to transport **nutrients, waste and hormones**.

Water is also important for controlling body **temperature** and helps to replace **fluid** after sweating during exercise. Athletes must take on water regularly in order to prevent dehydration.

Why do boxers and jockeys sometimes take part in heavy exercise which causes sweating, but then choose not to take on water?

This is because it can sometimes be advantageous to lose weight in these sports. For example boxers may need to lose weight just before a 'weigh in' in order to get into a certain weight category. Jockeys who lose weight shortly before a race may find that they are more likely to win a race.

What are the dangers of doing this?

Dehydration leading to vomiting

Fibre (also known as roughage) adds bulk to your food and also **aids digestion**.

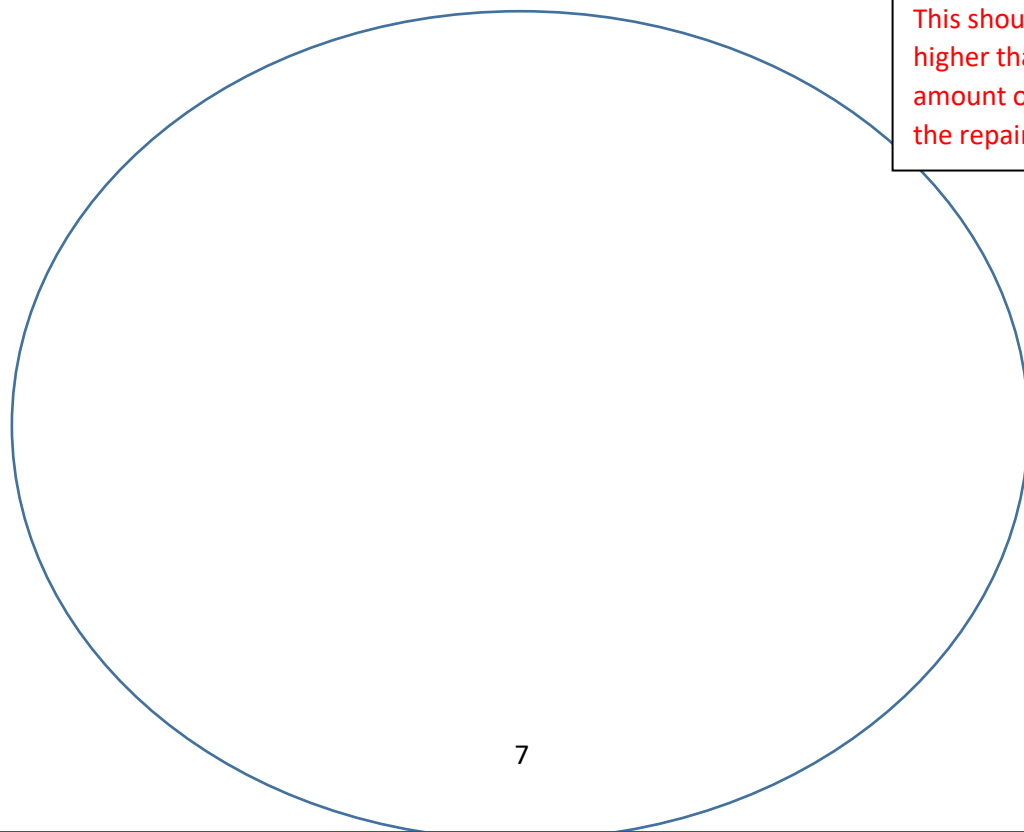
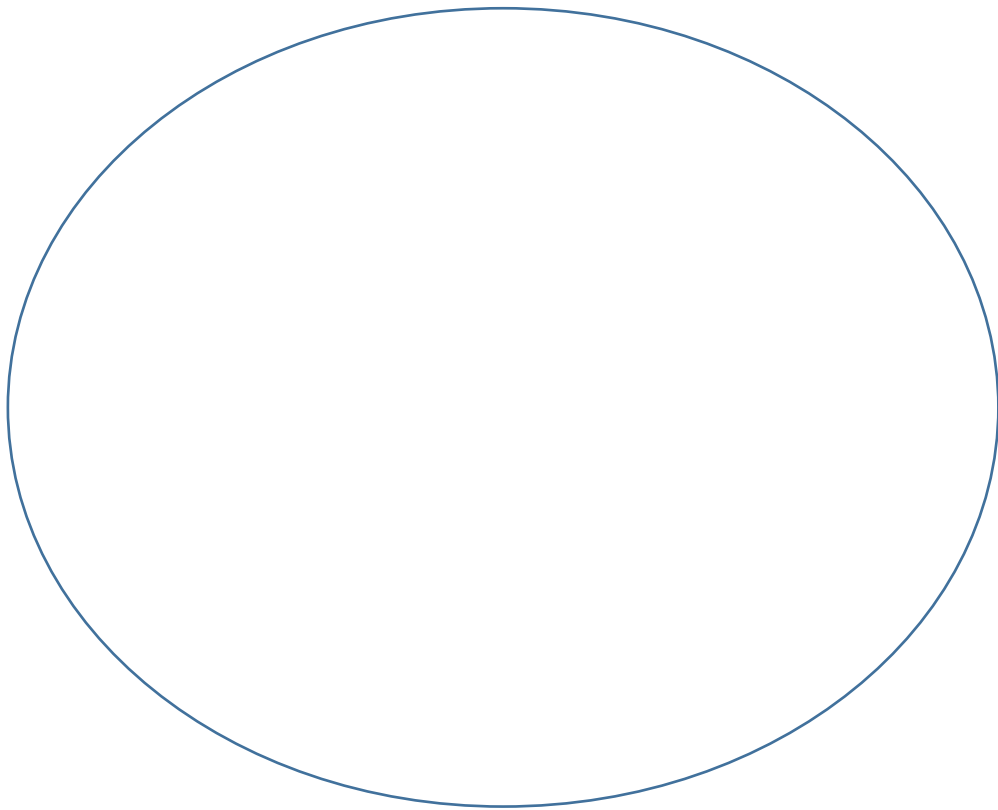
Name 3 types of food that are high in fibre:

