



Starters and Plenaries

For GCSE Eduqas

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Teacher's Introduction

This resource contains 64 starters and plenaries designed specifically for Eduqas GCSE PE specification (2016). The starters in this resource offer activities which will engage the students in the lesson following a break or provide an opportunity for students to make the transition from a break into a lesson by recapping on previous work. The plenaries can be used to finish a lesson, thereby ensuring that learning occurs right up to the end of the lesson.

A range of activities has been created in this resource which incorporates independent, paired and group work and which will be engaging for the students. The varied nature of the activities provides an opportunity for a range of learning styles to be developed, including visual, verbal, auditory and kinaesthetic.

A cross-reference table has been provided which links each activity to the specification points it covers and also identifies which activities are considered starters and which plenaries. However, the identification of each activity as a starter or plenary is only a suggestion and teachers might find that some of the activities are interchangeable.

December 2017

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* resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers

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Specification Cross-reference

This table will enable you to pick and choose starters or plenaries relevant to teaching. While each activity has been selected as either a starter or a plenary, starter and plenary tasks may be interchangeable, depending on how you teach. It is at the teacher's discretion when to use each task.

Specification reference	Activity
1. Health, training and exercise	Health, fitness and well-being
	Activity 1 – Health, fitness and well-being: Forbidden
	The contribution which physical activity makes to health and fitness
	Activity 2 – Physical well-being: Verbal tennis
	Activity 3 – Mental well-being: What's your advice?
	Activity 4 – Social well-being: Draw it
	Activity 5 – Impact of lifestyle choices: Colour-coding
	Consequences of a sedentary lifestyle
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	Diet and nutrition
	Activity 7 – Energy balance: Create a food plan
	Activity 8 – Nutrition in sport: Match-up
	Activity 9 – Hydration in sport: Order the answer
	Activity 10 – Nutrition for specific sports: Energy use
2. Exercise physiology	Components of fitness
	Activity 11 – Components of fitness: Glossary
	Measuring health and fitness
	Activity 12 – Value of fitness tests: Interview
	Activity 13 – Measuring components of fitness: Test p
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	Methods of training
	Activity 15 – Types of training: Guess the method
	Training zones
	Activity 16 – Training methods: Speech bubbles
	Principles of training and exercising
	Activity 17 – Principles of training and FITT: Tweet the
	Warm up and cool down
	Activity 18 – Warm-ups and cool-downs: Instructor
	Musculoskeletal system
	Activity 19 – Location of major bones: Label your mate
	Activity 20 – Joint types and movements: Guess the
	Activity 21 – Components of joints: Fact file
	Activity 22 – Functions of the skeleton: Forbidden wo
	Activity 23 – Classification of muscles: Fact file
	Activity 24 – Muscles of the body: Label your mate
	Activity 25 – Muscle fibres: Colour-code
	Cardiorespiratory and vascular systems
	Activity 26 – Structure of the cardiovascular system: B
	Activity 27 – Function of the cardiovascular system: F
	Activity 28 – Heart values: Cardiac calculations
	Activity 29 – Structures of the respiratory system: Dr
	Activity 30 – Gaseous exchange: True or false?
	Activity 31 – Interpreting a spirometer trace: Comple
	Activity 32 – Lung volumes: Data analysis
	Aerobic and anaerobic exercise
	Activity 33 – Aerobic and anaerobic exercise: O ₂ or no
	Short- and long-term effects of exercise
	Activity 34 – Short-term effects of exercise: Drawing
	Activity 35 – Long-term effects of exercise: Fill in the

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Specification reference		Activity
3. Movement analysis	Muscle contractions	Activity 36 – Antagonistic muscle pairs: Missing words Activity 37 – Antagonistic muscle pairs: Contract and relax
	Lever systems	Activity 38 – Lever systems: Drawing and performing
	Planes of and axes of movement	Activity 39 – Planes and axes: Dividing the body
	Sports technology	Activity 40 – Using technology: Analyse the film
		Activity 41 – Impact of technology: Mind maps
	Goal-setting	Activity 42 – Goals to optimise performance: Data in sport Activity 43 – Goal-setting: SMART match-up
4. Psychology of sport and physical activity	Information processing	Activity 44 – Basic information processing model: Analyse the model Activity 45 – Feedback on performance: Provide feedback Activity 46 – Feedback data: Data handling
		Activity 47 – Guidance on performance: Application of guidance
		Activity 48 – Mental preparation: Instructor
	Motivation	Activity 49 – Intrinsic and extrinsic motivation: Colourful cards
	Characteristics of skilled performance	Activity 50 – Characteristics of skilful movement: Two-part movement
	Classification of skills	Activity 51 – Classification of skills: What skill?
	Types of skill	Activity 52 – Practice structures: Pass the practice
		Activity 53 – Practice and skill classification: Practice and skill
5. Sociocultural issues in sport and physical activity	Participation	Activity 54 – Physical activity and sport in the UK: What is the picture? Activity 55 – Participation in physical activity and sport: What is the picture? Activity 56 – Development of children through participation
		Activity 57 – Improving participation: Provide the strategies
		Activity 58 – Provision for minority groups: Notes on provision
	Performance	Activity 59 – Commercialism in sport: Report
		Activity 60 – Sponsorship and the media in sport: Analyse the media Activity 61 – Globalisation of sport: Around the globe Activity 62 – Trends in commercialisation: Data discussion Activity 63 – Ethics in sport: Tri-answers Activity 64 – Drugs in sport: Positives and negatives

Use of Data is covered in activities throughout.

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Activity 1 – Health, Fitness and Well-being

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Teacher's Notes and Answers

Plenary Activity: Forbidden words

Aim of the activity	To understand the terms health, fitness and well-being.
Teacher's instructions	Photocopy the activity sheet and hand one copy to each pair. Students should complete the two activities. Students should work in pairs. For the first activity, one student in each pair is required to describe the meaning of a keyword or the forbidden words. The other student should listen and describe. For the second activity, students should work together to create a definition between the terms, using the grid provided.

Answers

Possible definitions:

- Health is described as being in a good physical, mental and social state, free from any sickness or injuries.
- Fitness is the ability to perform activities that are required within your own limits, without becoming too tired.
- Well-being is an individual's overall (mental, social and physical) level of happiness.

Any appropriate answer for each:

	Health	Fitness
Health		High levels of fitness can improve the health of an individual by reducing the risk of developing certain diseases e.g. a high cardiovascular fitness is linked to a reduction in cardiovascular disease.
Fitness	Being in good health will ensure that individuals can maintain physical activity levels and, therefore, maintain or improve their fitness levels.	
Well-being	Being in good health can allow individuals to maintain their quality of life by ensuring that they can lead an active and fulfilling lifestyle.	Low fitness levels in strength, muscular endurance, cardiovascular endurance and speed, can result in a reduced ability to complete everyday tasks without getting tired and fatiguing easily. This will reduce the quality of an individual's life and, therefore, life satisfaction.

Opposite answers can also be provided, e.g. poor health can reduce fitness levels, increase fitness levels.

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Health, Fitness and Well-being: Forbidden

Describe each of the keywords (without saying the keyword or forbidden) try to guess them. You must describe the words in relation to the condition. For example, you cannot describe 'etiquette' as 'having good table manners'.

Keyword	Forbidden
Health	 illness, condition
Fitness	 training, everyday
Well-being	 feeling, good

Now provide an example of how each term in the table below could possibly affect the other. Fill in two boxes for each relationship as, for example, the effect of fitness on health.

	Health	Fitness
Health		
Fitness		
Well-being		

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Activity 2 – Physical Well-being

Teacher's Notes and Answers

Plenary Activity: Verbal tennis

Aim of the activity	To discover the benefits of physical activity, exercise and sport and assess how these could be achieved.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 5–10 minutes filling in as many benefits of physical activity, exercise and sport as they can. For each benefit listed they should identify how it could be achieved. After they have prepared their answers, students should pair up. Each student should start by saying one of the physical benefits that they have listed. The other student should then try to provide a way in which that benefit could be achieved. For example, 'If they can't provide a method in five seconds they lose the point. If a method is given, no one gets the point and they pass the point to the other student and they say one of their benefits. An optional tennis ball could be used to pass the point between students.' Extend learning from this activity by allowing students to take part in a discussion about the impact of physical activity on social and mental health.

Answers

Physical health benefits could include the following:

(For each benefit students should provide a method in which each could be achieved.)

Physical health benefit from exercise	How it could be achieved
reduces the chance of coronary heart disease (CHD)	Taking part in aerobic exercise such as walking or running improves the function of the heart and reduces the risk of CHD.
limits the occurrence of a number of illnesses	Resistance training can reduce blood pressure and therefore the chance of a number of illnesses.
increases your ability to carry out daily activities	Taking part in resistance training can improve strength and endurance components such as muscular endurance and therefore the ability to perform housework tasks.
reduces the risk of becoming obese	Exercise can increase your energy expenditure and therefore reduce the risk of accumulating body fat.
reduces the risk of developing type II diabetes	High-intensity cycling can increase your insulin sensitivity in the blood and, therefore, reduce the risk of developing type II diabetes.
reduces blood pressure	Regular endurance training such as long-distance running or swimming increases the size of the arteries and, therefore, reduces blood pressure.
increases the size of the heart (hypertrophy)	Playing team sports such as hockey requires a lot of physical effort and, therefore, it adapts by becoming larger (hypertrophy).
reduces the resting heart rate (bradycardia)	Taking part in aerobic exercise results in a lower resting heart rate which reduces the number of times the heart has to beat to supply the body with oxygen at rest.
reduces the storage of fat	Taking part in a walking programme increases energy expenditure and therefore, reduces the amount of fat stored in the body.

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Physical health benefit from exercise	How it could be achieved
reduces the accumulation of fatty deposits within the arteries	Exercising with a jogging group will increase blood flow therefore, prevent it from accumulating
increases muscle size and tone	Taking part in a weight-training regime will increase muscle size as a result of adaptation to the load being placed on the muscles
increases flexibility of the muscles which will reduce the chance of muscular injury	Stretching the muscles during yoga sessions
increases the bone density	Loading the bones by running will result in stronger bones as they adapt to the risk of injury.
increases muscular strength and size (hypertrophy)	Taking part in sprint training will increase the size of leg muscles as an adaptation to the work being done
improves a number of fitness components	A range of fitness components can be improved by doing a range of work done in the physical activity that can improve cardiovascular endurance and muscular endurance
improves posture	Performing exercises such as yoga and Pilates can help to maintain body posture during every day activities at work and at home.

Discussion should be based on:

- Good physical health can positively improve mental health by ensuring a person is confident, has low levels of stress and does not have to worry about their health.
- Good physical health can positively improve social health by ensuring a person can maintain an active social life as they do not have any health issues that prevent them from leaving the house.
- Or the opposite effects.

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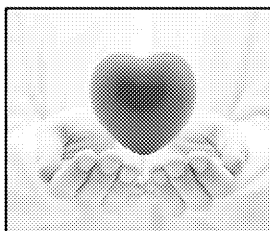
Physical Well-being: Verbal tennis

Complete the table below by listing as many physical health benefits of exercise as you can think of (and suggest ways to help you). For each benefit you should also suggest how an individual could

[illegible]

After 5–10 minutes your teacher will ask you to pair up with another student.

1. One student should start by saying one of the physical benefits that they have.
2. The other student should then try to provide a way in which that benefit can be achieved in five seconds or less, with an example.
3. If they can't provide a method in five seconds the student who said the benefit gets the point. If they can't provide a method in five seconds the student who said the benefit gets the point and the other student starts by saying one of the benefits.
4. Total up your points to see who is the winner.



Now discuss with your partner what impact physical health can have on men

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Activity 3 – Mental Well-being

Teacher's Notes and Answers

Starter Activity: What's your advice?

Aim of the activity	To discover the mental benefits of taking part in physical activity and how these could be achieved.
Teacher's instructions	Photocopy the activity page and give the students five minutes each individual regarding how physical activity and exercise can improve well-being. Then spend five minutes discussing these benefits. Extend learning from this activity by allowing students to discuss the impact of mental health on social and physical health.

Answers

Mental health and well-being

(Students should suggest how each of the individuals could benefit from the activity and which the selected benefit could be achieved.)

'I feel stressed.'

- Exercise can reduce the occurrence of stress and tension by providing a release of endorphins.
- This could be achieved through taking part in yoga sessions where participants learn relaxation techniques and learn to relax their muscles and mind.

'I feel fat.'

- Exercise can improve self-confidence as you improve your body image (e.g. muscle tone).
- Seeing the physical development of your body as it becomes healthier can improve self-confidence.

'I get anxious.'

- Regular physical activity can improve your self-esteem and help your mind is taken off your worries and your mind-set is more positive.
- By taking part in regular swimming sessions, you could help focus your mind as how your body moves through the water could be a relaxing way to exercise.

'I feel depressed.'

- The release of feel-good hormones, the social interaction and the improvement in something can reduce depression.
- This can occur when you are part of a running club, which allows you to meet new people as well as physically feel better.

'I have low confidence.'

- Exercise can improve self-confidence as you become fitter and develop a sense of achievement.
- Learning a new skill, for example through taking part in a beginner's course, can improve your confidence as you improve your ability.

Discussion should be based on:

- Good mental health can lead to improved physical health as individuals with low levels of anxiety are more capable of taking part in regular physical activity and improved physical health.
- Good mental health can lead to improved social health as individuals with low levels of anxiety are more capable of maintaining an active social life.
- Or the opposite effects.

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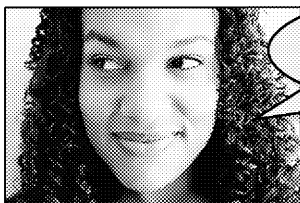


Mental Well-being: What's your advice?

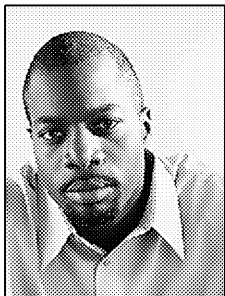
Explain to the following people how taking part in regular physical activity is improving their emotional health and well-being. Also suggest how this can be achieved.



I feel stressed.



I feel fat.



I get anxious.



I feel depressed.



I have low confidence.

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Now discuss with your partner what impact mental health can have on physical health.

Activity 4 – Social Well-being

Teacher's Notes and Answers

Starter Activity: Draw it	
Aim of the activity	To discover how improved social health can be achieved by activity and sport.
Teacher's instructions	Photocopy the activity page and give one copy to each student. Give students five minutes to think of three ways in which social health can be improved by sport and what causes these improvements. Then instruct students to spend five minutes drawing a visual representation of these improvements. Finally, give students five minutes drawing before discussing their ideas as a class for two minutes. Extend learning from this activity by allowing students to discuss the impact of social health on physical and mental health.

Answers

Social health and well-being

Students should draw pictures which represent the following:

- It provides an opportunity to make new friends or see your old friends.
How it is achieved: e.g. taking part in a five-a-side football league with friends.
- It can reduce the feeling of loneliness.
How it is achieved: e.g. taking part in a walking group can make you feel less lonely.
- It provides an opportunity to be part of a group.
How it is achieved: e.g. taking part in a team sport such as netball.

Discussion should be based on:

- Good social health is likely to lead to improved mental health as individuals gain confidence and self-esteem by building close relationships with others.
- Good social health is likely to lead to improved physical health as individuals have more opportunities to be physically active and they will have a supportive environment to maintain motivation levels.

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Social Well-being: Draw it

Draw a picture to represent three different social health benefits of taking physical activity and then provide an explanation for how these benefits could be achieved.

How it is achieved:	How it is achieved:
How it is achieved:	

Now discuss with your partner what impact social health can have on physical health.

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Activity 5 – Impact of Lifestyle

Teacher's Notes and Answers

Starter Activity: Colour-coding

Aim of the activity	To identify the different lifestyle choices that can be made that each one can have on health, fitness and well-being.
Teacher's instructions	Photocopy the activity page and hand out one copy to each student. Give them five minutes to identify which outcomes are caused by which lifestyle choices and then spend five minutes asking the students to explain their choices and provide any further consequences of making those lifestyle choices. Extend learning from this activity by allowing students to discuss the positive impacts of lifestyle choices and how individual lifestyle choices.

Answers:

Smoking: Bronchitis, addiction, asthma, coronary heart disease, lung cancer, defects if pregnant, pneumonia

Alcohol: Addiction, depression, coronary heart disease, liver disease, diabetes, stroke, birth defects if pregnant

High fat intake: Obesity, coronary heart disease, stroke

Lack of physical activity: Arthritis, obesity, coronary heart disease, a range of cardiovascular fitness, diabetes, high blood pressure, stroke, reduced strength

Work–sleep balance: Depression, fatigue, anxiety

Positive impacts discussed will be the opposite of the negative impacts. Achieving adequate physical activity will lead to:

- Reduced risk of arthritis
- Reduced weight gain / obesity
- Improved cardiovascular health, e.g. reduced risk of coronary heart disease, reduced blood pressure
- Improved cardiovascular fitness
- Reduced risk of diabetes
- Reduced blood pressure
- Increased strength

Maintaining adherence:

- They can set goals which should be based around the SMART principles
- They should regularly check their progress and keep a track of it in a diary
- They can attend meetings with other people who are trying to make changes
- They should maintain a close support network of family and friends to maintain motivation levels during difficult periods
- They should be realistic with what they hope to achieve
- Any other points linked to methods for maintaining motivation levels

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Impact of Lifestyle Choices: Colour-coding

Colour in the five lifestyle choices below using a different colour for each. Each lifestyle choice will result in from the box below and colour-code the outcomes (if an outcome could be caused by more than one lifestyle choice, use one colour).

Smoking

Alcohol

High fat intake

Lack of physical activity

Bronchitis

Addiction

Asthma

Arthritis

Lung cancer

Depression

Reduced cardiovascular fitness

Stroke

Anxiety

Liver disease

Pneumonia

A range of cancers

Fatigue

Reduced strength

Now discuss with a partner the positive impacts that lifestyle choices can have. How can individuals can maintain their adherence to healthy lifestyles.

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Activity 6 – The Consequences of a Sedentary Lifestyle

Teacher's Notes and Answers

Plenary Activity: Tweet the lesson	
Aim of the activity	To understand what comprises a sedentary lifestyle and the consequences of leading a sedentary lifestyle on an individual.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 10 minutes writing a tweet which summarises the information about the consequences of leading a sedentary lifestyle. The tweet should be engaging and should also include a hashtag to make the information more memorable.

Answers

Students can provide their own creative tweets but they must be relevant to the lesson. Here are some examples:

- Tweet 1:** Not being physically active on a regular basis is classed as a sedentary lifestyle. #CoachPotato
- Tweet 2:** Being inactive can cause weight gain and lead to obesity (the excess fat). #ExcessFat
- Tweet 3:** Sedentary lifestyles can lead to a number of health problems such as heart disease and atherosclerosis which can contribute to heart attacks. #HeartDisease
- Tweet 4:** Obesity can lead to a lack of confidence due to a reduced body image. #BodyImage
- Tweet 5:** Obesity can reduce a number of fitness components such as cardiovascular endurance which can reduce self-esteem. #CardioFatscular
- Tweet 6:** Physical activity provides an opportunity to forget about life's stresses and to stress. #LessStress
- Tweet 7:** Diets containing a lot of bad cholesterol (low-density lipoprotein) can lead to heart disease when fatty streaks develop on the walls. #Blockage

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Activity 7 – Energy Balance

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Teacher's Notes and Answers

Starter Activity: Create a food plan	
Aim of the activity	To understand the factors affecting optimum weight and how a healthy weight balance can be achieved in order to maintain a healthy weight.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. They should then spend 10 minutes creating a food plan (breakfast, lunch, dinner) based on the calorie requirements of two or three different types of people. They should then discuss their plans if they have time. They should then discuss the maintenance of a healthy weight with the rest of the class.

Answers

Total daily calories should represent the following:

- Muscular man – 2,500 Kcal or over
- Unmuscular man – 2,500 Kcal or under
- Woman 5ft 2in – 2,000 Kcal or under
- Woman 5ft 11in – 2,000 Kcal or over
- 40-year-old man – Around 2,500 Kcal
- 40-year-old woman – Around 2,000 Kcal
- Man with a high bone density – 2,500 Kcal or over
- Man with a low bone density – 2,500 Kcal or under

Students should discuss the following points:

- Energy balance = energy in (dietary) – energy out (basal metabolic rate + physical activity)
- A positive energy balance leads to weight gain
- A negative energy balance leads to weight loss
- A balanced energy balance ensures that weight is maintained
- The average man will have a higher optimum weight than the average woman. They will need to consume more calories to maintain a healthy weight.
- Taller people will have a higher optimum weight than shorter people. They will need to consume more calories to maintain a healthy weight.
- Those with large bone structures will have a higher optimum weight than those with smaller bone structures and will, therefore, need to consume more calories to maintain a healthy weight.
- Those with a large muscle girth will have a higher optimum weight than those with a smaller muscle girth and will, therefore, need to consume more calories to maintain a healthy weight.

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Energy Balance: Create a food plan

Read the list of foods below, and the number of calories found in each one. Create a food plan (breakfast, lunch, dinner and snacks) for the day for two or three people. Choose the foods listed which would allow them to maintain a healthy weight. Then discuss the energy balance equation, the effects of having different energy balances (positive, negative, and zero) and the different factors which impact on the maintenance of a healthy weight.

Steak – 240 Kcal	Boiled potatoes – 115 Kcal	☐
Bagel – 200 Kcal	Spaghetti and meatballs – 260 Kcal	☐
Avocado – 305 Kcal	White bread – 55 Kcal per slice	☐
Blueberries – 80 Kcal	Canned tuna – 165 Kcal	☐
Carrots – 70 Kcal	Strawberries – 45 Kcal	☐
Cheesecake – 280 Kcal	Peas – 125 Kcal	☐
Chicken breast – 140 Kcal	Margarine spread – 75 Kcal	☐
Cornflakes – 110 Kcal	Lamb chop – 135 Kcal	☐
Egg – 75 Kcal	Cream cheese – 100 Kcal	☐

Types of people: muscular man, unmuscular man, woman (5ft 2in), woman (5ft 7in), man, 40-year-old woman, man with a high bone density, man with a low bone density

Type of person:	
Breakfast:	
Lunch:	
Dinner:	
Snacks:	
Total calories:	

Type of person:	
Breakfast:	
Lunch:	
Dinner:	
Snacks:	
Total calories:	

Type of person:	
Breakfast:	
Lunch:	
Dinner:	
Snacks:	
Total calories:	

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Activity 8 – Nutrition in Sport

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Teacher's Notes and Answers

Starter Activity: Match-up	
Aim of the activity	To understand the nutritional requirements of the diet of athletes and the role of macronutrients and micronutrients.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give them 5–10 minutes to spend 5–10 minutes writing a description of each component and then linking all of the components which are related by drawing lines. Then start a class discussion about the role that each component plays.

Answers

Carbohydrate – Appropriate description, e.g. the major source of energy stored as glycogen in the muscles and broken down to create energy through respiration. (macronutrient)

- 55–60% of diet
- Bread (image)
- Pasta (image)
- Source of energy for all intensities of exercise
- Consumed in large quantities by endurance athletes prior to competition

Fat – Appropriate description, e.g. a source of energy for exercise which provides a reserve of energy when the intensity is low and also provides the body with insulation and protection of organs. (macronutrient) tissues.

- 25–30% of diet
- Butter (image)
- Cheese (image) (Can also be used for minerals – calcium)
- If unused could be stored and cause obesity
- Source of energy for low-intensity aerobic exercise such as walking

Protein – Appropriate description, e.g. the nutrient which is required for repair and growth within the body and, therefore, important for muscle development. (macronutrient)

- 15–20% of diet
- Chicken (image)
- Steak (image) (Can also be used for fat)
- Milk (image) (Can also be provided for fats and minerals – calcium)
- Can be consumed after resistance exercise to aid strength development

Minerals – Appropriate description, e.g. nutrients which are required for the body to function properly, e.g. bone growth. (micronutrient)

- Fruit (image)
- Carrots (image)
- Needed for energy, growth and hydration

Water – Appropriate description, e.g. the source of hydration which allows the body to maintain a constant temperature. (macronutrient)

- Can be provided by the fluid within food
- It is required during exercise in hot and humid conditions
- Maintains blood volume in long-duration events

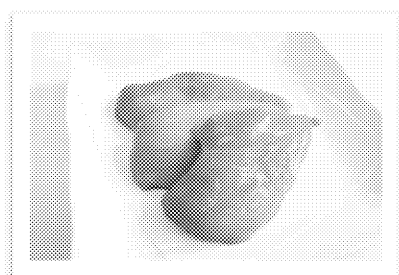
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Nutrition in Sport: Match-up

Provide a brief description of each type of nutrient below, and indicate a micronutrient. Then, using five different colours (one for each), link to each of the four nutrients by colouring, circling or drawing a line between

Carbohydrates:	Fats:	Protein:	Minerals:
Macronutrient ☐ Micronutrient ☐	Macronutrient ☐ Micronutrient ☐	Macronutrient ☐ Micronutrient ☐	Macronutrient ☐ Micronutrient ☐

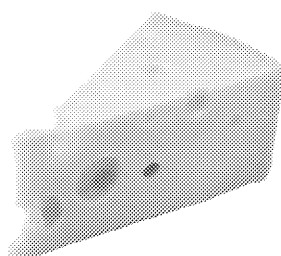
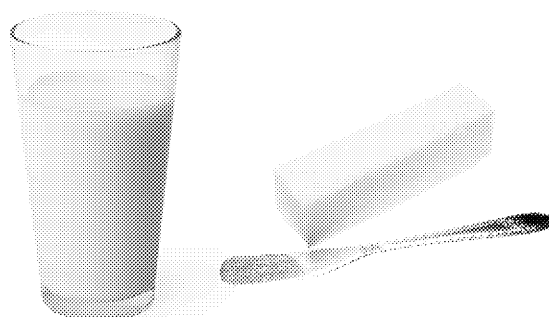


Can be consumed after resistance exercise to aid strength development for power athletes

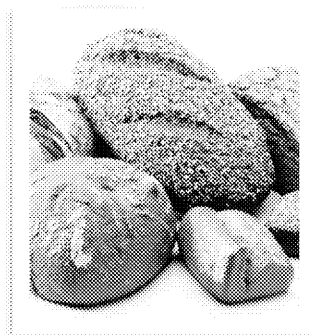
Consumed in large quantities to aid endurance prior to competition

A source of energy for all intensities of exercise

Can be provided from the fluid within food



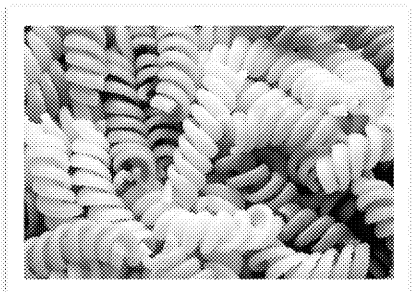
If unused could be stored and cause obesity



Maintains blood glucose levels in long-duration exercise

Source of energy for low intensity aerobic exercise such as walking

25–30% of diet



It is required during exercise in hot and humid conditions

55–60% of diet

Activity 9 – Hydration in Sport

Teacher's Notes and Answers

Plenary Activity: Order the answers	
Aim of the activity	To understand what dehydration is, how it can be prevented and the negative effects of it.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give them scissors and glue and instruct them to spend 10 minutes cutting out the answers and then trying to arrange them into the correct order. Once they have finished, the teacher should ask the class to discuss the correct order and reveal the answers. The teacher should then glue down their answers.

Answers

Exercising for long periods of time or in hot conditions can cause an individual to become dehydrated. / This water is lost as sweat and can lead to dehydration. / In order to avoid dehydration, an individual should ensure that water is consumed before, during and after exercise in order to maintain fluid balance. / If an individual becomes dehydrated this can affect their ability to exercise effectively and the strain it places upon the body.

Water forms part of the blood and, therefore, as water is lost, the blood becomes thicker. / As a result of this, blood flow is slower. / In order to provide enough oxygen to the working muscles, the heart will have to work harder by beating more frequently.

During exercise a large amount of heat is created by the body and water is lost through sweating. / Therefore, if an individual is not able to maintain fluid balance, they will not be able to effectively cool the body and may overheat. / This can lead to health impairments such as increased reaction times and wrong decisions. / It can also lead to physical impairments such as a reduced ability to exercise for long periods due to fatigue.

Over hydration is also an issue which can lead to health impairments. / At times, an individual may consume large quantities of fluids in a short space of time following exercise. / The body may not be able to remove water from the body quickly enough. / which can lead to a dilution of sodium between water and sodium in the blood / leading to the impairment of cognitive function.

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Hydration in Sport: Order the answer

Cut out the following sentences and arrange them into an order which answers the question.

Define 'dehydration' and 'overhydration' and explain how they can be avoided and what they can have on the body.



Exercising for long periods of time or in hot conditions can cause an individual to become dehydrated.

As a result of this, blood flow is slower.

Athletes will often consume large quantities of fluids in a short space of time.

It can also lead to physical impairments such as a reduced ability to exercise, fatigue and cramp.

During exercise a large amount of heat is created by the body and water is lost through sweating.

The problem with this is that the kidney may not be able to remove water from the body.

This can lead to psychological impairments such as increased reaction times and poor decision making.

Over hydration is also an issue which can lead to health impairments.

Therefore if an individual is not able to maintain their water balance, they will become dehydrated, which can affect the body and may overheat.

If an individual becomes dehydrated this can affect their ability to exercise and can have negative places upon the body.

In order to avoid dehydration, it is important that water is consumed before and after exercise to maintain water balance.

leading to the impairment of cognitive functioning.

This water is lost as sweat and can lead to dehydration.

which can lead to an imbalance between water and sodium in the blood.

Water forms part of the blood and, therefore, as water is lost, the blood becomes thicker.

In order to provide the same amount of oxygen to the working muscles, the heart has to beat more frequently.

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Activity 10 – Nutrition for Specific Athletes

Teacher's Notes and Answers

Plenary Activity: Energy use	
Aim of the activity	To understand the effect of diet and hydration on physical activity.
Teacher's instructions	Photocopy the activity page and hand one copy to each student to study the two athletes and fill in the table. They then discuss the importance of each component for a specific athlete.

Answers

Weightlifter:

- **Carbohydrates** – provide glucose in the bloodstream which can provide energy for exercise, but glycogen stores are less important for high-intensity anaerobic exercise as it does not last long enough to utilise them.
- **Proteins** – important for recovery and adaptation. It is important to consume large quantities of protein following an exercise session as it will aid the development of new muscle tissue which will increase muscle mass.
- **Fats** – less important as an energy source for anaerobic exercise such as weightlifting, but body mass is an important component of performance, therefore, beneficial to consume fat.
- **Minerals** – minerals such as calcium can improve bone strength and are important for weightlifters as they are repeatedly placing their bones under stress.
- **Water** – water can be consumed before competition and after competition. It is important in short duration sports as not much water is lost through sweating. For athletes to regulate their fluid intake as they do not want to exceed their body weight.

Triathlete:

- **Carbohydrates** – carbohydrates provide the main source of energy for prolonged intensity aerobic exercise and should, therefore, be consumed in large quantities. To perform carb-loading before a competition in order to greatly increase energy stores can be achieved by initially depleting glycogen stores through prolonged exercise and then consuming large quantities of carbohydrates in the week building up to a competition. Carbohydrates can also be consumed during prolonged exercise and they should be consumed after exercise in order to replenish glycogen stores.
- **Proteins** – less important than sports such as weightlifting where muscle mass is important. However, protein can be used as an energy source during very prolonged exercise and is important after exercise in order to aid the recovery process.
- **Fats** – fats require oxygen to be metabolised and they are therefore more important during prolonged aerobic exercise. They also help to reduce the use of glycogen stores to last longer during prolonged exercise.
- **Minerals** – iron intake is important as this is required for oxygen transport. If an athlete has adequate amounts of iron, it ensures that the athlete has the ability to deliver oxygen to the working muscles during exercise in order to fuel aerobic exercise.
- **Water** – water should be consumed before, during and after exercise. It is important during the event and it is important that they attempt to replace the fluid lost during the race in order to reduce the effects of dehydration. Dehydration can therefore negatively affect the amount of oxygen that can be transported to the muscles.

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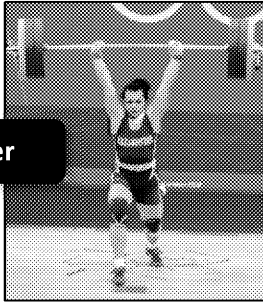
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Nutrition in Sport: Energy use

Although a balanced diet is important for general health, athletes need to eat to perform to a high level in their sport. For both of the athletes below the diet is important for them and how they may alter their intake in order to

Weightlifter



Triathlete

Carbohydrates:

Proteins:

Fats:

Minerals:

Water:

Carbohydrates:

Proteins:

Fats:

Minerals:

Water:

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Activity 11 – Components of Fitness

Teacher's Notes and Answers

Plenary Activity: Glossary	
Aim of the activity	To understand the different components of fitness and sports in which they are required.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 10 minutes to create a glossary of the terms around the classroom while the students are completing the activity. If they are unsure about any of the terms, you could encourage them to ask the teacher or students to describe the tests for each and their processes.

Answers:

Definitions should be similar to the ones provided below.

- **Agility** – The ability to rapidly change direction – important in rugby to quickly sidestep an opponent.
- **Balance** – The ability to maintain your centre of balance in a stable position. In gymnastics to control movements of the body in order to provide a stable base.
- **Cardiovascular endurance** – The ability to supply the working tissues with oxygen to maintain aerobic exercise for a long period – important for long-distance running to maintain work rate for a long duration.
- **Coordination** – The ability to time the movement of body parts in response to cues – important for cricket, e.g. timing leg and arm movements with the ball for efficiency in movement.
- **Flexibility** – The ability to produce a large range of movement at a joint. Important for players as it extends their range of movement when stretching to reach the ball.
- **Muscular endurance** – The ability to repeatedly contract a muscle over a long period of time. Important for long-distance cycling in order to continually contract the muscles for a long time.
- **Power** – The ability to quickly apply force – important for long jump to rapidly produce a large force and jump further.
- **Reaction time** – The ability to respond quickly to a cue – important for sprinting in order to start running when the gun is sounded.
- **Muscular strength** – The ability to overcome a large resistance – important for scrumming to force the opponent backwards off the ball in order to win the scrum.
- **Speed** – The ability to move a certain distance in a short period of time. Important in sports such as football and hockey, e.g. when chasing an opponent to the ball.
- **Body composition** – The relative contribution of fat and fat-free mass to total body weight. Important in all sports as body size and shape will affect performance. A bodybuilder benefits from a large proportion of fat mass as it will increase the force they can produce, whereas a marathon runner requires low levels of fat mass as they need to maintain a low body weight for a long period of time.

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Components of Fitness: Glossary

Create a glossary for the components of fitness. Include examples of physical activities that require each component of fitness and then provide a reason why you choose those activities.

Agility is:	Sports that require agility:
Balance is:	Sports that require balance:
Cardiovascular endurance is:	Sports that require cardiovascular endurance:
Coordination is:	Sports that require coordination:
Flexibility is:	Sports that require flexibility:
Muscular endurance is:	Sports that require muscular endurance:
Power is:	Sports that require power:
Reaction time is:	Sports that require reaction time:
Muscular strength is:	Sports that require muscular strength:
Speed is:	Sports that require speed:
Body composition is:	Sports that require body composition:

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Activity 12 – Value of Fitness Tests

Teacher's Notes and Answers

Plenary Activity: Interview	
Aim of the activity	To understand why fitness tests are used and the limitations
Teacher's instructions	Photocopy the activity page and hand one copy to each pair of students. They are to interview each other and write down a summary of the interview. One student should take on the role of the interviewer and the other the role of the interviewee. The interviewee should answer the questions to the best of their knowledge and the interviewer should write a summary of the interview and add any information that was missed in a different class.

Answers:

- 1) Answer to include:
 - Provides an opportunity to find out the current state of relevant fitness tests in order to develop an understanding of an athlete's strengths and weaknesses
 - Provides an opportunity to find out a baseline level of fitness
 - Provides information on which training programmes can be designed
- 2) Answer to include:
 - Provides an opportunity for the training programmes to be assessed against baseline and previous measurements
 - Provides an opportunity to track the improvements of the athlete
 - Provides an opportunity for the athlete to be compared to normal
- 3) Answer to include:
 - Goals can be set and tracked against the fitness test to maintain motivation
 - Completing fitness tests can be fun and provide an interesting challenge
- 4) Answer to include:
 - The fitness tests are not always specific to certain sports, e.g. sit-ups are not relevant for sports which require upper body flexibility
 - The fitness tests do not always use the same movements as the sport
 - The fitness tests are not performed in competitive situations and therefore are not a true measurement
- 5) Answer to include:
 - Sub-maximal tests are sometimes inaccurate or unreliable
 - Maximal tests require athletes to be highly motivated to push themselves
- 6) Answer to include:
 - Collecting questionnaires
 - Blood pressure measurements
 - Heart rate measurements
 - Measure of calorie input
 - Measure of calorie expenditure
- 7) Answer to include:
 - A test is valid if it measures what it is designed to measure
 - A test is reliable if the results can be repeated
 - Validity can be increased by ensuring the correct protocols are followed
 - Reliability can be increased by carrying out a test at least three times

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Value of Fitness Tests: Interview

Interview your partner by asking the following questions and writing down the answers. If they have missed any important points, write them down as well. Use one colour to record their answers and another colour to record anything they may have missed.

- 1) Why is fitness testing useful before starting a training programme?

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- 2) Why is fitness testing useful during and after a training programme?

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- 3) How does fitness testing ensure athletes remain interested in training?

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Now swap roles and do the same for the following questions

- 4) Why is fitness testing not always appropriate for certain sports?

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- 5) Briefly evaluate the use of maximal and sub-maximal fitness tests.

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- 6) Apart from fitness tests, how else can health-related data be collected?

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- 7) What are 'validity' and 'reliability' and how can they be increased?

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Activity 13 – Measuring Components

Teacher's Notes and Answers

Starter Activity: Test Procedures	
Aim of the activity	To understand which fitness tests can be used to measure fitness and the procedures of these tests.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. They should work with a partner and spend 10 minutes filling in one of the tables. They should provide information about the equipment needed, the name of the test, the fitness it measures and the units of measurement. Once they have completed their table, the students should explain their table to their partner so that they can check it.

Answers

Procedure summary	Equipment	Test
Measure a set distance (e.g. 50 m) and place a cone at each end. Start the stopwatch and see how far the participant can run/swim in 12 minutes.	tape measure, cones, stopwatch	Cooper 12-minute test
Sit on the floor and place your legs out in front of you, against the box. Try to reach forward as far as possible onto the box in front of you.	sit-and-reach box	sit-and-reach test
Perform as many press-ups as possible in one minute.	mat and stopwatch	one-minute press-up test
Measure the amount of subcutaneous fat that can be pinched at a range of anatomical points on the body and work out the density of the body using an equation.	skinfold callipers	body density test
Run between two marks, set 30 m apart, in the shortest time possible.	stopwatch, cones, sports hall and tape measure	30 m sprint test
Squeeze a dynamometer with your hand with maximum isometric contraction for around five seconds.	grip dynamometer	handgrip dynamometer
Run around the multidirectional course as quickly as possible.	cones, stopwatch	Illinois agility test

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Procedure summary	Equipment	Test
Balance on one leg with the other leg raised with the foot placed against the standing leg's knee for as long as possible.	stopwatch	stork balance test
Run between two lines of cones set 20 m apart in time to the signal (bleep) on an audio tape. You must arrive at the other end in time with the signal and then run back. The time between the signals will get progressively shorter as you progress through the stages.	cones, stopwatch, CD player	multistage fitness test
Perform as many abdominal curls as you can while keeping in time with a metronome set to 20 bpm.	stopwatch, mat	Abdominal curl test
Perform one repetition of a weightlifting exercise with as much weight as possible.	weights	One-repetition max test
Lie face down on the floor and reach above your head with both arms to hold onto a measuring stick. Try to lift your arms as far up the stick as you can.	measuring stick	hyperextension test
Throw a ball against a wall and catch it in the opposite hand as many times as possible in 30 seconds.	wall, tennis ball, stopwatch	alternate hand throw test
Place your fingers either side of the bottom of a ruler as an assistant holds it. Grab the ruler as quickly as possible when they drop it.	ruler	ruler drop test
Reach as high as possible while standing with your feet on the ground and mark the height against the wall. Now perform a standing jump and try to reach as high as possible and mark the wall at the peak of the jump.	ruler, wall, chalk	vertical jump

Measuring Components of Fitness: Test Pro

Brief test procedures have been provided for a range of fitness tests. Write in the blank spaces in the table by identifying the equipment needed, the appropriate component of fitness it measures and the units of measurement. One person should complete the first table and the other person should complete the second. After you have the information, come back together and talk each other through your

Procedure	Equipment	Test
Measure a set distance (e.g. 50 m) and place a cone at each end. Start the stopwatch and see how far the participant can run/swim in 12 minutes.		
Sit on the floor and place your legs out in front of you, against the box. Try to reach forward as far as possible onto the box in front of you.		
Perform as many press-ups as possible in one minute.		
Measure the amount of subcutaneous fat that can be pinched at a range of anatomical points on the body and work out the density of the body using an equation.		
Run between two cones, set 30 m apart, in the shortest time possible.		
Squeeze a dynamometer with your hand with maximum isometric contraction for around five seconds.		
Run around the multidirectional course as quickly as possible.		
Balance on one leg with the other leg raised with the foot placed against the standing leg's knee for as long as possible.		

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Procedure	Equipment	Test
Run between two lines of cones set 20 m apart in time to the signal (bleep) on an audio tape. You must arrive at the other end in time with the signal and then run back. The time between the signals will get progressively shorter as you progress through the stages.		
Perform as many abdominal curls as you can while keeping in time with a metronome set to 20 bpm.		
Perform one repetition of a weightlifting exercise with as much weight as possible.		
Lie face down on the floor and reach above your head with both arms to hold onto a measuring stick. Try to lift your arms as far up the stick as you can.		
Throw a ball against a wall and catch it in the opposite hand as many times as possible in 30 seconds.		
Place your fingers either side of the bottom of a ruler as an assistant holds it. Grab the ruler as quickly as possible when they drop it.		
Reach as high as possible while standing with your feet on the ground and mark the height against the wall. Now perform a standing jump and try to reach as high as possible and mark the wall at the peak of the jump.		

Activity 14 – Fitness Test

Teacher's Notes and Answers

Starter Activity: Report	
Aim of the activity	To be able to interpret data from fitness test results and normative data tables.
Teacher's instructions	Photocopy the two activity pages and hand one to each student to read through the results and tables of normative data before the test on the second page. Then feed back the correct answers to the students and mark their own work.

Answers

1. Cooper 12-minute test
2. Flexibility and muscular endurance
3. He scored well on the tests for cardiovascular fitness (Cooper 12-minute test) and speed (30 m sprint test) which are all important for fitness. He did not score well on the test of muscular endurance (one-minute press-up) and for the muscular endurance of the arms which is of little importance. 1,500 m.
4. The sit-and-reach test
5. No. The tables of normative data that Stephanie should compare her results to are the differences in scores recorded by male and female participants.
6. No. Stephanie would compare better to national averages if she scored higher due to the normative data for females being lower for all tests except the Cooper 12-minute test.

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Fitness Test Data: Report

Compare the results achieved by Hugo (a 16-year-old 1,500 m runner) to the results of other students and answer the questions on the following page.