1. Cereal
2. Dried Fruit
3. Nuts



Using the below shapes, create 3 pie charts to show the food types displayed in the following diets:

1. Your diet
2. The diet of a weight lifter
3. The diet of a premier league football player



Weight Lifter:
This should show a higher than normal amount of protein – for the repairing and growth

Premier League Footballer:

This should show a higher than normal amount complex carbohydrates and fats, as a football player will require the slow release of energy throughout training and matches.

Carbohydrate Loading & Protein Intake

Use the statements below to fill in the table.

	Carbohydrate-Loading	Protein Intake
Why is it done?	Produce extra energy	Repair and re-build muscle cells
When is it done?	In the days leading up to exercise	Immediately after exercise
Who does it?	Marathon Runners	Weight Lifters

Repair and re-build muscle cells

Marathon Runners

In the days leading up to exercise

Immediately after exercise

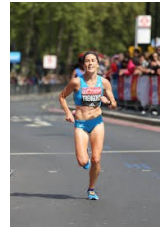
Produce extra energy

Weight Lifters

9 Mark Question

9 Mark Question Assess the relative importance of a high protein diet for a weight lifter and a marathon runner.

Example Answer:



A01 – Protein is very important for a weightlifter

A02 – This is because it helps them to repair and grow muscle following heavy training and weight lifting competitions.

A03 – Therefore muscular hypertrophy will occur which will help them to become stronger and lift heavier weights, giving them a better chance of winning competitions. The timing of this protein intake is also important as it is required immediately after training and competitions.

A01 – Protein is important for a runner, but not as important as other food types such as carbohydrates and fats.

A02 – It is important because it helps to repair the muscles in legs following continuous training sessions, which can result in minor damage to muscle cells.

A03 – Therefore, if protein is taken on following long training sessions, the runner will recover quicker and be able to run again sooner. More training will then result in better cardiovascular fitness and more chance of winning events or competitions.

A01 – If a marathon runner runs out of carb/fat, protein will be important as a reserve energy store

A02 – This could be especially important for a first-time marathon runner who is not used to having the correct stores of carbohydrates and fats ready for energy.

E – Therefore even if they run out of other macro-nutrients they will still have enough energy to complete the race effectively. Without this protein as a reserve energy store, they could 'hit the wall' and fail to finish a marathon.

Conclusion – Relatively more important to weight lifter due to damaged muscles...but also of importance for a marathon runner

Accept other appropriate answers.

Factors affecting optimum weight:

Why is it important for a sports performer to know their optimum weight?

They can then work towards their optimum weight, which should be appropriate for their position, body type and sport.

How would the optimum weight differ between a prop forward and a scrum half in rugby?