Cooper 12-minute test	2,820 m
Sit-and-reach	3.9 cm
One-minute press-up	17
Vertical jump	54 cm
30 m sprint	4.1 s

Cooper 12-minute test

Age	Excellent	Above Average	Average
15–16	>2800 m	2500–2800 m	2300–2499 m

Sit-and-reach test

Age	Excellent	Above Average	Average
16–19	>14	14.0–11.0	10.9–7.0

One-minute press-up test

Age	Excellent	Good	Average
Teens	45+	31–41	26–29

Vertical jump test

Age	Excellent	Above Average	Average
16–19	>65 cm	50–65 cm	40–49 cm

30 m sprint test

Age	Excellent	Above Average	Average
16–19	<4	4.0–4.2	4.3–4.4

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Answer the following questions relating to Hugo's performance in the tests

1. In which test did Hugo perform the best compared to national average?

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2. Which components of fitness should Hugo try to improve?

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3. Did Hugo score highly in the tests which are important for competing at the international level? Explain your answer.

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4. Which test did Hugo score the worst on compared to national average?

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5. Hugo's training partner Stephanie also took part in the same fitness tests. Add her results to the tables above in order to determine how well she scored compared to Hugo.

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6. If Stephanie scored the same results as Hugo, would she compare well to the national average? Explain your answer.

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Activity 15 – Types of Training

Teacher's Notes and Answers

Starter Activity: Guess the Method

Aim of the activity	To understand what the different types of training involve and for what sport or physical activities they are useful for.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students between five and ten minutes to read the statements and guess the type of training they relate to. Students should then write down one advantage and one disadvantage of each method.

Answers

- 1) This requires the athlete to perform a number of different exercises in a set order.
- 2) The athlete performs this exercise at a steady pace for a prolonged period.
- 3) This requires the athlete to continually lift large loads, and will result in muscle hypertrophy.
- 4) This can be performed on a range of terrains at different speeds.
- 5) This exercise is interspersed with periods of rest / low-intensity exercise.
- 6) This involves bounding or jumping in order to increase power through the use of eccentric contractions followed by larger concentric contractions.

Students could provide one of the following advantages and disadvantages, or any other appropriate answer.

Type of Training	Advantages	Disadvantages
Circuit training	- different components of fitness and skills can be developed - intensity of work and rest periods can be altered	- requires a lot of equipment - can be time consuming
Continuous training	- improves cardiovascular endurance - improves muscular endurance	- can be boring - does not improve strength
Weight training	- improves strength - improves muscular endurance - improves power	- can be boring - requires a lot of equipment - not suitable for all ages
Fartlek training	- useful for games players - more varied than continuous training	- requires a lot of equipment - difficult to organise
Interval training	fitness improvements can be made with relatively little time spent exercising	- physically demanding - requires a lot of equipment
Plyometric training	improves power	high risk of injury

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Types of Training: Guess the Method

Identify which type of training session each of the people below is talking to the images below to place next to each statement. Then discuss each partner got the same answers.

Then, write down one advantage and one disadvantage of each training

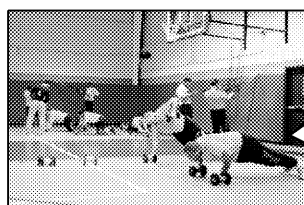
1	2	3	4	5
Circuit training	Continuous training	Weight training	Fartlek training	Interval training

☐

This exercise is interspersed with periods of rest or low exercise.

Advantage:

Disadvantage:



This requires the athlete to perform a number of different exercises at each station that they move through.

Advantage:

Disadvantage:

☐

The athlete performs this exercise at a steady pace for a set period of time.

Advantage:

Disadvantage:



This can be performed on a range of terrains.

Advantage:

Disadvantage:

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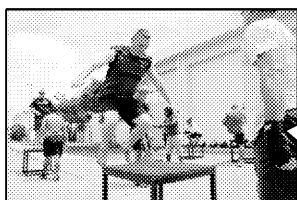




This requires the athlete to continually lift large loads, a in strength gains.

Advantage:

Disadvantage:



This involves bounding or jumping in order to reach the basket through eccentric contractions followed by concentric contractions.

Advantage:

Disadvantage:

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Activity 16 – Training Methods

Teacher's Notes and Answers

Plenary: Speech Bubbles	
Aim of the activity	To understand the factors that need to be considered when choosing appropriate training methods and training intensities for different people and sports.
Teacher's instructions	Photocopy the activity page and hand one to each student. They should be asked to complete the activity by filling in the blank speech bubbles for a given person. The advice should contain what forms of training are most appropriate and what intensity of training is the most appropriate for that person. They should also calculate the appropriate heart rate training zone.

Answers

Below are the most appropriate training methods and intensities which would be suitable for the case study:

- i) This person should take part in continuous training or fartlek training. This training should be performed at light intensity of 50 – 60% using the Karvonen formula.

Minimum heart rate (50%): $220 - 26 = 194$ $194 - 80 = 114$ $114 \times 0.50 + 80 = 137 \text{ bpm}$	Maximum heart rate (60%): $220 - 26 = 194$ $194 - 80 = 114$ $114 \times 0.60 + 80 = 148 \text{ bpm}$
--	--

- ii) This person should use circuit training. The circuit can be developed to target a range of different fitness components. They should work aerobically by training at 70 – 80% of their predicted maximum heart rate using the Karvonen formula.

Minimum heart rate (70%): $220 - 16 = 204$ $204 - 74 = 130$ $130 \times 0.70 + 74 = 165 \text{ bpm}$	Maximum heart rate (80%): $220 - 16 = 204$ $204 - 74 = 130$ $130 \times 0.80 + 74 = 178 \text{ bpm}$
--	--

- iii) This person should use interval training and plyometrics. When performing this training, they should work anaerobically by training at 90 – 95% of their predicted maximum heart rate using the Karvonen formula.

Minimum heart rate (80%): $220 - 25 = 195$ $195 - 69 = 126$ $126 \times 0.80 + 69 = 170 \text{ bpm}$	Maximum heart rate (90%): $220 - 25 = 195$ $195 - 69 = 126$ $126 \times 0.90 + 69 = 188 \text{ bpm}$
--	--

Karvonen formula:

- $220 - \text{age} = \text{Maximum heart rate}$
- $\text{Maximum heart rate} - \text{resting heart rate} = \text{heart rate reserve}$
- $(\text{Heart rate reserve} \times \text{training \%}) + \text{resting heart rate} = \text{target heart rate}$

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Training Methods: Speech Bubbles

Read each of the small case studies. For each person think about their current level of fitness and the facilities available to them. Based on this information write speech bubbles with:

- 1) What you think is the most appropriate training method for them to achieve their goals.
- 2) What intensity you think they should work at or get participants working at to achieve their goals.
- 3) For each individual, use the Karvonen formula to calculate their target heart rate.

i)

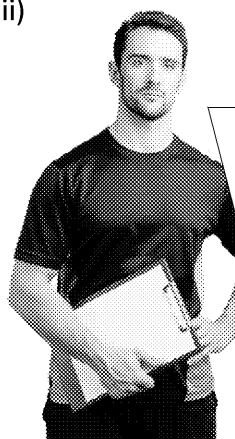


I am 26 years old with a resting heart rate of 80 bpm and I have never taken part in a formal exercise programme before and don't have access to a gym. I would like to improve my cardiovascular endurance so that I can reduce my blood pressure as I have hypertension.

1).....
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Calculations:

ii)

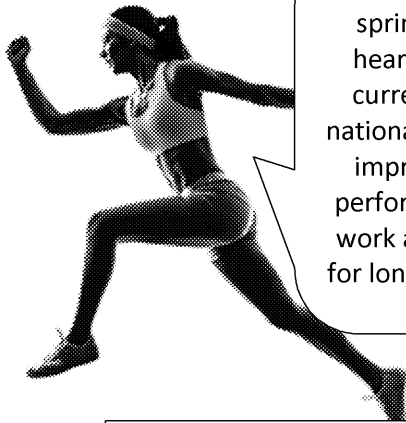


I am a fitness coach for a local hockey team. I want to help one of my 16-year-old athletes who has a resting heart rate of 74 bpm to develop their aerobic fitness in order to improve overall performance and I have been given access to a range of equipment in order to achieve this.

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Calculations:

iii)



I am a 25-year-old 200 m sprinter with a resting heart rate of 69 bpm. I currently compete at a national level and I want to improve my anaerobic performance so that I can work at a higher intensity for longer during my races.

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Calculations:

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Activity 17 – Principles of Training

Teacher's Notes and Answers

Plenary Activity: Tweet the Lesson

Aim of the activity	To understand the key principles of training and how to apply them
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give them 5 minutes to create a tweet which summarises each principle and includes a relevant hashtag in order to engage the public with the topic. You can then remind the students about any principles that they are struggling with. Use 140 characters per tweet. Extend this to 160 if students are confident.

Answers

Each tweet to include information relating to the following:

1. Specificity – The training needs to include the same skills and fitness as the sport #MatchToSport
e.g. focusing mostly on positions which improve the flexibility of legs
2. Progression – You need to increase your workload as your body adapts
e.g. performing harder positions once the athlete starts to find the current ones easy
3. Overload – You need to stress your body in order to develop #Don'tOverload
e.g. the athlete should ensure that they are optimally stretching the muscles
4. Frequency – The number of times training sessions occur #HowOften
e.g. the athlete could take part in two sessions per week
5. Intensity – The amount of work performed in each training session #Intensity
e.g. the athlete could take fewer rest periods during the session
6. Duration – The amount of time spent training during each session #Duration
e.g. the athlete could perform hour-long sessions instead of 30-minute ones
7. Variance – The type of activity performed during each training session #Variance
e.g. the athlete could take part in different types of yoga in order to improve flexibility

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Principles of Training and FITT: Tweet the

Create a series of tweets which summarise the principles of training listed in the table above. You should include examples to support your information (include a creative hashtag as well). Explain how each principle could be used to improve the fitness of an athlete who is trying to become more active.

You can only use 140 characters per tweet.

Tweet 1: Specificity

Tweet 2: Progression

Tweet 3: Overload

Tweet 4: Frequency

Tweet 5: Intensity

Tweet 6: Duration

Tweet 7: Variance

Tweet 1:

[illegible]

Example of use:

.....

Tweet 2:

[illegible]

Example of use:

.....

Tweet 3:

[illegible]

Example of use:

.....

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Tweet 4:

[illegible]

Example of use:

.....

Tweet 5:

[illegible]

Example of use:

.....

Tweet 6:

[illegible]

Example of use:

.....

Tweet 7:

[illegible]

Example of use:

.....

Activity 18 – Warm-ups and Cool-downs

Teacher's Notes and Answers

Starter Activity: Instructor	
Aim of the activity	To understand the components of an effective warm-up and the benefits of both.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 5 minutes to plan a warm-up or cool-down for their partner. Each student then takes turns instructing their partner through their chosen activity. When the activities are being performed, walk around the room to ensure their chosen activities are appropriate for the components of a warm-up or cool-down. They may wish to provide some equipment or ask students to perform the activity without equipment.

Answers

The following are examples of activities that could be included:

Warm-up:

- gentle walking and then jogging to raise the heart rate
- a series of active/passive/dynamic stretching
- a series of proprioceptive neuromuscular facilitation (PNF) stretching
- a period of skill practice, e.g. keeping the ball up when preparing for a football match
- a period of rest for mental preparation, e.g. deep breathing to relax
- high-paced jogging in order to improve the delivery of oxygen

Students should cover the following benefits of warming up:

- raises the body temperature
- increases range of movement that can be achieved at a joint by increasing the elasticity of the muscles
- provides an opportunity to gradually increase the intensity of work
- gradually increases the heart rate
- provides an opportunity to practise skills
- reduces the risk of becoming injured
- increases pliability of the ligaments and tendons as muscles are more flexible and relaxed
- increases supply of oxygen to the muscles which will be active
- ensures rapid muscle contractions can be performed when the exercise begins
- allows the athlete to mentally prepare and get themselves into 'the zone'
- provides an opportunity to improve focus and motivation

Cool-down:

- a period of jogging in order to maintain the heart rate at an elevated rate
- slowly reduce the jogging to walking in order to reduce the heart rate
- a period of static stretching in order to reduce muscle stiffness and the delayed onset muscle soreness (DOMS)

Students should cover the following benefits of cooling down:

- provides an opportunity to recover from the effects of exercise and transition to rest
- provides an opportunity to accelerate the recovery process following exercise
- provides an opportunity to rehydrate by drinking water and isotonic sports drinks
- provides an opportunity for the heart rate to reduce
- provides an opportunity for the breathing rate to reduce
- provides an opportunity for the body temperature to decrease to normal body temperature
- maintains the circulation of blood and oxygen to the working muscles in order to remove products of exercise, i.e. lactic acid, to be removed
- prevents or reduces delayed onset of muscle soreness (DOMS) and stiffness
- provides an opportunity for oxygen to continue to be transported to the muscles to repay the oxygen debt
- allows the muscles to continue to be stretched in order to maintain muscle flexibility

Other methods:

- ice baths
- massage

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Warm-ups and Cool-downs: Instructor

Ask your partner what sport they play. Then, using the basic guidelines, create a minute warm-up or cool-down for them to complete.

Choose who will instruct first and take your partner through their warm-up or cool-down. Then inform them of the benefits of warming up / cooling down as they are performing. Then swap roles.

Warm-up should include:

- a pulse raiser
- stretching
- proprioceptive neuromuscular facilitation (pnf)
- skill practice
- any other important activities

Cool-down should include:

- low-intensity exercise
- stretching
- any other important activities

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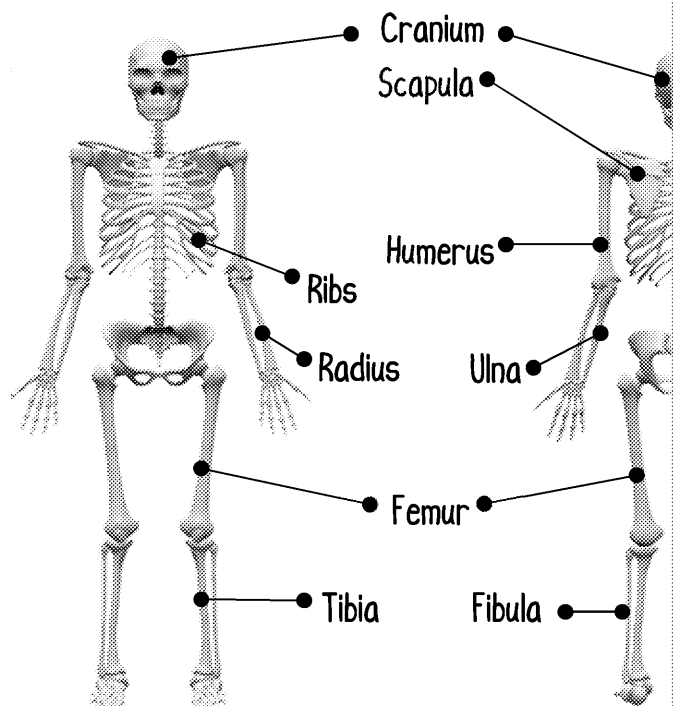
What methods of cool-down could you perform if you had specialist equipment?

Activity 19 – Location of Major Bones

Teacher's Notes and Answers

Starter Activity: Label Your Mate	
Aim of the activity	To allow students to gain an understanding of the bones and joints and be able to identify their locations.
Teacher's instructions	Photocopy the labels on the next page and give one set to each pair of students. Give each student a piece of sticky tape for the class. The students should cut out the labels and stick one piece of sticky tape onto the top of each label. One student in each pair acts as a model while the other student sticks the labels onto the model. The students then work together to identify the location of each bone. During the activity, ensure that students are taking part and that both students in each pair are contributing. Because this activity involves students labelling each other, ensure that they do so carefully. For example, you may wish to pair students who are of similar height.

Answers



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Location of Major Bones: Label Your Mate

Cut out the following labels and use the sticky tape to correctly label the
Remember to work together to identify the bones.



Radius

Humerus

Tibia

Scapula

Ribs

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Activity 20 – Joint Types and Movements

Teacher's Notes and Answers

Starter Activity: Guess The Movement

Aim of the activity	To provide an opportunity for students to develop their knowledge of joints and the type of movement that can occur at specific joints.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Ask them to spend 10 minutes identifying the joints in each picture, the type of joint it is, the articulating bones involved and the movements that can occur at the joint. Ensure that the students identify all of the joints (wrist, elbow, ankle and shoulder) and what type of movement can occur at each joint.

Answers

- 1) Joints which contain a capsule filled with synovial fluid and surrounded by a layer of hyaline cartilage. They can be classified into different types of synovial joints based on different form of movement.
- 2)
 - i) **Joint:** elbow (right)
Articulating Bones: humerus, radius and ulna
Joint Type: hinge joint
Movements: flexion during preparation phase and extension during the shot
 - ii) **Joint:** knee (right)
Articulating Bones: femur, tibia and fibula
Joint Type: hinge joint
Movements: flexion during preparation phase (backswing) and extension during the phase (forwards swing)
 - iii) **Joint:** shoulder (right)
Articulating Bones: humerus and scapula
Joint Type: ball-and-socket joint
Movements: abduction during backwards preparation phase and adduction during the phase of the shot
- Joint:** elbow (right)
Articulating Bones: humerus, radius and ulna
Joint Type: hinge joint
Movements: flexion during preparation phase and extension during the shot

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- iv) **Joint:** radioulna
Articulating Bones: radius and ulna
Joint Type: pivot
Movements: rotation (pronation)

Joint: shoulder
Articulating Bones: humerus and scapula
Joint Type: ball-and-socket joint
Movements: adduction during preparation phase (backswing) phase (forwards swing) of the shot

Joint: elbow
Articulating Bones: humerus, radius and ulna
Joint Type: hinge joint
Movements: flexion during backswing (preparation phase), extension (execution phase)
- v) **Joint:** shoulder
Articulating Bones: humerus and scapula
Joint Type: ball-and-socket joint
Movements: rotation

Joint: elbow
Articulating Bones: humerus, radius and ulna
Joint Type: hinge joint
Movements: flexion during preparation phase (withdrawing arm) execution phase (pushing down on wheels)
- vi) **Joint:** elbow
Articulating Bones: humerus, radius and ulna
Joint Type: hinge joint
Movements: extension

Joint: shoulder
Articulating Bones: humerus and scapula
Joint Type: ball-and-socket joint
Movements: abduction
- vii) **Joint:** shoulder
Articulating Bones: humerus and scapula
Joint Type: ball-and-socket joint
Movements: circumduction
- viii) **Joint:** hip
Articulating Bones: femur
Joint Type: ball-and-socket joint
Movements: flexion during downwards phase, extension during upwards phase

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Joint Types and Movements: Guess the Movement

1) Define what is meant by a synovial joint.

.....

.....

2) Now complete the sporting actions below by identifying the joint in the type of joint it is and the movements demonstrated.

i) Basketball shot



Joint: *Elbow (right)*

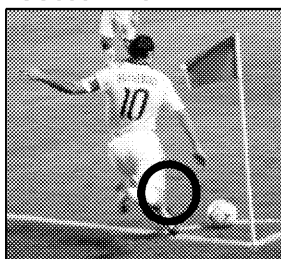
Articulating Bones:

Joint Type:

Movements (preparation phase)

Movements (execution phase)

ii) Football kick



Joint: *Knee (right)*

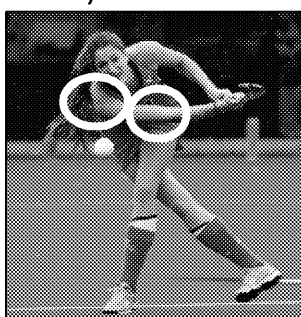
Articulating Bones:

Joint Type:

Movements (preparation phase)

Movements (execution phase)

iii) Hockey shot



Joint: *Shoulder (right)*

Articulating Bones:

Joint Type:

Movements (preparation phase)

Movements (execution phase)

Joint: *Elbow (right)*

Articulating Bones:

Joint Type:

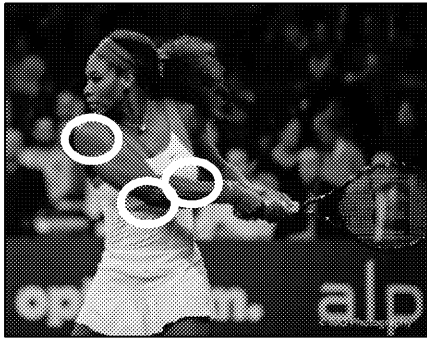
Movements (preparation phase)

Movements (execution phase)

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iv) Tennis topspin



Joint:

Articulating Bones:

Joint Type: *Pivot*

Movements:

Joint:

Articulating Bones:

Joint Type: *Ball-and-socket*

Movements (preparation phase)

Movements (execution phase)

Joint:

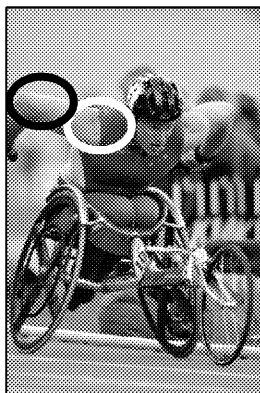
Articulating Bones:

Joint Type: *Hinge*

Movements (preparation phase)

Movements (execution phase)

v) Wheelchair sprinting



Joint:

Articulating Bones:

Joint Type:

Movements: *Rotation*

Joint:

Articulating Bones:

Joint Type:

Movements (preparation phase)

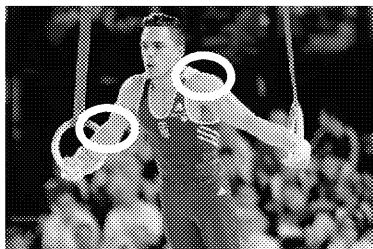
Movements (execution phase)

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vi) Outstretched arms on the rings



Joint: *Elbow*

Articulating Bones:

Joint Type:

Movements: *Extension*

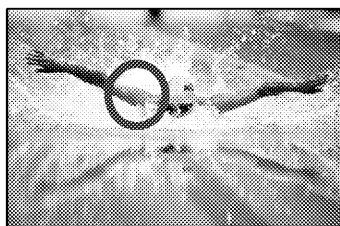
Joint:

Articulating Bones:

Joint Type:

Movements: *Abduction*

vii) Butterfly stroke



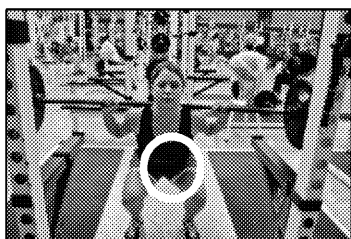
Joint:

Articulating Bones:

Joint Type:

Movements:

viii) Squats



Joint: *Hip*

Articulating Bones:

Joint Type:

Movements (up):

Movements (down):

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Activity 21 – Components of

Teacher's Notes and Answers

Starter Activity: Fact File	
Aim of the activity	To understand the role of ligaments and tendons.
Teacher's instructions	Photocopy the activity page and hand one to each student. Give students five minutes to write down as many roles and characteristics of a synovial joint as they can think of. Then spend five minutes to discuss and feed back the characteristics they identified in order to add them to the list on the board for each of the structures.

Answers

Ligaments:

- connect bones to bones
- stabilise the joint
- strong
- malleable, i.e. structure can be altered
- form of connective tissue
- hold the joint together
- can be damaged when turning sharply

Tendons:

- form of connective tissue
- transfer the force of a muscular contraction onto the bones
- pull the bones
- allow movement at a joint

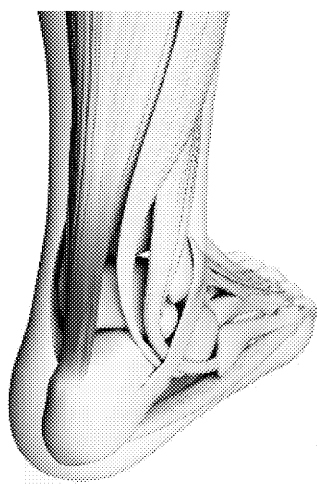
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Ligaments



Activity 22 – Functions of the S

Teacher's Notes and Answers

Starter Activity: Forbidden Words	
Aim of the activity	To allow students to test their knowledge of the functions of the skeletal system.
Teacher's instructions	Photocopy the tables on the next page and give to one student. Give students 10 minutes to complete both parts of the activity. Then return to the classroom listening to the students to check that they have understood their time is up, ask students to feed back their ideas for improvement.

Answers

Keyword	Example of description	Importance
Protection	Flat bones ensure that vital organs are not easily damaged.	It reduces the risk of being injured.
Movement	Muscles attach to the bones to put the body in motion. Different joint types allow different movements.	It allows for a healthy and active lifestyle.
Support	Ensures the body is able to stay upright.	It allows for correct body posture and successful movement.
Blood cell production	Bone marrow produces red blood cells, white blood cells and platelets that all have individual functions such as red blood cells (transporting nutrients), white blood cells (immune defence) and platelets (clotting blood).	Red blood cells transport oxygen from the lungs to the rest of the body. White blood cells fight off disease by destroying pathogens.

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Describe each of the functions (without saying the keyword or forbidden words). You must describe the words in relation to the function; so, for example, you cannot describe 'support' as '*being there for*' or 'are upset'.

Part b:

The skeletal system provides a number of functions. For each of the functions, your partner to provide an explanation for why it is important for participation in physical activity.

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Activity 23 – Classification of Muscles

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Teacher's Notes and Answers

Plenary: Fact File	
Aim of the activity	To be able to classify different types of muscle and understand the characteristics of each type.
Teacher's instructions	Photocopy the activity page and hand one to each student. Give students 5 minutes to write down characteristics of each type of muscle. Then give students 5 minutes getting the students to feed back the characteristics. Finally, give students 5 minutes to create a list of characteristics on the board for each type.

Answers

Skeletal (voluntary muscles):

- Under conscious control
- Can contract them when you want to
- Contraction of these muscles requires the person to think about a movement
- They are used for movement
- All the major muscle groups of the body such as the quadriceps are skeletal muscles
- They can become fatigued
- There are two categories of voluntary muscle fibres: fast-twitch and slow-twitch

Smooth (involuntary muscles):

- Not under conscious control
- Controlled by the subconscious
- They control our internal organs such as the stomach
- They are important for bodily functions
- They assist digestion and breathing
- They allow vital processes to occur at night when you are asleep

Cardiac muscle:

- This type of muscle is found in the heart
- This is a type of involuntary muscle
- Not under conscious control
- Allows the heart to beat with a continuous rhythm
- Allows blood to be pumped around the body as we sleep
- Ensures that the oxygen demand of the body can be met
- Very resistant to fatigue
- High number of mitochondria
- Very good blood supply

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Classification of Muscles: Fact File

Complete the fact files below by writing down the characteristics of the

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Skeletal (Voluntary Muscles)

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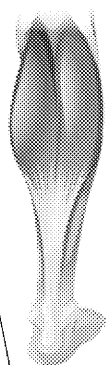
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Smooth

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Cardiac Muscle

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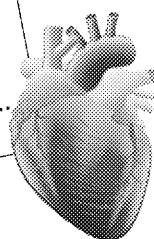
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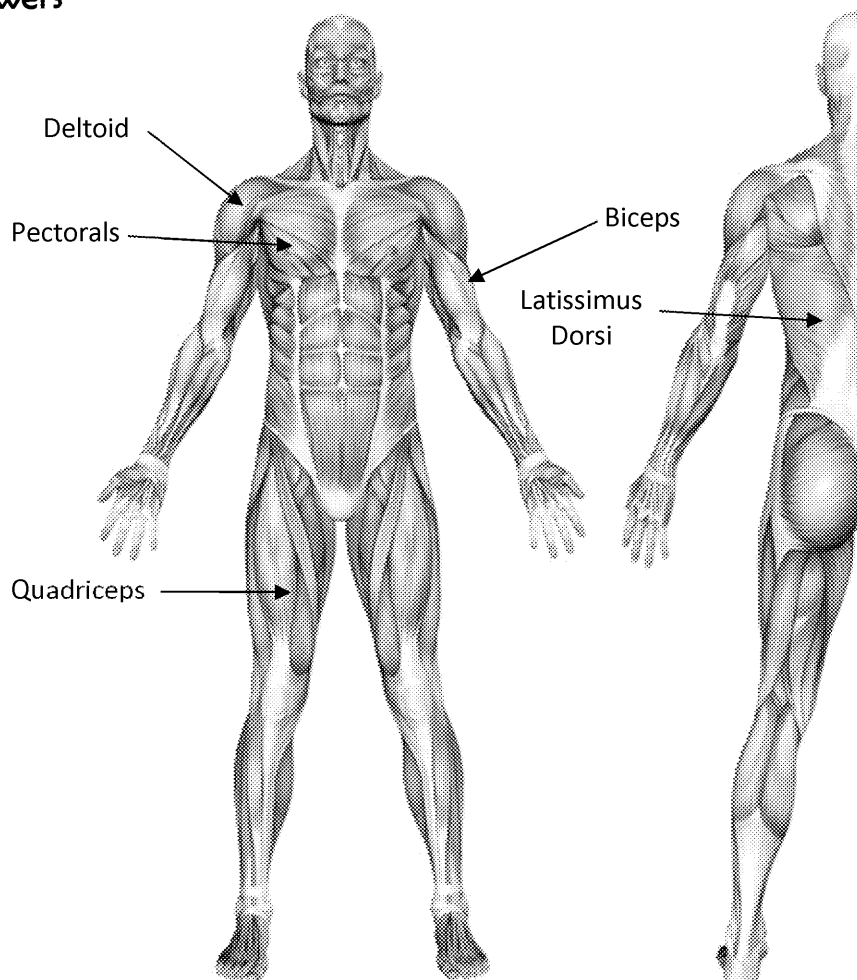


Activity 24 – Muscles of the

Teacher's Notes and Answers

Starter Activity: Label Your Mate	
Aim of the activity	To allow students to develop an understanding of the major muscles of the body.
Teacher's instructions	Photocopy the labels on the next page and give one set of labels to each pair of students. Give each student a piece of sticky tape onto the top of each label. One student should be the model while the other student sticks the labels on the model. The pair should work together to identify the location of each muscle. Then, if they have time, students should identify the main function of each muscle, by writing on each label. During the activity, ensure that students are taking part and that both students in each pair are contributing. Because this activity involves students labelling each other, ensure that they do so carefully. For example, you may wish to pair students of the same sex to avoid any embarrassment. Also, omit muscles in more personal areas such as gluteus and hip flexors.

Answers



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Muscles of the Body: Label Your Mate

Cut out the following labels and use the sticky tape to correctly label the
Remember to work together to identify the muscles.



Biceps

Pectorals

Gastrocnemius

Latissimus dorsi

Quadriceps

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If you have time, begin to identify the movements each muscle can perform
write them down on each label.

flexion, extension, abduction, adduction, rotation, circumduction

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Activity 25 – Muscle Fibres

Teacher's Notes and Answers

Plenary activity: Colour-code	
Aim of the activity	To understand the different characteristics of fast- and slow-twitch muscle fibres and how they impact on physical activity.
Teacher's instructions	Photocopy the activity page and hand one to each student. Give students 5 minutes to complete the colour-coding activity and one minute to discuss what fibre types are important for the sports performed. Give students 5 minutes getting the students to feed back their answers.

Answers

Type I

- They are red
- Also known as slow-twitch
- Dense supply of myoglobin
- Dense supply of mitochondria
- Produce energy through aerobic respiration
- Can withstand prolonged aerobic exercise

Type IIa

- Also known as fast oxidative
- Dense supply of myoglobin
- Dense supply of mitochondria
- Produce energy through aerobic and anaerobic respiration
- Able to produce fast and strong contractions
- Do not fatigue easily but they are not the most fatigue-resistant muscle fibre

Type IIx

- They are white
- Low density of myoglobin
- Low density of mitochondria
- Produce energy through anaerobic respiration
- Able to produce fast and strong contractions
- The most easily fatigued muscle fibre

Students should identify the athletes as having the greatest proportion of:

- Middle-distance track cyclist – Type IIa
- Long-distance runner – Type I
- Weightlifter – Type IIx

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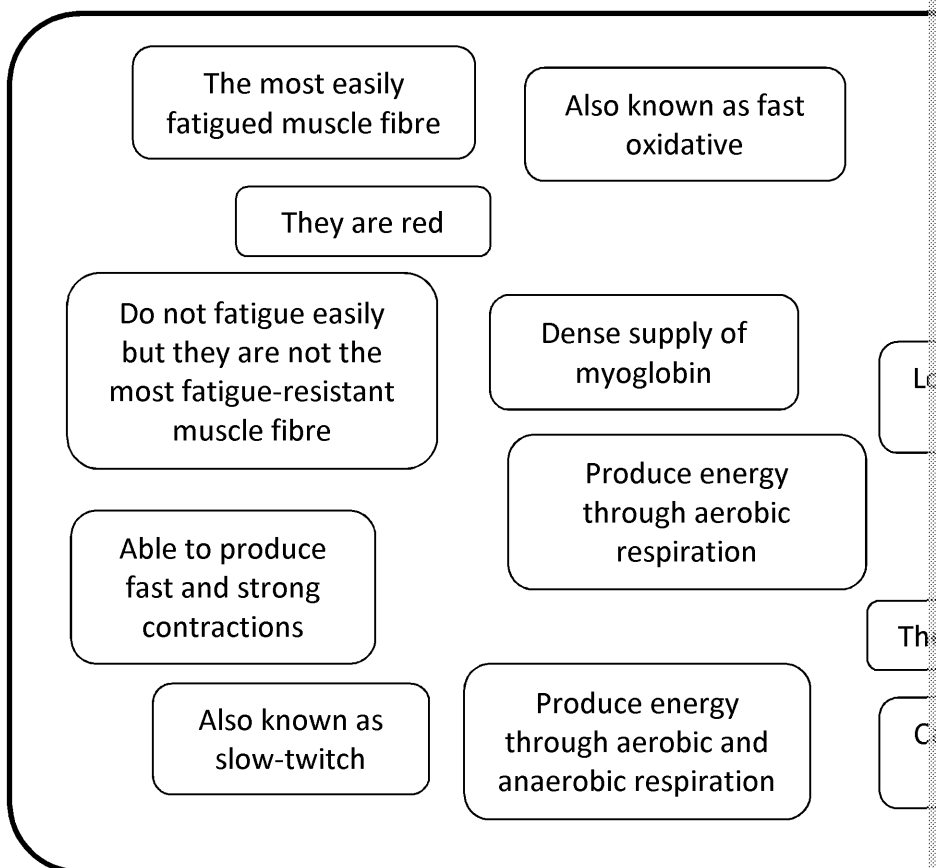
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Muscle Fibres: Colour-code

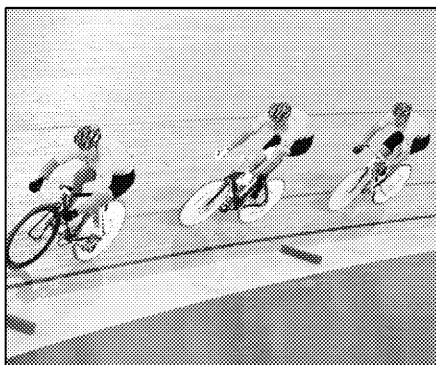
Colour-code the characteristics which match up with each of the different types of muscle fibre. Some characteristics will be relevant for more than one type of muscle fibre.

Muscle fibre	Colour
Type I	
Type IIa	
Type IIx	



Now identify which type of muscle fibre the following sports performers have a high proportion of.

Middle-distance track cyclist



Type of fibre:

Long-distance runner



Type of fibre:

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Activity 26 – Structure of the Cardiovascular System

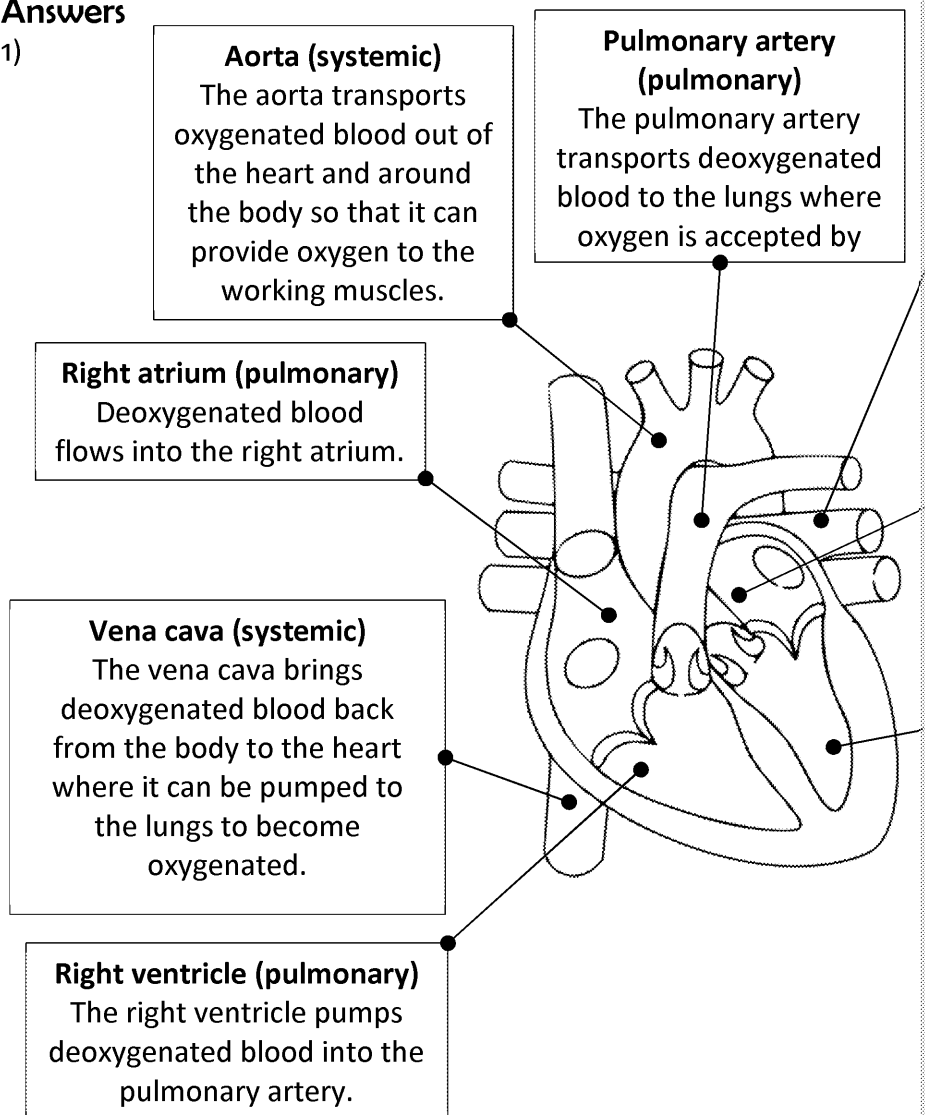
Teacher's Notes and Answers

Starter Activity: Blood Flow

Aim of the activity	To understand the structures of the heart and their role in circulation.
Teacher's instructions	Photocopy the activity page and give one copy to each group. Give the groups five minutes labelling the diagram with the correct structures. Then give them five minutes writing down what role each structure plays in the heart. Finally, give them five minutes writing down what role each structure plays in the working muscles during exercise and identifying what part of the pulmonary or systemic circulatory system.

Answers

1)



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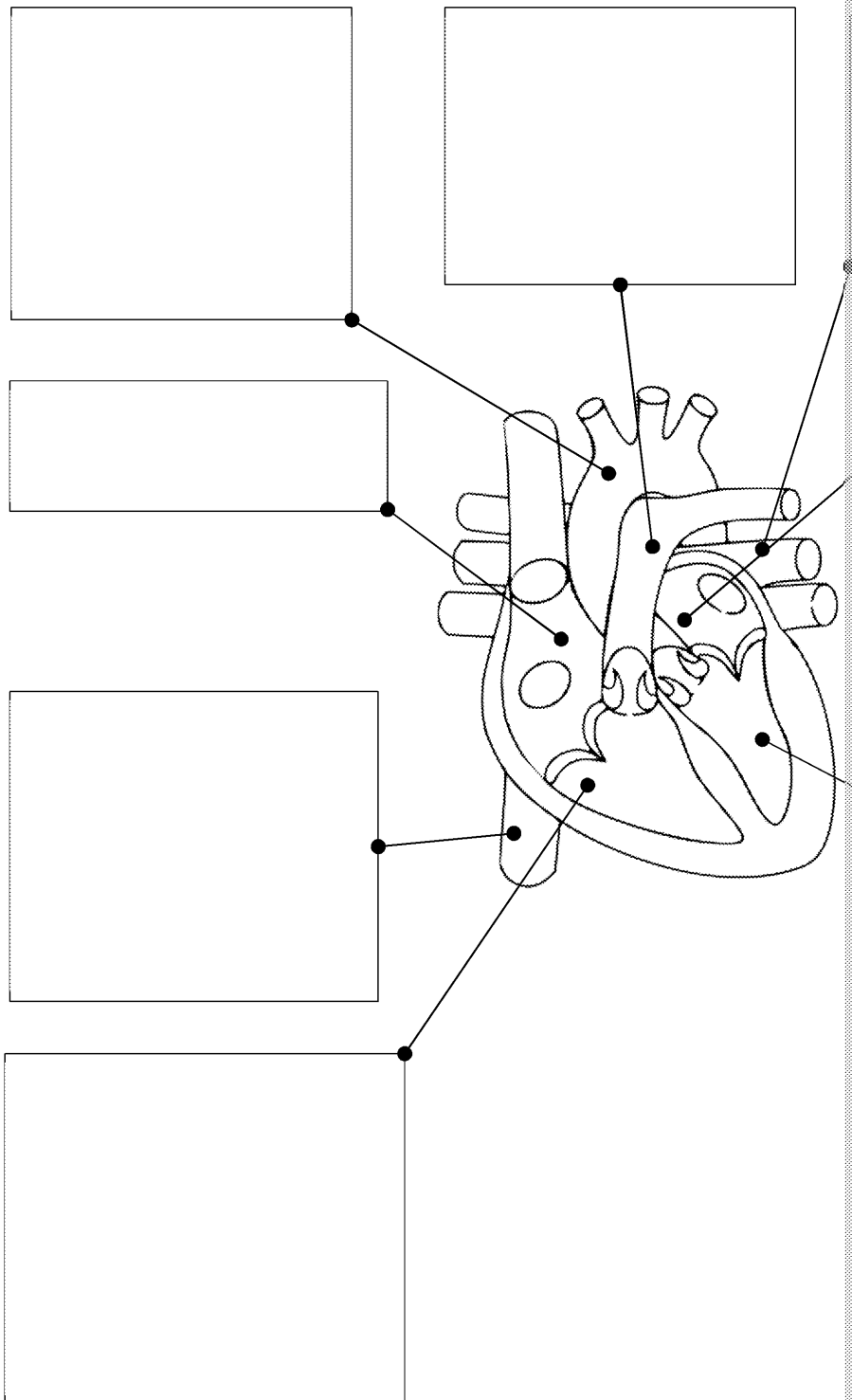
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Structure of the Cardiovascular System: Block 1

Label the diagram of the heart below with the following structures:
atria (right and left), ventricles (right and left), aorta, vena cava, pulmonary artery, pulmonary vein.

Then, for each of the labels you have identified, outline its role in maintaining blood flow and state whether it is part of the pulmonary or systemic circulatory system.