Prop – Heavy muscle and some fat required for scrummaging

Scrum Half – Powerful but lighter for agility



A **BMI chart**, such as the one below, is one method used to calculate your **optimum weight**. However this doesn't account for the optimum weight required in different sports

WEIGHT	lbs	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
	kgs	45.5	47.7	50.0	52.3	54.5	56.8	59.1	61.4	63.6	65.9	68.2	70.5	72.7	75.0	77.3	79.5	81.8	84.1	86.4	88.6	90.9	93.2	95.5	97.7
HEIGHT	in/cm	Underweight				Healthy				Overweight				Obese				Extremely Obese							
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6'4" -	193.0	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26

A number of factors affect your optimum body weight. How do the following factors affect your body weight?

Sex/Gender

Although females often have a higher percentage of body fat, males will usually weigh more due to having a higher amount of muscle mass

Height

Taller people are of course heavier than shorter people of the same build. You would not expect two football strikers of different height to be the same weight

Bone Structure

People have different bone structure/different frame. A larger frame will result in a heavier person.

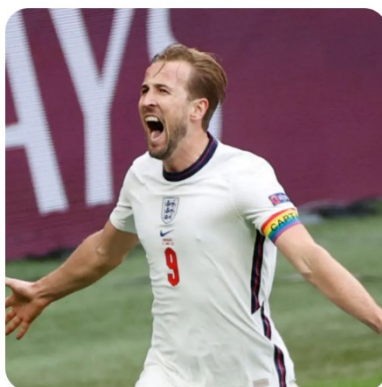
Muscle Girth

Two people of the same height can be a completely different weight based on the size of their muscles. Weight lifting can contribute to this.

Harry Kane and N’Golo Kante are both top footballers. Kante weighs 70kg and Kane weighs 86kg. Both could be described to be at their optimum weight. Why does their optimum weight differ?

The main reason for the difference in their optimum weight is their height. As Kane is much taller than Kante his optimum weight will be higher.

Their optimum weight also plays a part in the way they play the game, with Kane able to muscle his way past opponents and Kante relying on agility.



Use the following table to collate the BMI scores of 7 people in the class. For each person, decide which sport they are most suited to and give reasons for your answers.

Name	BMI Score	BMI Category	Sport/Position suited to	Reasons why

Energy Balance for Maintaining an Optimum Weight

Energy balance is the basis of weight control.

In order to maintain your weight you must take in (through eating) and use up (through exercise) an equal number of calories.

If you take in more calories than you burn off, what will happen?

Put on weight

If you burn off more calories than you take in, what will happen?

Lose weight

Task

Think about the last snack that you ate. Do some research to find out how many calories it contains. Using a piece of cardiovascular equipment in the gym, see how quickly you can burn these calories off.

However we all have our own rate of using up energy, which is known as **metabolic rate**. People with a **high** metabolic rate are able to take on lots of **calories** without putting on weight, whereas people with a **low** metabolic rate eat less food but put on **weight** very quickly.

Do some research in order to fill in the table below on calorie intake:

Category	Daily Calorie Intake
Average Male	
Average Female	
16 year old male	
16 year old female	
Elite Marathon Runner	
Premier League Football Player	

Hydration

It is important for any sportsman to stay **hydrated** in order to perform at the best of their ability. When you exercise you can lose up to a litre of fluid every hour through **sweating** and breathing.

Maintaining correct hydration levels:

Before exercise:

Test the colour of your **urine**. If it is pale, you are **dehydrated**. If it is dark yellow or orange, you need to take on **water** without delay.

Drink at regular intervals throughout the day. Try to drink 500ml of **water** at least four hours before you exercise.

10-15 minutes before you exercise, aim to take on about 250ml of fluids.

During Exercise:

Stop for regular water **breaks**, particularly in hot weather. If you are thirsty, you are already becoming **dehydrated**.

Dehydration leads to **dizziness** and **fatigue** which can **negatively impact performance**.

After Exercise:

Take on lots of water immediately after exercise

Avoid **diuretics** such as tea and **coffee**.



Key Terms:

Macronutrients – The foods which you need in large amounts – Carbohydrates, Protein and Fat

Micronutrients – The food that you need in small amounts for normal growth; vitamins and minerals

Carbohydrate-loading – Taking on extra carbohydrates in the lead up to an endurance event

Optimum Weight – The most favourable weight to produce the best performance in sport

Metabolic Rate – The rate at which the body uses up energy

Hydrate – Take on water

Energy balance – The amount of calories taken in minus the amount 'burned off'



Name: _____

1.3 Energy Use, Nutrition, Diet & Hydration

Date:

Total marks available: 20

Total marks achieved: _____

Percentage: _____

Q1. Why are vitamins and minerals important as part of a balanced diet? **(1 mark)**

- A** To provide energy for exercise
- B** To help with the repair of damaged muscle cells
- C** To aid digestion
- D** To help keep the body healthy and free of disease

Q2. Why do some people seem to take on lots of calories without ever putting on a large amount of weight? **(1 mark)**

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Q3. Sara is a long distance swimmer. A balanced diet is essential for her performance. Explain how the intake of fats can help Sara's swimming performance. **(2 marks)**

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Q4. Explain how a 100m sprinter could use carbohydrates to improve their performance. **(3 marks)**

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Q5.