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Activity 27 – Functions of the Cardiovascular System

Teacher's Notes and Answers

Plenary activity: Fill in the Table

Aim of the activity	To understand the functions of the cardiovascular system.
Teacher's instructions	Photocopy the activity page and give one to each student. Students complete the activity and then ask the students to feed back to the rest of the class.

Answers

Students should identify the following functions and provide a similar response to the importance of each function in physical activity.

Photo	Function	Importance for physical activity
1	Thermoregulation	This allows athletes to avoid overheating by increasing the blood flow to the skin in order to increase heat loss. This is particularly important when exercising in hot weather.
2	Blood clotting	This ensures that athletes will not experience excessive bleeding when they develop cuts. This is particularly important in sports such as rugby or adventurous sports such as rock climbing where cuts are common.
3	Transport of nutrients	This ensures that nutrients provided by the diet, such as proteins and carbohydrates, can be transported to the muscles for muscular contractions during physical activity. This is important for muscle growth to occur after physical activity.
4	Transport of oxygen	This ensures that oxygen can be transported to the muscles in order for energy production to occur. This is particularly important when taking part in aerobic exercise such as running or swimming.
5	Transport of carbon dioxide	This ensures that carbon dioxide can be transported away from the working muscles. Carbon dioxide is transported to the lungs where it is exhaled. This is important as carbon dioxide is a waste product of exercise which can lower pH and cause fatigue if it is not removed.
6	Vasoconstriction/vasodilation	This ensures that blood flow can be adjusted to different parts of the body as they change. For example, during exercise, muscles will require increased blood flow to supply them with oxygen and nutrients, while non-working tissues, such as the digestive system, will vasoconstrict to reduce blood flow. Therefore, during exercise, supplying the working muscles will vasoconstrict the non-working tissues.

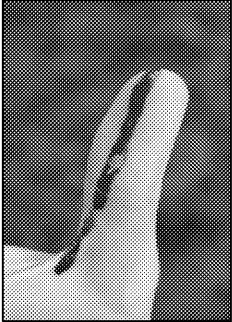
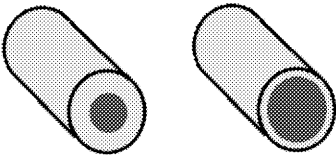
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Function of the Cardiovascular System: Fill

Identify five major functions of the cardiovascular system (using the photos) then write down the importance of each function for physical activity.

	Function	Importance
		
		
		
		
CO_2 $O=C=O$  <i>carbon dioxide</i>		
		

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Activity 28 – Heart Value

Teacher's Notes and Answers

Starter Activity: Cardiac Calculation

Aim of the activity	To understand heart rate, stroke volume, and cardiac output
Teacher's instructions	Photocopy the activity page and give one copy to each student. Give students 5 minutes to complete the match-up task and then ensure they understand the definitions before doing the calculations for the three individuals. Check the correct answers as a class.

Answers

1)

Heart Rate	→	The number of times the heart beats per minute
Stroke Volume	→	The amount of blood ejected from the heart per beat
Cardiac Output	→	The amount of blood ejected from the heart per minute

2) **Correct equation:**

$$\text{Cardiac Output} = \text{Stroke Volume} \times \text{Heart Rate}$$

3) **Individual 1:**

$$\text{Cardiac Output} = 70 \times 80$$

$$\text{Cardiac Output} = 5600 \text{ ml/min}$$

Individual 2:

$$\text{Stroke Volume} = 5025/67$$

$$\text{Stroke Volume} = 75 \text{ ml}$$

Individual 3

$$\text{Heart Rate} = 6175/65$$

$$\text{Heart Rate} = 95 \text{ bpm}$$

4) Students should provide the following information:

- 2012 – Systolic and diastolic blood pressure are 'high'
- 2013 – Systolic blood pressure is 'high' and diastolic blood pressure is 'pre-high'
- 2014 – Systolic and diastolic blood pressure are 'pre-high'
- 2015 – Systolic and diastolic blood pressure are 'pre-high'
- 2016 – Systolic and diastolic blood pressure are 'ideal'
- Overall, the individual's blood pressure changed from being 'high' to 'ideal'

Discussion points to include:

- Heart rate increases prior to, and during, exercise
- Stroke volume increases as the intensity of exercise increases
- Cardiac output increases as a result of an increased heart rate
- Blood pressure increases during exercise as a result of blood being pumped more forcefully
- Stroke volume only increases up to an exercise intensity of around 50% of maximum. After this, the increase in cardiac output is the result of an increased heart rate

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Heart Values: Cardiac Calculations

- 1) Match up the following terms relating to the heart with the correct definition:

Heart Rate	The amount of blood ejected from the heart
Stroke Volume	The number of times the heart beats per minute
Cardiac Output	The amount of blood ejected from the heart per minute

- 2) Now write an equation below to show the relationship between the three terms:

- 3) Check your equation is correct with your teacher and then use it to calculate the missing measurements of the individuals below; you may need to change your units for one measurement:

Individual 1	Individual 2
Heart Rate = 80 bpm	Heart Rate = 67 bpm
Stroke Volume = 70 ml	Stroke Volume =
Cardiac Output =	Cardiac Output = 5025 ml/min

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- 4) Analyse the table below which contains the resting blood pressure of an individual over a five-year period.

Year	Systolic
2012	150
2013	142
2014	137
2015	124
2016	118

Compare the values to the diagnostic chart below, which provides the unhealthy blood pressure ranges.

Range	Systolic
High	More than 140
Pre-high	120 to 139
Ideal	90 to 119
Low	70 to 89

Explain how the individual's systolic and diastolic blood pressure changes over the five-year period.

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Now discuss with the rest of the class how heart rate, stroke volume and blood pressure values would change as an athlete moves from rest to exercise.

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Activity 29 – Structures of the Respiratory System

Teacher's Notes and Answers

Starter Activity: Draw and Annotate

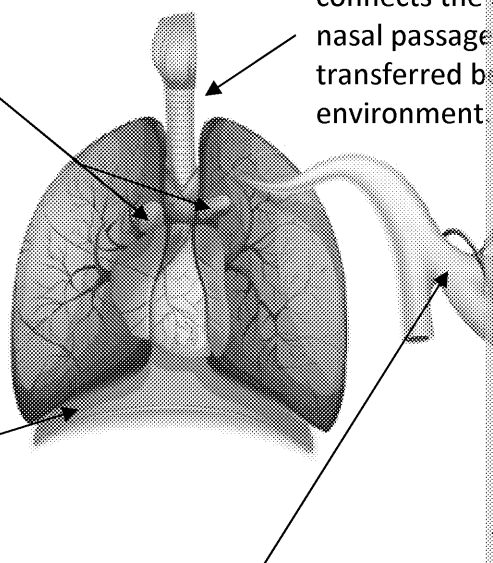
Aim of the activity	To be able to identify the structures that make up the respiratory system
Teacher's instructions	Photocopy the activity page and give one copy to each student. Give students 10 minutes to draw a diagram which displays the respiratory system and label each structure with an explanation of its function. Discuss the inhalation and exhalation of oxygen and carbon dioxide.

Answers

Students' images may vary, but should include the following components explained.

Bronchi – These branch off the windpipe and allow air to be transported from between the lungs and the atmosphere

Diaphragm – This is a dome-shaped muscle under the ribs which contracts and relaxes to change the capacity of the thoracic cavity and, therefore, causes inhalation and exhalation



Trachea – The trachea connects the trachea to the nasal passage and allows air to be transferred between the environment and the lungs

Bronchioles – These connect the alveoli to the bronchi and allow air to pass through them

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The Pathway of Air: Draw and annotate

Draw and label a diagram of the main components of the respiratory system. Each label with information about the role each structure plays in the pathway of air and carbon dioxide:

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Activity 30 – Gaseous Exchange

Teacher's Notes and Answers

Plenary Activity: True or False	
Aim of the activity	To help students identify the factors that allow gaseous exchange to take place.
Teacher's instructions	Photocopy the quiz provided and give one copy to each student. Students should complete the quiz independently and correct any statements that are false. When everyone has finished, read out the answers and correct answer for the false statements.

Answers

- 1) False – Gas moves from areas of high concentration to areas of low concentration.
- 2) True
- 3) False – Carbon dioxide can be transported by haemoglobin.
- 4) True
- 5) False – The larger the surface area of the alveoli, the more gas can be exchanged.
- 6) False – The alveoli are found within the lungs.
- 7) True
- 8) True
- 9) False – The alveoli have a short diffusion pathway for oxygen and carbon dioxide.
- 10) False – Oxygen is exhaled but in smaller quantities than it is inhaled.
- 11) True
- 12) False – Oxygenated blood supplies oxygen to the working muscles.
- 13) False – The blood is able to remove lactic acid from the muscles following exercise.
- 14) False – Carbon dioxide is a waste product of aerobic exercise only.

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Gaseous Exchange: True or False?

Decide if the following statements relating to gaseous exchange are true or false by circling your answer. For any false answers write the correct answer.

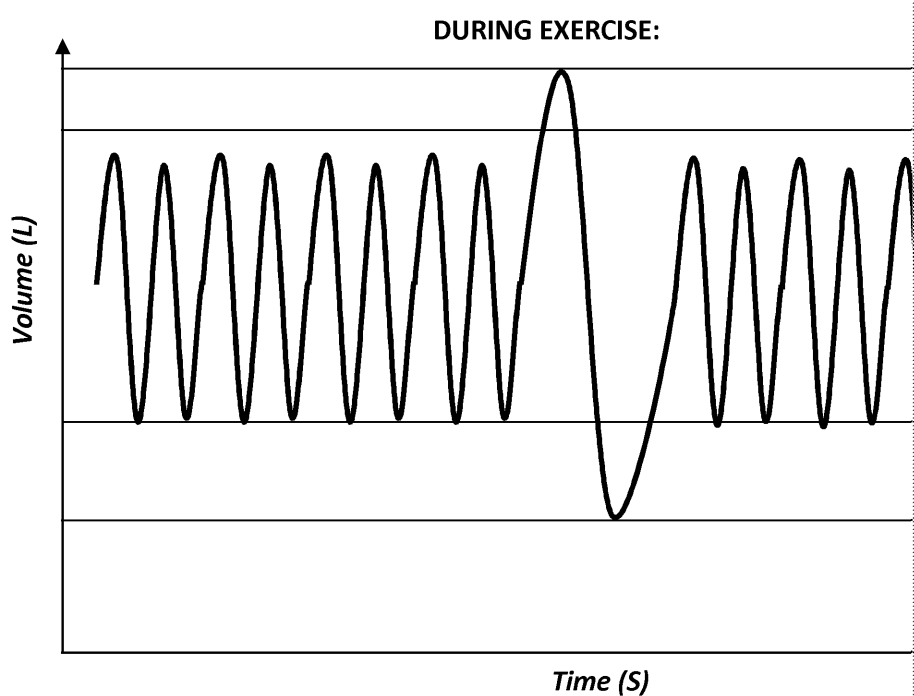
1. Gas moves from areas of low concentration to areas of high concentration.
2. Oxygen is transported by haemoglobin.
3. Carbon dioxide cannot be transported by haemoglobin.
4. The alveoli are only one cell thick.
5. The smaller the surface area of the alveoli, the more gas can be exchanged.
6. The alveoli are found at the ends of arteries and veins.
7. Gaseous exchange occurs at the capillaries.
8. The body can adapt by increasing the number of capillaries in order to improve the efficiency of gaseous exchange.
9. The alveoli have a large diffusion pathway for oxygen and other gases.
10. Oxygen is not exhaled from the body during aerobic respiration.
11. The longer aerobic exercise lasts, the more oxygen will need to be inhaled and the more carbon dioxide will need to be exhaled.
12. Deoxygenated blood supplies oxygen to the working muscles during aerobic exercise in order to fuel muscular contractions.
13. The blood is not responsible for removing the lactic acid produced during anaerobic exercise.
14. Carbon dioxide is a waste product of both aerobic and anaerobic exercise and, therefore, must be removed from the body when exercising aerobically and anaerobically.

Activity 31 – Interpreting a Spirometry Trace

Teacher's Notes and Answers

Starter Activity: Complete the Grid	
Aim of the activity	To be able to understand the different volumes represented on a spirometry trace and identify and discuss the differences between a resting and an exercising trace.
Teacher's instructions	Photocopy the activity page and hand one copy to each group. Give the groups 5 minutes to label the first trace, discuss the difference between the two traces and draw an exercising trace. Then discuss the differences between the two traces and draw an example of an exercising trace on the board.

Answers



Discussion point:

The tidal volume increases during exercise compared to at rest because the body needs to take in more oxygen with each breath in order to increase the amount of oxygen delivered to the working muscles. This oxygen is required in order to produce energy for the muscles.

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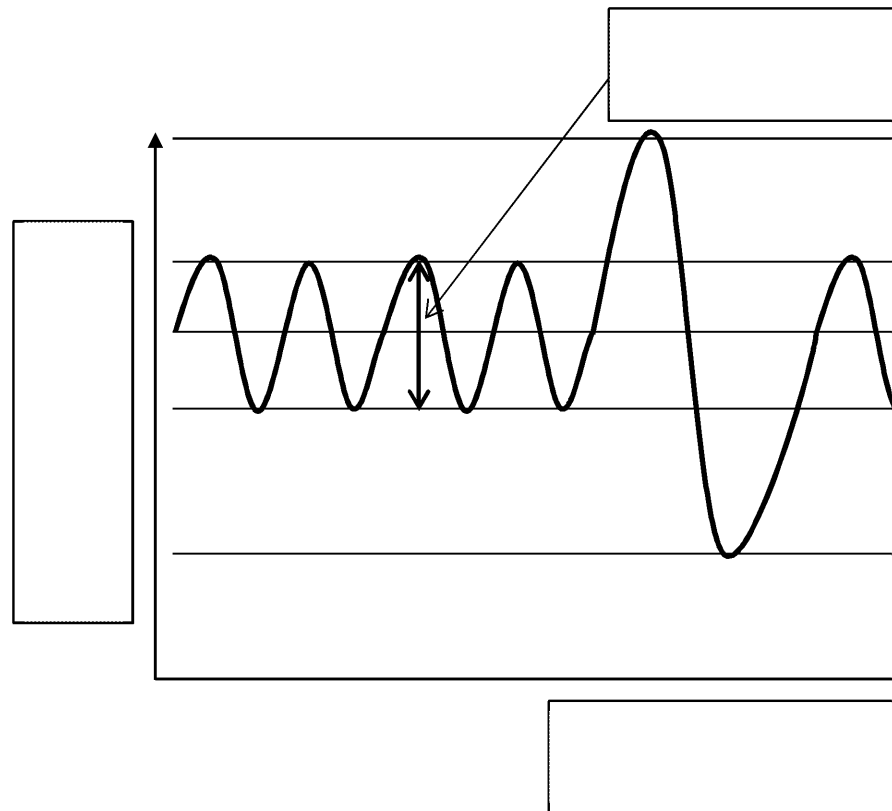
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Interpreting a Spirometer Trace: Complete the Graph

Label the following resting spirometry trace with the terms provided below (there are more terms than are correct).

Expiratory Reserve Volume, Inspiratory Reserve Volume, Tidal Volume, Residual Volume, Volume of Air Expired, Distance (M), Independent Residual Volume



Now discuss with a partner the differences between a spirometry trace of an athlete at rest and the one you have just discussed the differences, draw a spirometry trace (using a different colour) over the graph above.

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Activity 32 – Lung Volumes

Teacher's Notes and Answers

Plenary Activity: Data Analysis

Aim of the activity	To be able to understand the different volumes relating to breathing.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 5 minutes to provide a description of the three terms and answer the data analysis question.

Answers

- 1)
 - Breathing frequency (rate): the number of times a person inhales and exhales in a given time.
 - Tidal volume: the amount of air inhaled and exhaled with each breath.
 - Minute ventilation: the amount of air inhaled and exhaled in one minute.
- 2) Minute ventilation = Tidal volume x Breathing rate
- 3) Students should provide points similar to below:
 - There is an increase in minute ventilation between rest and during the race.
 - Minute ventilation at rest is 7.5l/min.
 - Minute ventilation at the end of the race is 64.4l/min.
 - Minute ventilation will plateau once the athlete reaches a steady state.
 - Breathing frequency (rate) and tidal volume increase in order to take in more oxygen.

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Lung Volumes: Data Analysis

1) Define the following terms:

- Breathing frequency (rate):
- Tidal volume:
- Minute ventilation:

2) Now, use the three terms you defined above to complete the equation

$$\boxed{} = \boxed{} \times \boxed{}$$

3) A 1500 m runner is having their breathing rate, tidal volume and minute ventilation measured during a training session.

	Rest	60 s	120 s
Breathing frequency (rate) (<i>breaths per minute</i>)	15	21	26
Tidal volume (L)	0.5	1.2	2.1

Using the table above, analyse how the minute ventilation of the runner changes during exercise.

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Activity 33 – Aerobic and Anaerobic

Teacher's Notes and Answers

Plenary Activity: O ₂ or No O ₂	
Aim of the activity	To develop further the understanding of aerobic and anaerobic exercise
Teacher's instructions	Photocopy the activity page and give one copy to each pair of students. Ask them to produce a definition of aerobic and anaerobic exercise and the energy process using the words and symbols provided. Give them 10 minutes to complete these first two activities. Give students five minutes to discuss sports which include aerobic and anaerobic exercise. Complete the Venn diagram given. You may want to add an element to the diagram which pair can come up with the most sports for each category.

Answers

Example definitions:

- Aerobic exercise is any exercise that is performed when there is enough **oxygen** to produce the **energy**. This occurs during **low-intensity** exercise such as **endurance** sports, e.g. **jogging** and walking, and uses **carbohydrates** as the main source of **energy**.
- Anaerobic exercise is any exercise where not enough **oxygen** can be used to meet the **energy** demands. This form of exercise uses **carbohydrates** and **phosphates** during **high-intensity** exercise such as **sprinting**. When the intensity is high, **phosphates** are used to produce ATP from ADP for a short time. If exercise continues, **lactic acid** is produced. When the intensity is high, they reach their **anaerobic threshold** – the point where **lactic acid** is produced. The production of **lactic acid** will create an **oxygen debt** at the end of exercise, which requires an elevated breathing rate in order to provide oxygen to help remove the **lactic acid**.

Equations:

- Aerobic:
Glucose + Oxygen → Energy + Carbon dioxide + Water
- Anaerobic:
Glucose → Energy + Lactic acid

Examples of sports:

- Aerobic:
Marathon running, long-distance cycling,
- Anaerobic:
100 m sprint, sprint cycling, jumping, lifting heavy weights with low oxygen,
- Both:
400 m running, boxing, team sports, e.g. hockey

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Aerobic and Anaerobic: O₂ or No O₂?

Sort the tiles below into order to provide a definition of aerobic and anaerobic respiration using the words provided and your own words.

oxygen

energy

respiration

endurance

lactic

fats

sprinting

intensity

low

creatine phosphate

oxygen debt

anaerobic

Aerobic:

.....

.....

Anaerobic:

.....

.....

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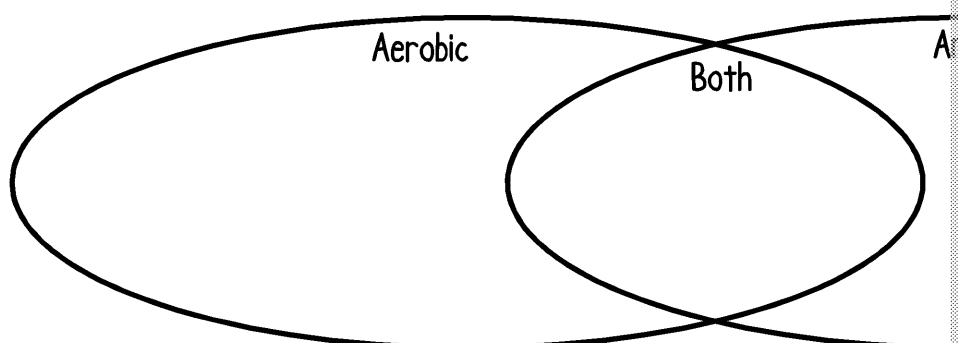
Use the terms and symbols provided below in order to provide the correct definition of aerobic and anaerobic respiration. Each term may be used more than once and some may not be used.

Oxygen, Carbon dioxide, +, Lactic acid, Glucose, →, Water, Energy, -, Anaerobic

Aerobic:

Anaerobic:

Discuss with a partner and note down as many different sports and physical activities as you can in 5 minutes. Categorise each sport / physical activity as either aerobic, anaerobic or both. If you categorised each, justifying why you categorised them that way.



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Activity 34 – Short-term Effects of Exercise

Teacher's Notes and Answers

Starter Activity: Drawing Board	
Aim of the activity	To learn about and identify the short-term effects of exercise
Teacher's instructions	Photocopy the worksheet provided and give one copy to each student. Give students five minutes to think about as many short-term effects of exercise as they can and then ask them to draw a picture which represents each effect. Students can then swap their drawings with a partner and give a verbal explanation of the effect. Now engage the class in a group discussion about the short-term effects of exercise. Intensity and duration can have on these short term effects.

Answers:

Drawings should be provided for the following effects and each effect should be explained.

- Lactic acid is produced.
- Muscle temperature increases.
- Heart rate increases.
- Stroke volume increases.
- Cardiac output increases.
- Depth of breathing increases.
- Respiratory rate increases.
- Tidal volume increases.
- Minute ventilation increases.
- Amount of oxygen taken in each minute increases.
- Blood is redistributed away from the internal organs and towards the muscles.
- Blood is redistributed to the skin as the blood vessels carrying blood to the skin dilate to be lost and temperature regulated so as not to overheat.

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Short-term Effects of Exercise: Drawing Box

Think about all of the short-term effects that can occur when exercising. represents each of these effects and then swap your page with a partner then try to identify which effects you have drawn and note their answer

1)

Effect:

2)

Effect:

3)

Effect:

4)

Effect:

5)

Effect:

6)

Effect:

Your teacher will now ask you to engage in a class discussion about the short-term effects of exercise that you have identified and how these affected by changes in the intensity and duration of exercise.

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Activity 35 – Long-term Effects of Exercise

Teacher's Notes and Answers

Starter Activity: Fill in the Gaps

Aim of the activity	To understand the long-term training effects of taking regular exercise.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give them five minutes to fill in the spaces in the text with their own answers. Discuss the answers with the whole class. Note: teachers should have taught components of fitness before this activity. See Activity 11.

Answers

The gaps should be filled in with the correct words (or similar):

- Regular exercise increases the amount of energy that you are expending. It can reduce the amount of **fat** that is stored within the body, and it can cause **hypertrophy** (increase in muscle size), and increased muscle mass. This can result in the exerciser's body shape being changed. It is also good for the bones. **Weight loading** can lead to bone remodelling which increases the **bone density**.
- A range of **fitness components** can be improved through exercise. This includes muscle mass which is associated with regular exercise, particularly with resistance training. This leads to increased muscular **strength**, **elasticity** and **endurance** which will increase resistance to **fatigue**.
- Exercise can also increase the size of the heart over time. This is called **cardiac hypertrophy**. This increased size and strength of the heart causes more blood to be pumped out of the heart, with less effort. Hypertrophy of the heart therefore leads to a lower resting **heart rate** and an increased resting **stroke volume** as more blood is pumped with each beat. The potential **cardiac output** during exercise is greatly increased due to the increased strength of the heart, which greatly improves an athlete's performance during exercise as it can ensure an adequate supply of **oxygen** is maintained to the muscles. The lumen of the blood vessel can also be increased and the artery walls become more elastic which will lead to a reduced resting **blood pressure**.
- The ability of the respiratory system to take in oxygen and transport it is improved by the increased contractile strength of the **respiratory muscles**. This leads to an increased **vital capacity** (the maximum amount of oxygen that can be held in the lungs) and an increased **tidal volume** (the amount of oxygen taken in with each breath) and, therefore, an increased **breathing frequency** (number of breaths per minute). The increased density of the **capillaries**, also increases the body's ability to transport oxygen.

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Long-term Effects of Exercise: Fill in the Gaps

Complete the sentences below about the long-term effects of exercise by filling in the gaps.

- Regular exercise increases the amount of energy that you are expected to use. This leads to a reduction in the amount of _____ that is stored within the body. Regular exercise also leads to an increase in muscle size, known as _____ (increase in muscle size), and an increase in bone density. Both of these changes will result in the exerciser's body shape being more athletic. Regular exercise is also good for bone health as regular _____ can lead to bone remodelling and an increase in bone density.
- A range of _____ can be improved through regular exercise. For example, an increase in muscle mass which is associated with regular resistance exercise, can lead to increased muscular _____ which will increase the muscles' resistance to _____.
- Exercise can also increase the size of the heart over time. This is called _____ hypertrophy. This increased size and strength of the heart can lead to a more effective pump, meaning that blood can be effectively pumped from the heart, with less effort. Hypertrophy of the heart leads to a reduction in heart rate, known as bradycardia (a lower resting _____). This is because the heart can pump more blood with each beat, so the heart does not need to beat as often. The increased strength of the heart, which greatly improves an athlete's _____ for exercise as it can ensure an adequate supply of blood is maintained for longer. The size of the lumen of the blood vessel can increase and the artery walls can become more flexible which will lead to a reduced _____.
- The ability of the respiratory system to take in oxygen and transport it to the working muscles is improved by the increased contractile strength of the _____ for an increased _____ (the maximum volume of air that can be breathed out), _____ (the amount of air that enters the lungs with each breath) and, therefore, a reduced _____ (the number of breaths per minute). The increased density of capillaries, known as angiogenesis, increases the body's ability to transport oxygen to the working muscles.

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Activity 36 – Antagonistic Muscles

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Teacher's Notes and Answers

Starter Activity: Missing Words	
Aim of the activity	To increase the understanding of antagonistic pairs of muscles and their contraction.
Teacher's instructions	Photocopy the activity sheet on the next page and hand it out towards the end of the lesson. Write the following words on the board: contracting, tendon, one, antagonistic, agonist, quadriceps, hamstrings, isometric, length, changes, contract, lengthens. Give the students 10 minutes to complete the activity. Check the correct answers and ask the students to mark some of their work.
Students' task	Students should work on their own to fill in the missing words. Words have been written on the board. Each word can be used only once. If they have filled in all the gaps, they should swap their work with a partner and check the work as the teacher reads out the correct answers.

Answers

Muscles allow us to move by **contracting** and pulling the bone that it is attached to. However, muscles can only pull the bone in **one** direction and, therefore, a joint would be stuck in that position unless another muscle is able to return it to its original position. As a result of this, movement of joints is controlled by more than one muscle. Muscles that work in pairs are known as **antagonistic** pairs. Antagonistic pairs are made up of an **agonist** and an **antagonist**. The **agonist** is responsible for putting a body part into motion when it contracts. For example, the **agonist** is the **biceps** during the upwards phase of a bicep curl. In order for the biceps to contract and shorten, which pulls the lower arm towards the upper arm. During the downwards phase of the bicep curl, the **triceps** act as the **antagonist** by contracting and lengthening to pull the arm back to its lowered position.

The **antagonist** is responsible for slowing down this movement in order to stop the movement and keep the body **stable**. When a football player takes a penalty kick, the **quadriceps** act as the **agonist** during the backswing and the hamstrings act as the **antagonist** during the swing phase. When the foot is struck, the **hamstrings** contract in order to slow down the leg during the follow-through.

Contractions can be described as isotonic or **isometric**. Isometric contractions occur when the muscle generates force but does not change **length**. Isometric contractions occur when a person pushes against a wall. Isotonic contractions occur when the muscle changes length. Isotonic contractions can be further divided into **concentric** and **eccentric** contractions. Concentric contractions occur when the force produced is large enough to overcome the load and the muscle moves when it contracts and, therefore, the muscle **shortens**. Eccentric contractions occur when the force produced by the muscle is not large enough to overcome the load and the muscle **lengthens** as it contracts.

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Antagonistic Muscle Pairs: Missing words

Fill in the missing words in the text below using the words your teacher has written on the board.

Muscles allow us to move by _____ and pulling the bone the _____ . However, muscles can only pull the bone in _____ therefore after moving the body part, it would be stuck in that position unless it is pulled back to its original position. As a result of this, movement of joints is controlled by muscles working in pairs, known as _____. Antagonistic pairs are _____ and an antagonist.

The _____ is responsible for putting a body part into motion. For example, during the upwards phase of a bicep curl, the biceps contract and shorten, which pulls the lower arm towards the shoulder. During the downwards phase of the bicep curl, the _____ act as the antagonist and pulling the arm back to its lowered position.

The _____ is responsible for slowing down this movement in order to bring the arm back to its original position more _____ . When a football player takes a penalty kick, the quadriceps act as the agonist during the backswing and the _____ act as the antagonist during the follow-through.

Contractions can be described as isotonic or _____. Isometric contractions occur when a muscle generates force but does not change _____ . Isometric contractions occur when someone pushes against a wall. Isotonic contractions occur when the muscle length changes. Isotonic contractions can be further divided into _____ contractions. Concentric contractions occur when the force produced is large enough to overcome the resistance, therefore, the body part moves when it contracts and, therefore, the muscle shortens. Eccentric contractions occur when the force produced by the muscle is not large enough to overcome the resistance, therefore, the muscle _____ as it contracts.

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Activity 37 – Antagonistic Muscles

Teacher's Notes and Answers

Plenary Activity: Contract and Relax	
Aim of the activity	To increase the understanding of antagonistic pairs of muscles and their role in contraction.
Teacher's instructions	Photocopy the activity sheet on the next page and hand out towards the end of the lesson. Give students between 5 and 10 minutes to provide a definition for agonists and antagonists and then 5 minutes to provide a definition for tendons and ligaments and the role they both play. Feed back the correct answers once all have completed.

Answers

Agonist – The muscle which is responsible for bringing about the movement.

Antagonist – The muscle which is responsible for resisting the movement.

- | | |
|-----------------------------------|------------------------------|
| i) Agonist: deltoid and pectorals | Antagonist: latissimus dorsi |
| ii) Agonist: hamstrings | Antagonist: quadriceps |
| iii) Agonist: quadriceps | Antagonist: hamstrings |
| iv) Agonist: biceps | Antagonist: triceps |
| v) Agonist: triceps | Antagonist: biceps |
| vi) Agonist: deltoid | Antagonist: latissimus dorsi |
| vii) Agonist: latissimus dorsi | Antagonist: deltoid |

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Antagonistic Muscle Pairs: Contract and Relax

Define what is meant by an agonist and an antagonist and then for each movement mime the movement and identify the agonist and antagonist acting during the movement.

Agonist:	Antagonistic pairs
	Muscles that allow...
	i) The upwards phase of a bench press
	ii) Flexion at the knee during the backswing of a rugby kick
	iii) Extension at the knee during a kick-boxing kick
	iv) Flexion at the elbow during a badminton smash
	v) Extension at the elbow during a punch in boxing
	vi) Abduction at the shoulder when a goalkeeper makes a save
	vii) Adduction at the shoulder during a baseball pitch

Activity 38 – Lever System

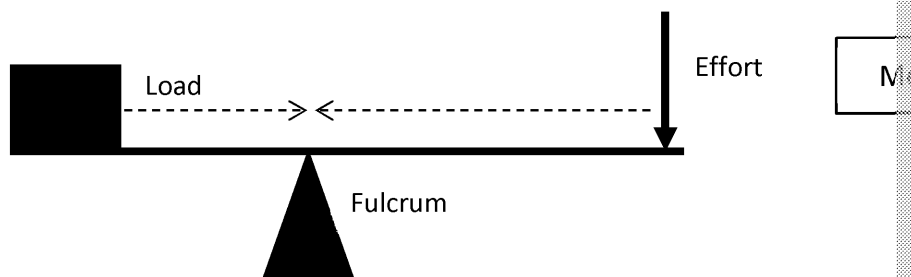
Teacher's Notes and Answers

Plenary Activity: Drawing and Performance

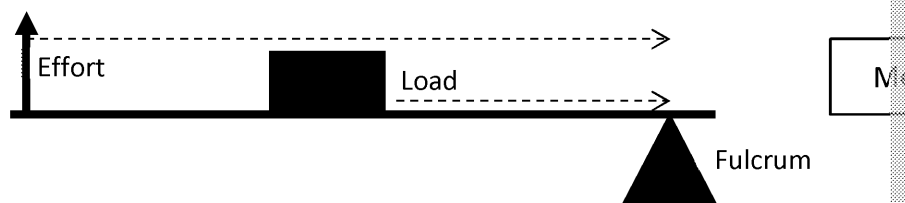
Aim of the activity	To identify first-, second-, and third-class lever systems and recognise sporting actions which involve these systems.
Teacher's instructions	Photocopy the activity page and give one copy to each student. Students should have 5 minutes to draw the three classes of lever system using the template provided. They should also identify which lever systems have a mechanical advantage and which have a mechanical disadvantage. Then give the students 5 minutes to work in pairs in order to act out the physical activities which involve each lever system. Walk around the class and offer support as needed. Students are performing the actions in order to help them identify the lever system on their bodies.

Answers:

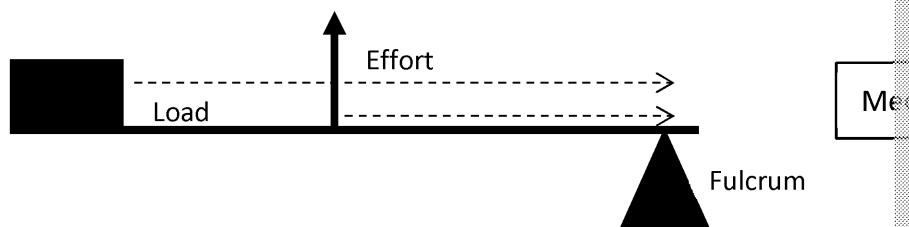
First Class:



Second Class:



Third Class:



- **Front crawl in swimming:**
First class – water (load), shoulder joint (fulcrum), latissimus dorsi muscle (effort)
- **Bicep curl (upwards phase):**
Third class – biceps (effort), elbow (fulcrum), weights (load)
- **Ice hockey shot (striking):**
Third class – Body weight (load), gluteal muscles (effort), hip joint (fulcrum)
- **Rugby conversion (striking):**
First class – weight of the ball (load), knee joint (fulcrum), quadriceps (effort)

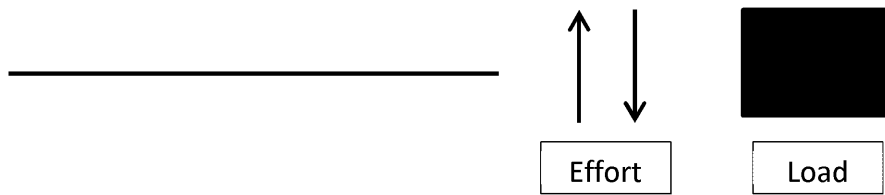
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Lever Systems: Drawing and Performing

Draw your own lever systems (first-, second-, and third-class) using the



Then on each lever system illustrate whether it has a mechanical advantage or disadvantage, and tick the correct choice for each one.

Remember: Mechanical advantage = effort arm $\div$ load (resistance) arm

First-class	Me Me
Second-class	Me Me
Third-class	Me Me

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Now act out the following physical activities with a partner and try to identify which parts of the body are being used, and which parts of the body represent the effort, load, and fulcrum. Do the same for your own activities.

Action	Joint	Lever System	Effort
Front crawl in swimming	Shoulder		
Bicep curl (upwards phase)	Elbow		
Ice hockey shot (striking)	Hip		
Rugby conversion (striking)	Knee		

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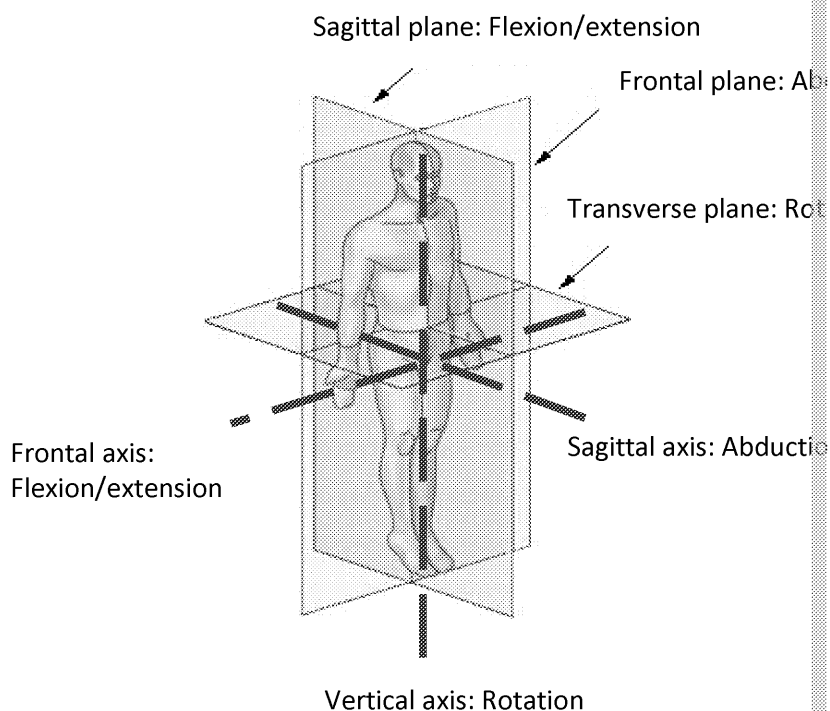


Activity 39 – Planes and Axes

Teacher's Notes and Answers

Starter Activity: Dividing the Body	
Aim of the activity	To understand the planes and axes of movement in relation to the body.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 5–10 minutes to label the diagram with the correct planes and the basic types of movement that can occur in each plane. Then, students can complete the multiple-choice questions before you feed back the answers to them.

Answers



- 1) iv) Frontal axis and sagittal plane
- 2) iv) Frontal axis and sagittal plane
- 3) ii) Vertical axis and transverse plane
- 4) ii) Frontal axis and sagittal plane
- 5) iii) Sagittal axis and frontal plane
- 6) iii) Frontal axis and sagittal plane
- 7) iii) Frontal axis and sagittal plane

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Planes and Axes: Dividing the Body

Match up the planes and axes to their correct location on the diagram and types of movement (flexion, extension, abduction, adduction, rotation) that occur in each plane and axis. Then answer the questions by identifying the following sporting movements.

Transverse plane

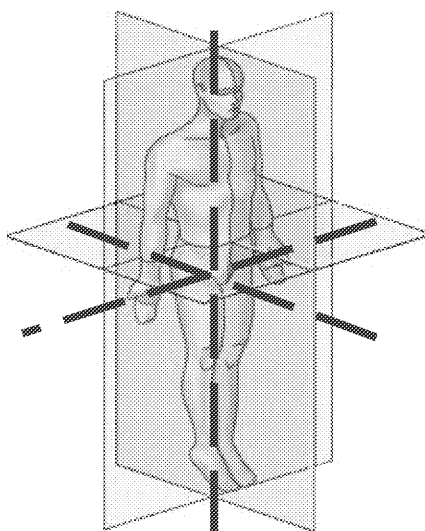
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Frontal plane

.....

Sagittal plane

.....



- 1) In which axis and plane does flexion and extension of the knee occur during the action of running?
 - i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Sagittal axis and frontal plane
 - iv) Frontal axis and sagittal plane
- 2) In which axis and plane does a back somersault occur?
 - i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Sagittal axis and frontal plane
 - iv) Frontal axis and sagittal plane
- 3) In which axis and plane does an athlete move when performing a full-twist jump in trampolining?
 - i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Sagittal axis and frontal plane
 - iv) Transverse axis and sagittal plane
- 4) In which axis and plane does flexion at the hip occur during the performance of a long jump?
 - i) Transverse axis and transverse plane
 - ii) Frontal axis and sagittal plane
 - iii) Sagittal axis and frontal plane
 - iv) Transverse axis and sagittal plane

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- 5) **In which axis and plane does a cartwheel occur?**
- i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Sagittal axis and frontal plane
 - iv) Transverse axis and sagittal plane
- 6) **In which axis and plane does extension of the knee occur when kicking a football?**
- i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Frontal axis and sagittal plane
 - iv) Transverse axis and sagittal plane
- 7) **In which axis and plane does extension and flexion of the elbow occur when throwing a javelin?**
- i) Transverse axis and transverse plane
 - ii) Longitudinal axis and transverse plane
 - iii) Frontal axis and sagittal plane
 - iv) Transverse axis and sagittal plane

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Activity 40 – Using Technology

Teacher's Notes and Answers

Plenary Activity: Analyse the Film	
Aim of the activity	To understand how technology can be used to collect sporting movements in order to analyse and improve performance.
Teacher's instructions	Give each student a copy of the activity page and get them to work in pairs. They will need equipment capable of recording, such as a video camera or tablet, in order to film each other performing. Students should choose a movement, e.g. a handstand, tennis forehand or football kick, and perform this movement with equipment while their partner films. After filming the movement, both students should watch the performance. The students should then swap roles and repeat the process.

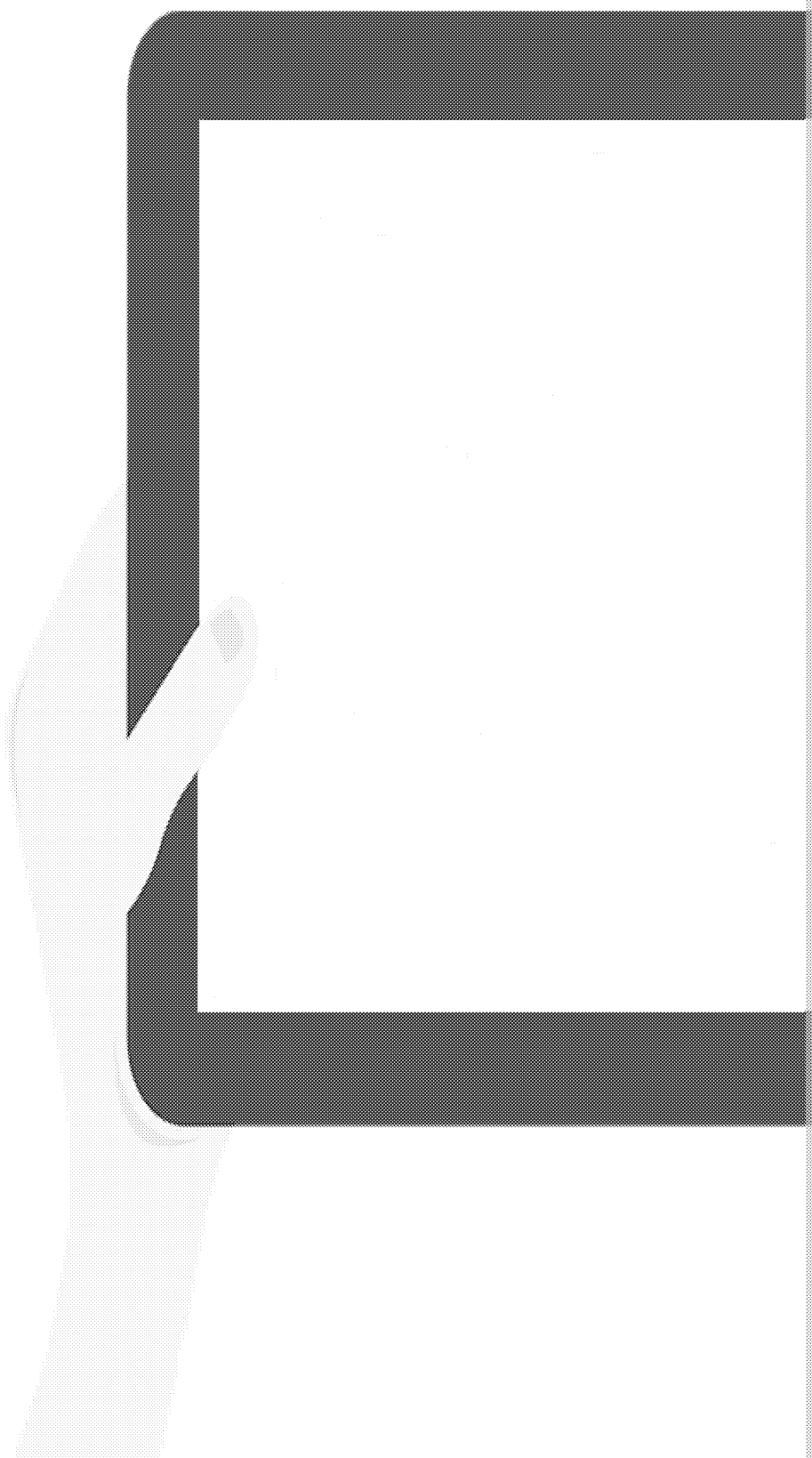
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Using Technology: Analyse the Film

Work with a partner and film each other performing a sporting movement. The first person should perform the movement while the second person has the camera. After the first person has finished, the second person should have filmed the first person performing, watch the video back together. The person who performed that movement should use the space on the screen to discuss the correct aspects of their technique. Now swap roles and record and analyse the second person.