The two athletes pictures above are both gymnasts and both are at their optimum weight.

Considering the factors affecting optimum bodyweight, give two reasons why the performer on the right is heavier than the performer on the left.

Reason 1:

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..... (2 marks)

Reason 2:

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..... (2 marks)

[illegible]

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1.3 Energy Use, Diet, Nutrition & Hydration

Mark Scheme

Q1. Why are vitamins and minerals important as part of a balanced diet? **(1 mark)**

- A** To provide energy for exercise
- B** To help with the repair of damaged muscle cells
- C** To aid digestion
- D** To help keep the body healthy and free of disease

Mark One – D. To help keep the body healthy and free of disease

Q2. Why do some people seem to take on lots of calories without ever putting on a large amount of weight? **(1 mark)**

Mark One – Due to having a high metabolic rate **or** due to large amounts of exercise burning off these extra calories

Q3. Sara is a long distance swimmer. A balanced diet is essential for her performance. Explain how the intake of fats can help Sara's swimming performance. **(2 marks)**

Mark One – Fats release energy slowly

Mark Three – Therefore if she has enough fat content in her system she will be able to continue creating energy for the whole event, without burning out or 'hitting a wall'.

Accept other appropriate answers

Q4. Explain how a 100m sprinter could benefit from the intake of carbohydrates **(3 marks)**

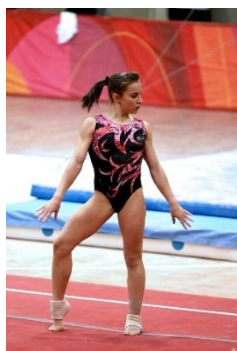
Mark One – Sprinting requires anaerobic respiration/fast release of energy/short period of exercise only

Mark Two – **Simple Carbohydrates** taken shortly before the race will enable a quick burst of energy

Mark Three - This fast release of energy could result in the a quicker performance with the sprinter more likely to win the race

Accept other appropriate answers

Q5.



The two athletes pictures above are both gymnasts and both are at their optimum weight.

Considering the factors affecting optimum bodyweight, give two reasons why the performer on the right is heavier than the performer on the left.

Reason 1: **(2 marks)**

Mark One – The athlete on the right has more **muscle girth**

Mark Two – This is because he needs muscular strength to compete his activity effectively (the rings)

Reason 2: **(2 marks)**

Mark One – The performer on the left appears to be shorter

Mark Two – Shorter people will have a lower optimum weight than those who are taller

Accept other appropriate answers – could relate to gender or bone structure as factors affecting optimum weight

Q6. Micronutrients are a vital part of a balanced diet. Using examples, discuss the importance of the intake of micronutrients in order to maintain a high level of performance in hockey. (9 marks)

A01 – Micronutrients are vitamins and minerals. An example being the mineral iron.

A02 – Iron is found in red meat and has the benefit of increasing red blood cell production.

A03 – This is vitally important to a hockey player as a hockey requires aerobic respiration. A player with a large number of red blood cells will be able to transfer more oxygen to their muscles throughout the match, meaning that they can cover more ground for their team, hence improving performance.

A01 – An example of a vitamin that should be taken regularly is vitamin A.

A02 – Vitamin A is found in foods such as carrots and helps with vision.

A03 – Vision and awareness is very important in hockey. The hockey ball moves at rapid speeds during a match and a player with better vision will be sharper to react to the movement of the ball, increasing their ability to make interceptions, or to make blocks as a defender.

A01 – A final essential mineral is calcium.

A02 – Calcium can be found in dairy products such as milk and is essential for strengthening bones.

A03 – A hockey player with stronger bones will be less likely to suffer from injuries such as fractures when taking a fall, or developing issues such as osteoporosis. Less injuries means more time playing the sport and improving skills and fitness during training, which ultimately results in a better performance.

Accept other appropriate answers.

Pupils should also make use of a short introduction and conclusion.