Activity 41 – Impact of Technology

Teacher's Notes and Answers

Plenary Activity: Mind Maps

Aim of the activity	To understand the effects of technology on the performer, spectators and sponsors involved in sport.
Teacher's instructions	Photocopy the mind maps on the following page and give the students five minutes to discuss the positive and negative impact of technology on the performer, sport, official, spectators and sponsors. Ask the students to feed back their answers to the rest of the class and discuss the positive or negative impact. Write down any appropriate points.

Answers

Sport:

- + Technology can inform and improve training, which results in an improved sporting performance
- + It can produce a more exciting sport which increases the number of spectators
- + By improving the quality of the product, sponsors are willing to pay for advertisements which increases the amount of money a sport can generate
- The use of video replays by officials can disrupt the flow of games
- Officiating equipment, such as Hawk-Eye, is expensive and cannot be afforded by every sport
- Because of advances in technological equipment and its increased use, the gap between athletes is closing

Performer:

- + Improved ability to analyse performance and make improvements
- + Training can be improved with the use of fitness monitoring tools
- + Athletes can rewatch their performances from more angles
- Some training tools are expensive and cannot be afforded by every athlete
- Higher fees are required in order to cover the costs of technology from participating
- Technology, such as games consoles and television, has provided alternatives to physical activity which can reduce an individual's level of fitness

Officials:

- + Increased viewing angles for officials to make decisions
- + Implementation of tools such as Hawk-Eye which makes decisions easier
- + Video replays can be used to improve decision-making by officials
- + Better timing devices improve the recording of sporting performances
- + Modernised testing devices can detect drugs more effectively, identifying doping successfully
- It may dilute the role of umpires, referees, etc.
- Testing devices are generally a step behind the technology being used, meaning that those doping can still do so undetected

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Spectators:

- + Increased viewing angles for spectator enjoyment
- + Slow-motion technology allows the exciting and complex skills to be analysed
- + Improved analysis – enables a more complete and in-depth review of a game, generating interesting statistics
- + Action replays allow the more entertaining moments of an event to be relived
- Improved coverage has resulted in more people watching an event, even if they are paying more to watch it live
- Reviewing decisions throughout the game breaks up the flow of the game, so the excitement cannot be built up

Sponsors:

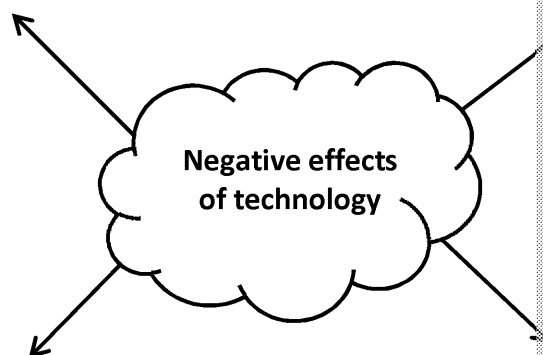
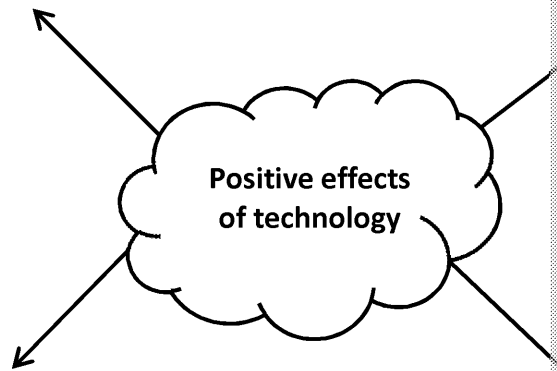
- + Sponsors are able to have more entertaining advertisements, e.g. on the outside of a pitch
- + There are more places for a sponsor's advertisements to be seen, e.g. on games and websites
- + Sponsors can make more advertisements, e.g. using motion tracking technology
- Some consumers can feel saturated by modern technology which is used by a company

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Impact of Technology: Mind Maps

Complete the two spider diagrams by writing the positive and negative effects of technology on the **sport**, the **performer**, **officials**, **spectators**, and **sponsors**.



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Activity 42 – Goals to Optimise Performance

Teacher's Notes and Answers

Starter Activity: Data interpretation

Aim of the activity	To understand how goal-setting can improve training performance.
Teacher's instructions	Photocopy the activity page and hand one to each pair. Give them 5 minutes to analyse the data in the graph and then suggest what factors may have influenced the data recorded. Next, get all groups to share what they came up with, with the rest of the class.

Answers

Discussions should include (but not be limited to):

- The average 100 m race time has decreased over the six month period. This may have been motivated to improve as they approached the competitive season.
- There was no change between the first and second month, as training was still in the initial effect.
- Between April and June there was a significant improvement in the times recorded, that the goal-setting was improving performance.
- Between June and July she experienced reversibility and her times increased. This was a result of reduced motivation to adhere to her training schedule.
- From July to August she experienced a further decrease in her average time. This may have been as a result of motivation to train, due to it being the competitive season.

Possible reasons are mentioned above, but could also include the following:

- Training adherence can be improved by goal-setting.
- Goal-setting focuses attention towards the task of improving performance.
- Concentration can be increased by setting goals.
- Short-term goals can provide a strategy for achieving a longer-term goal, such as becoming a team for the next Olympic Games.
- The athlete may have been more motivated when using goal-setting to track their effort.
- Goal-setting can increase confidence which can allow an athlete to perform better.
- Students may include any other suitable reason.

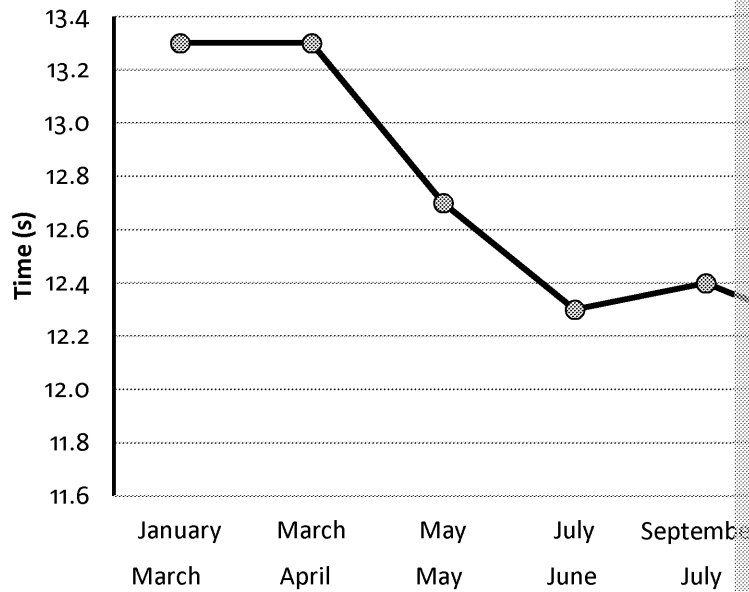
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A 100 m sprinter has recently started using goal-setting in order to aid her average race times during her training sessions over a six month period.

Fig. 1 Average race times of 100 m athlete over a six m



2. Identify what the data in the graph above shows and discuss the possible reasons for the athlete's performance and how goal-setting could have led to the improvement.

The data shows.....

[illegible]

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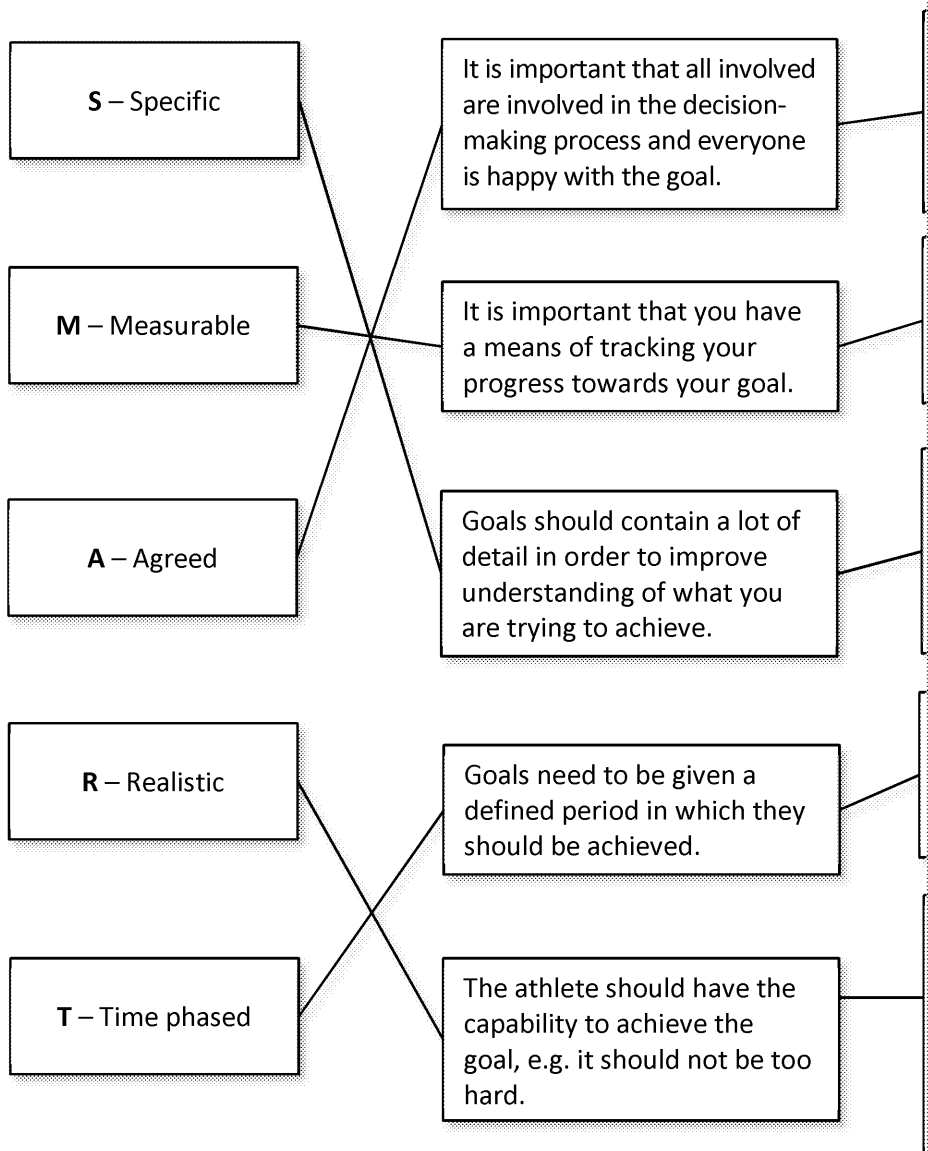


Activity 43 – Goal-setting

Teacher's Notes and Answers

Starter Activity: SMART match-up	
Aim of the activity	To allow students to understand and test their knowledge of the principles of goal-setting.
Teacher's instructions	Photocopy the activity page and hand out one copy to each student. Give students five minutes to complete the match-up activity by writing a description of how this principle can lead to improved performance of a runner. Then spend five minutes discussing their answers.

Answers



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Goal-setting: Smart match-up

Fill in the five principles of goal-setting (SMART) and match them up to write down a description of how each principle could be beneficial for a their time.

S –

It is important that all involved are involved in the decision-making process and everyone is happy with the goal.

M –

It is important that you have a means of tracking your progress towards your goal.

A –

Goals should contain a lot of detail in order to improve understanding of what you are trying to achieve.

R –

Goals need to be given a defined period in which they should be achieved.

T –

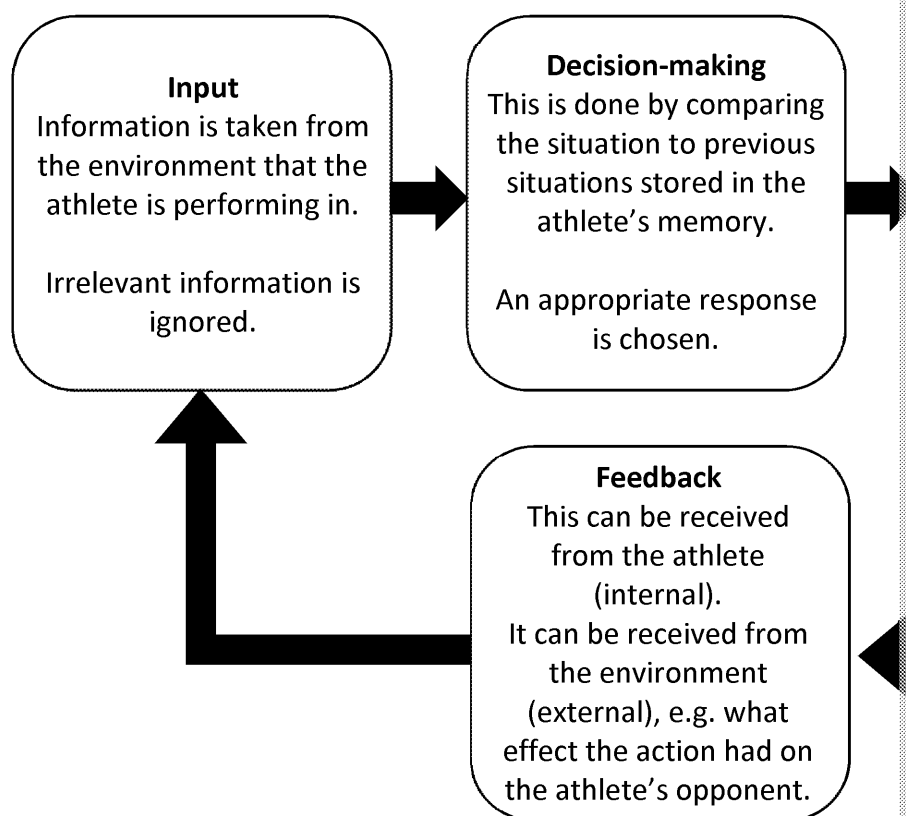
The athlete should have the capability to achieve the goal, e.g. it should not be too hard.

Activity 44 – Basic Information Processing

Teacher's Notes and Answers

Plenary Activity: Arrange the Components	
Aim of the activity	To allow students to understand and test their knowledge of the information processing model.
Teacher's instructions	Photocopy the activity page and hand out one copy to each student. Give the students with scissors, glue and a blank piece of paper. Cut out the components of the model. Give the students 10 minutes to arrange the component of the model of information processing and stick it on a new piece of paper. They will need to place the stages in the correct order and stick the relevant sentences under the correct stages. Students can check their answers with the teacher before gluing them down.

Answers



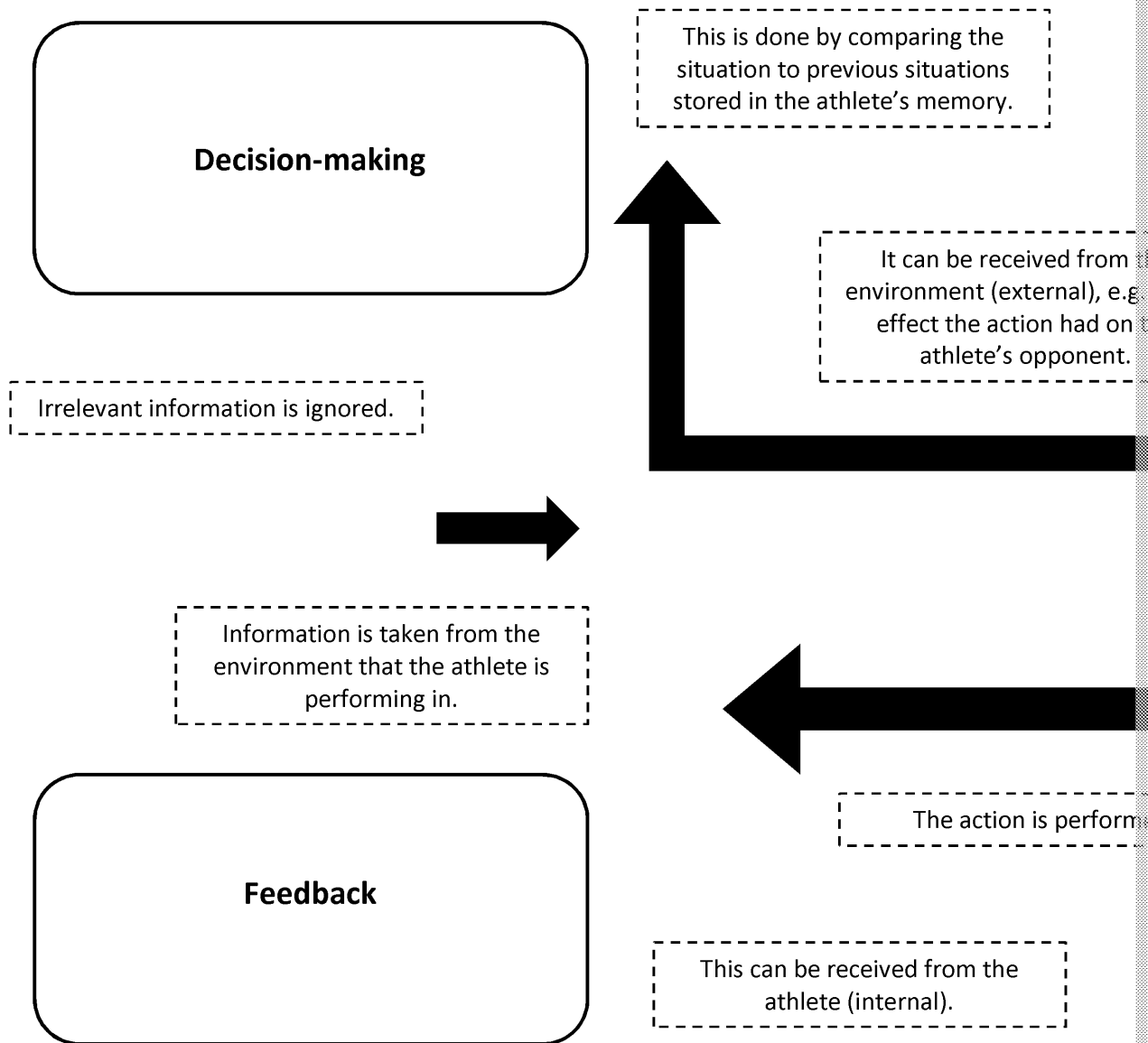
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Basic Information Processing Model: Arrange the Components

Cut out the following components of the basic model of information processing and organise in your teacher before gluing them down.



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Activity 45 – Feedback on Performance

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Teacher's Notes and Answers

Plenary Activity: Provide feedback	
Aim of the activity	To understand and evaluate how different types of feedback are given to different types of athletes (beginners/elite).
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Give students 5–10 minutes to read both passages and write down some feedback received by the athletes. After they have done this, ask the students to discuss which feedback are most appropriate for beginners and elite-level athletes.

Answers

Elite athlete

- Negative – The athlete did not run their fastest and the coach could have been more encouraging. As they are an international athlete and it would, therefore, be appropriate for them to receive criticism, they will be highly motivated and be willing to take criticism on board to improve their performance.
- Knowledge of results – The athlete would focus on the fact that they did not win the race as this is what they are competing for in a competition. This is a negative feedback as it will determine whether they qualify for the international competition. The fact that they did not win the race will be more motivational for an elite athlete, who is experienced, as they may have gone wrong on their performance.
- Intrinsic – Experienced athletes are more likely to get their feedback from within as they know how they feel during and following the event.

Beginner

- Positive – The coach could focus on the positive fact that they ran a good race as this would be more appropriate for a beginner than focusing on their mistakes and have a lot of improvements to make.
- Knowledge of performance – The coach should focus on the fact that they ran a good race (knowledge of performance) rather than the fact that they did not win (knowledge of result) as their performance against others is not relevant at this early stage of development.
- Extrinsic – Inexperienced athletes are more likely to get their feedback from others as what their coach tells them following the event as they do not have a good understanding of how the skill should feel like in order to feedback internally.

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Feedback on Performance: Provide feedback

Read the following passages which describe the performance of a beginner and an elite athlete. After reading each passage, circle the most appropriate feedback type for that athlete and then write the feedback that the athlete could receive and ensure that it is appropriate for each one.

Elite athlete:

The athlete is taking part in a qualifying race for an international athletics competition. They complete their race in a time that matches their personal best for the event. However, it is not the fastest they have ever run and they do not finish in the top three.

Positive/negative:

Knowledge of results /
knowledge of performance:

Positive/negative:

Knowledge of results /
knowledge of performance:

Beginner:

The athlete is taking part in their first athletic competition at a school level. They complete the race in a personal best time but finish fifth. After the race, they are not very happy because they wanted to finish within the top three.

Activity 46 – Feedback D

Teacher's Notes and Answers

Starter Activity: Data handling	
Aim of the activity	To interpret and analyse graphical representations of data performance.
Teacher's instructions	Photocopy the worksheet and give one copy to each student. Give five minutes looking at the data presented in the chart and then they could give to each player based on their performance. Then the students to share their feedback with the class.

Answers

Feedback could include:

Murray:

- Murray needs to increase the number of points won on first and second serve points on his serve than Federer did.
- He needs to play more net shots by running to the net following an error. This is the one measured area where Murray performed to a higher level than Federer. He needs to utilise this advantage.
- He needs to improve his service return, e.g. by learning to identify where the ball was the area where the difference between Murray and Federer was the greatest. That Murray would need to address in future matches.

Federer:

- Federer needs to avoid allowing Murray to come to the net, e.g. by not playing net shots in the area where Murray was able to outperform him and gain more points.
- Positive feedback can be given for his service and serve return performance. Murray on 'first serves in', 'first serve points won' and 'second serve points won'. Federer to continue to dominate this area of his game.

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Look at the chart below which shows data from the match between Andy Murray and Novak Djokovic in the Wimbledon semi-final. Study the chart and then write down some feedback for each player in order to improve their future performances against each other.



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Activity 47 – Guidance on Performance

Teacher's Notes and Answers

Starter Activity: Application of methods	
Aim of the activity	To understand and evaluate how different forms of guidance can be used to improve performance.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Students should choose a skill that they are learning and fill in the boxes. They should then fill in the blank boxes by describing a method of guidance and identifying how they could utilise each method to improve their skill. If any students get stuck, offer an example for another skill. If any students get stuck, offer an example for another skill using a similar principle for their chosen skill.

Answers

Any skill can be used for each method provided the description of use is appropriate.

Visual

involves demonstrating the skill to the individual

- **Advantages:** can be used at all stages of learning but good for beginners, can be used alongside all other methods, can be delivered to multiple learners.
- **Disadvantages:** may be difficult to teach difficult skills using this method, requires the coach to have the required skills in order for it to be effective, learners can become bored, does not allow a kinaesthetic feel to be developed
- **Most suited to:** cognitive, associative and autonomous

Verbal

involves telling the individuals about the skill

- **Advantages:** can be used at all stages, can be used alongside all other methods, can be delivered to multiple people at the same time, can be delivered at the time of learning.
- **Disadvantages:** the coach must have the required skills in order for it to be effective, difficult to teach difficult skills using this method, learners can become bored, form of guidance, hard to form a clear picture of the skill when used
- **Most suited to:** associative and autonomous

Manual

involves moving the athlete's body parts for them

- **Advantages:** can be used alongside all other methods, useful for beginners, provides a kinaesthetic understanding of the skill, reduces the risk of injury
- **Disadvantages:** difficult to deliver to multiple learners, can prevent the learner from developing a true feel for the movement, can be dangerous if equipment is faulty
- **Most suited to:** cognitive

Mechanical

Involves using equipment to aid performance

- **Advantages:** useful for beginners who need physical assistance, provides a kinaesthetic understanding of the skill, reduces the risk of injury for novices
- **Disadvantages:** specialised equipment is required, difficult to deliver to multiple learners, prevent the learner from developing a true feel for the movement, requiring the support in order to perform, can be dangerous if equipment is faulty
- **Most suited to:** cognitive

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Guidance on Performance: Application of

For each type of guidance given below, identify a skill you could teach then describe this skill. You should then evaluate each type of guidance in terms of its advantages and choose whether it would be most suited to those at the cognitive, associative or autonomous stage, ticking those that you think it would be most beneficial for.

Visual



Skill you are teaching:

Description of use:

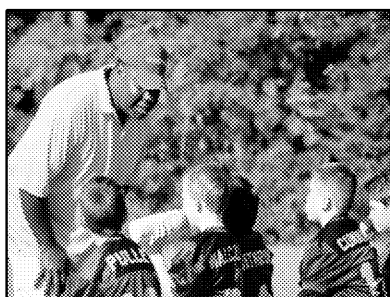
Evaluation:

Stage of learning most suited to:

Cognitive ☐

Associative ☐

Verbal



Skill you are teaching:

Description of use:

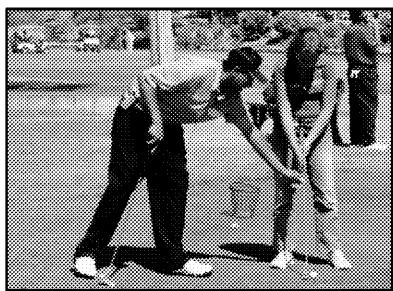
Evaluation:

Stage of learning most suited to:

Cognitive ☐

Associative ☐

Manual



Skill you are teaching:

Description of use:

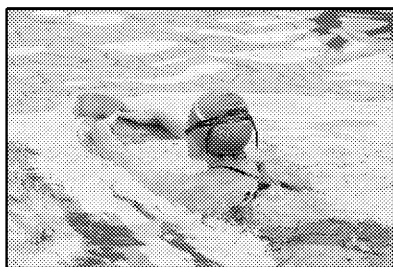
Evaluation:

Stage of learning most suited to:

Cognitive ☐

Associative ☐

Mechanical



Skill you are teaching:

Description of use:

Evaluation:

Stage of learning most suited to:

Cognitive ☐

Associative ☐

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Activity 48 – Mental Preparation

Teacher's Notes and Answers

Starter Activity: Instructor	
Aim of the activity	To understand the different mental preparations athletes use in competition.
Teacher's instructions	Photocopy the instructions of the stress management techniques to each pair. Instruct one member of the pair to read out the instructions then teach their partner how to use each method. Give each pair a worksheet with these techniques and walk around the class to ensure they are using them appropriately. To make this more difficult you could give them the worksheet immediately and see if they can teach their partner without assistance, by just knowing the name of the technique.

Answers

Possible discussion points:

- Ensures you understand what needs to be done in order to perform
- Can prepare you for a range of different situations
- Can control your arousal levels
- Can get you into the 'zone'
- Can provide a distraction from distractors
- Can allow you to focus on important factors
- Can allow you to practise your performance without physically fatiguing
- Can increase your self-confidence
- Can improve your motivation by making your performance feel achievable
- Can help you to maintain motivation when it is not possible for you to perform in poor weather conditions

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Mental Preparation: Instructor

In pairs, choose who will be the instructor and who will be the participant. The instructor will draw the cards and teach the participant how to use the methods of mental preparation.

Mental rehearsal

- Close your eyes and take deep breaths.
- Imagine yourself performing in an upcoming competition.
- Think about everything you would experience in the environment of the crowd, the size of the pitch and the smell of the grass.
- Now imagine yourself having to perform the skills that are required for the competition.
- Identify everything you would need to do in order to perform the skills.
- Imagine yourself performing the skills successfully and the feelings that this would result in.

Imagery

- Close your eyes and take deep breaths.
- Think about the last time you performed a skill well in your sport.
- Try to visualise that performance and what it felt like.
- Now imagine yourself performing that skill again in a different environment.
- Imagine each aspect of successful performance of the skill and how you would be performing each part perfectly.

Discuss with your partner how these two strategies could improve your performance and motivation.

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Activity 49 – Intrinsic and Extrinsic

Teacher's Notes and Answers

Plenary Activity: Colour Code	
Aim of the activity	To understand the difference between intrinsic and extrinsic motivation and be able to identify examples of the two forms of motivation.
Teacher's instructions	Photocopy the activity page and hand one copy to each student. Each student has two pens which are different colours and five minutes to read the statements and colour-code them as related to intrinsic or extrinsic motivation. Once they have completed the task, they provide a description of intrinsic and extrinsic motivation.
Students' task	Students will have five minutes to colour-code the statements as related to intrinsic or extrinsic motivation. After the task, they provide a description of intrinsic and extrinsic motivation to the class.

Answers

Intrinsic motivation

- From within
- Determined by yourself
- Related to pride
- Self-satisfaction
- Considered to increase motivation and encourage continued participation
- Considered to be more effective for increasing performance levels
- Considered to increase effort
- Wanting to improve your skill level
- Being happy with setting a personal best time in a race even if you are slower compared to the other participants

Extrinsic motivation

- Can be tangible
- From external sources
- Can be intangible
- Influenced by other people
- Relying on this type of motivation can undermine the other type
- Can give athletes a sense of pride
- Athletes can start to rely on these motivators
- Receiving prize money for winning a tournament
- Outperforming your opponent to show that you are better than them
- Receiving praise from your coach after performing well

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Intrinsic and Extrinsic Motivation: Colour C

Colour in the descriptive words below in one colour for those related to intrinsic motivation and another colour for those related to extrinsic motivation.

Key:

Intrinsic motivation:

☐

Extrinsic motivation:

☐

Athletes can start to rely on these motivators

Outperforming your opponent to show that you are better than them

Can be intangible

Receiving prize money for winning a tournament

Receiving praise from your coach after performing well

Can be tangible

Relying on this type of motivation can undermine the other type

Determined by yourself

Considered to increase effort

Related to pride

Considered to be more effective for increasing performance levels

Self-satisfaction

Being happy with setting a personal best time in a race even if you did not perform well compared to the other participants

From within

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Activity 50 – Characteristics of Skilful Performance

Teacher's Notes and Answers

Starter Activity: Tweet it	
Aim of the activity	To understand the characteristics which make a performance skilful.
Teacher's instructions	Photocopy the activity page and hand one to each student to use as a guide to their performance. The following video of Simone Biles is a good example: zzed.uk/7927-biles Instruct the students to watch the video and write down eight characteristics of a skilful performance. After the video, they should create their own tweet using the characteristic of skilful performance in their tweet.

Answers

An ability to coordinate muscles and muscle groups in order to execute a skill.

The characteristics of skilful performance and examples of tweets:

- **Technique:** This athlete's movement pattern is perfect. #PerfectMovement
- **Efficient:** This athlete wastes no energy in their routine. Super efficient!
- **Consistency:** They clearly know their routine inside out as they can perform it every time. #PreparationIsKey
- **Controlled:** Every part of their body moves in perfect unison. #PerfectControl
- **Accuracy:** Look how accurate their movements are! #SharpShooter
- **Aesthetically pleasing:** I could watch them perform this skill over and over again.
- **Effectiveness:** Everything they do results in a positive outcome! #PerfectResult
- **Confidence:** You can tell they believe they will perform perfectly. #Confidence

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Characteristics of Skilful Movement: Tweet

Your teacher will show you a video of skilful movement in sport. As you watch the athlete perform, try to identify the characteristics of the performance of a skilful performance and then, after the video has finished, create eight tweets to summarise your identified characteristics. Also, create a tweet in order to describe the motor skill is.

Make sure you use a creative hashtag and only use 140 characters per tweet.

	MotorSkillsTweet @skillmovements1
	Characteristic 1: _____
	Characteristic 2: _____
	Characteristic 3: _____
	Characteristic 4: _____
	Characteristic 5: _____

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Characteristic 6: _____

[illegible]

Characteristic 7: _____

[illegible]

Characteristic 8: _____

[illegible]

Activity 51 – Classification of

Teacher's Notes and Answers

Plenary Activity: What skill?	
Aim of the activity	To understand, classify and justify a range of skills using
Teacher's instructions	Photocopy the worksheet on the following page and hand out. Give the students 10 minutes to complete the task by classifying skills as simple, complex, open, closed, self-paced or externally-paced and justify their classification in their explanation. Mark the students' answers so that they can mark their own work.

Answers

Diving: complex, closed, self-paced

Racing driving: complex, open, externally-paced

Rugby scrum: simple, open, externally-paced

Pole vault: complex, closed, self-paced

Volleyball serve: simple, closed, self-paced

Table tennis serve: simple, closed, self-paced

Reasons for classifications:

- Skills are classified as 'complex' if they must be extensively practised in order to become competent.
- Skills are classified as 'simple' if they require little thought.
- Skills are classified as 'open' if they must be adapted depending on the environment.
- Skills are classified as 'closed' if they take place in stable environments.
- Skills are classified as 'self-paced' if the athlete can initiate the movement at will.
- Skills are classified as 'externally-paced' if the athlete has to initiate the movement in response to an external factor such as another athlete moving or a starting signal.

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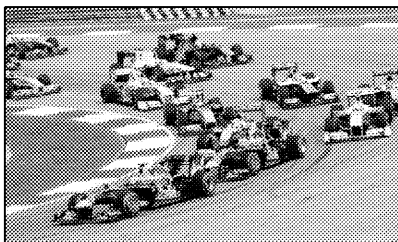


Classification of Skills: What skill?

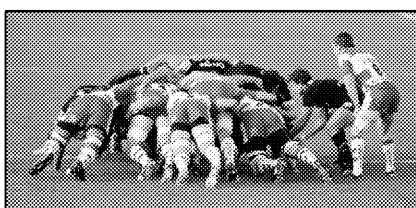
Classify the following sports examples by circling the appropriate classification and justify why you chose each one of the three classifications for each sport.



Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?

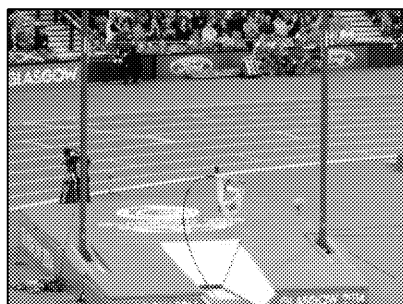


Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?

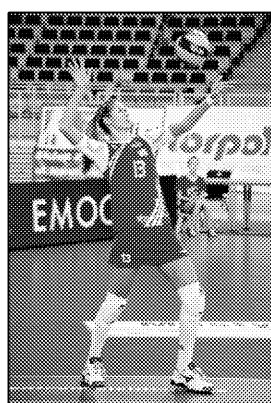


Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?

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Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?



Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?



Difficulty Basic ☐ Complex ☐	Why?
Environment Open ☐ Closed ☐	Why?
Pacing Self ☐ External ☐	Why?

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Activity 52 – Practice Structure

Teacher's Notes and Answers

Plenary Activity: Pass the practice	
Aim of the activity	To understand the differences between whole, part, and varied practice.
Teacher's instructions	Photocopy the activity sheet and hand one to each student. Give students 5 minutes to write down keywords or phrases for each type of practice. Students should then get into groups of four. One player should choose a type of practice and say one keyword. The person to their left should then say one keyword. This should go around the circle. If a player repeats a keyword or says a new one to add, they are eliminated. Play until one player remains. Discuss the other types of practice.

Answers

Keywords are not limited to the ones given below and can be different to those given.

Whole practice • Basic skills • Autonomous stage • Continuous • Repetitions • Extended • Long time • Requires few breaks • High level of fitness needed	Fixed practice • Self-paced skills • Cognitive stage • Repeating • Whole skill • Closed skills • Drills • Specific
Part practice • Complex skills • Self-paced skills • Cognitive stage • Intervals • Rest • Mental rehearsal • Difficult skills • Dangerous skills • Time-consuming	Varied practice • Open skills • Associative stage • Externally paced • Repeating • Whole skill • Different environments • Situations

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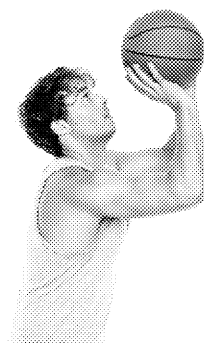
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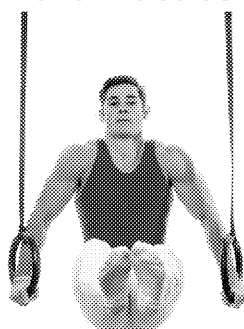
Practice Structures: Pass the practice

For each of the practices below, annotate the images with as many keywords as you can think of.

Whole Practice



Part Practice



Fixed Practice



Varied Practice



Now get into small groups (five to seven people) and get in a circle. One person starts by saying one of the keywords from the practice above and saying one of the keywords out loud. The person to their left repeats their keywords. If a player repeats a keyword already said or hasn't got a keyword, they are out. Play until only one person is left. Repeat for all four practices.

It would be a good idea to add others' keywords to your list as you play.

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Activity 53 – Practice and Skill Classification

Teacher's Notes and Answers

Plenary Activity: Practice design	
Aim of the activity	To apply knowledge about practice and skill classification to sporting skills in order to choose the most appropriate practice type.
Teacher's instructions	Photocopy the handout and give one copy to each student. Give students five minutes identifying which practice type would be most appropriate for the skills displayed and instruct them to write a brief explanation of the practice type is appropriate and how it would be carried out. Have a five-minute discussion regarding their answers.

Answers

Rugby attacking move:

Varied practice would be the most appropriate as this skill is **open** and complex and involve the move being practised in an open game-play situation so that the player can respond to defensive positioning.

Beam routine:

Part practice would be the most appropriate as this skill is **complex** and involves the routine being performed many times with a break between sections.

Tennis rally:

Varied practice would be the most appropriate as this skill is **basic** and complex and the entire skill being repeatedly practised in different situations so that the player can respond to a range of situations.

Shot put:

Fixed practice would be the most appropriate as the skill is **basic** and simple and the whole movement being repeatedly practised.

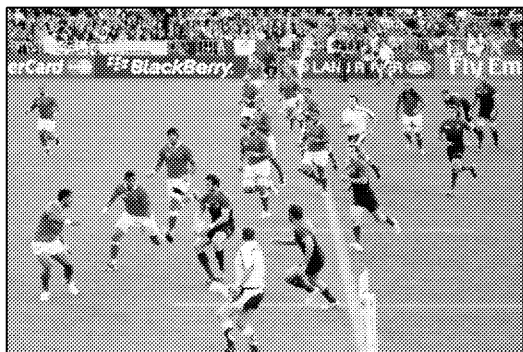
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Practise and Skill Classification: Practice de

Choose the most appropriate type of practice to learn each of the skills
justify this choice and write a brief guide of how you would carry out the



Skill: Rugby attacking move

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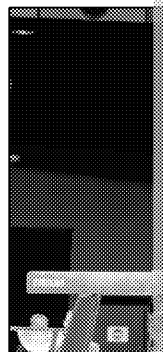
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Skill: Beam routine

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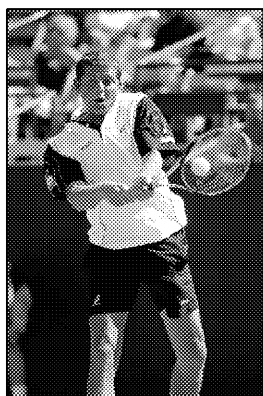
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Skill: Tennis rally

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Skill: Shot put

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Activity 54 – Physical Activity and Sport

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Teacher's Notes and Answers

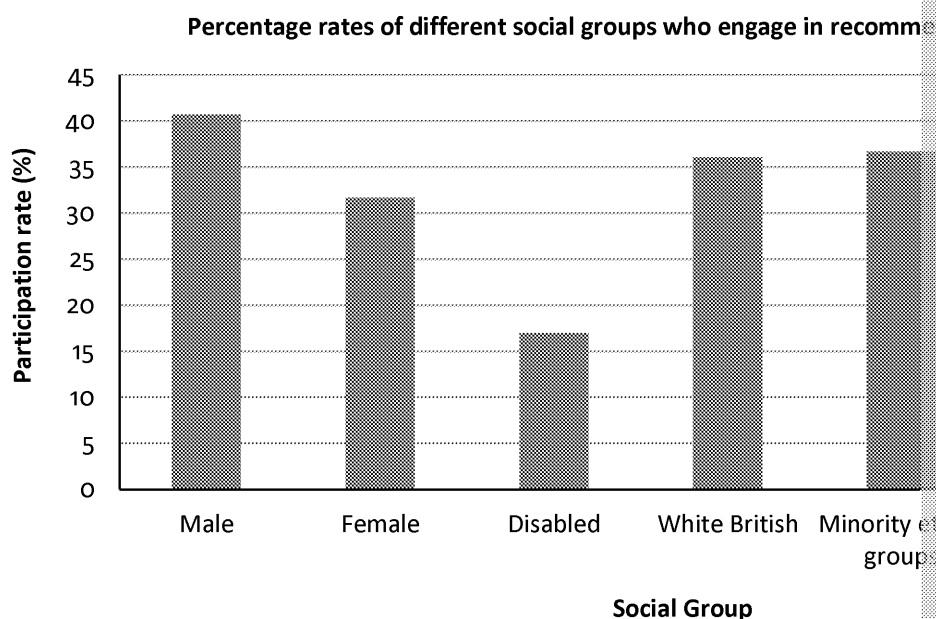
Starter Activity: What's the trend?

Aim of the activity	To understand the trends in physical activity participation
Teacher's instructions	Photocopy the activity page and hand one to each student. Students should spend between 10 and 15 minutes to create a graph from the data and then answer the questions about the data.

Answers

Students should create a graph which accurately depicts the data provided. The graph should have a title and labelled axes.

Students may present that data in a different style to the graph below



- The findings show that there was little difference between the participation rates of people from minority ethnic groups. **(1 mark)**
- Disabled individuals are the most at-risk group. **(1 mark)**
- People from lower socio-economic groups might have less free time due to the need to work longer hours **(1 mark)**, they may not have the money to spend on membership fees for gyms and clubs **(1 mark)** and they may live in areas which do not have the same facilities for physical activity as other areas.
- Better access could be provided through improved transport links (e.g. bus access into buildings. **(1 mark)** Physical activity centres could also be created, such as wheelchair tennis and wheelchair basketball. **(1 mark)**
- Female participation may be lower due to stereotyping and a lack of encouragement, which do not encourage female participation. **(1 mark)** It may also be due to the role of females looking after children and, therefore, having reduced time to be physically active. **(1 mark)** However, a modern shift away from traditional gender roles could lead to improved female participation in future surveys. **(1 mark)**

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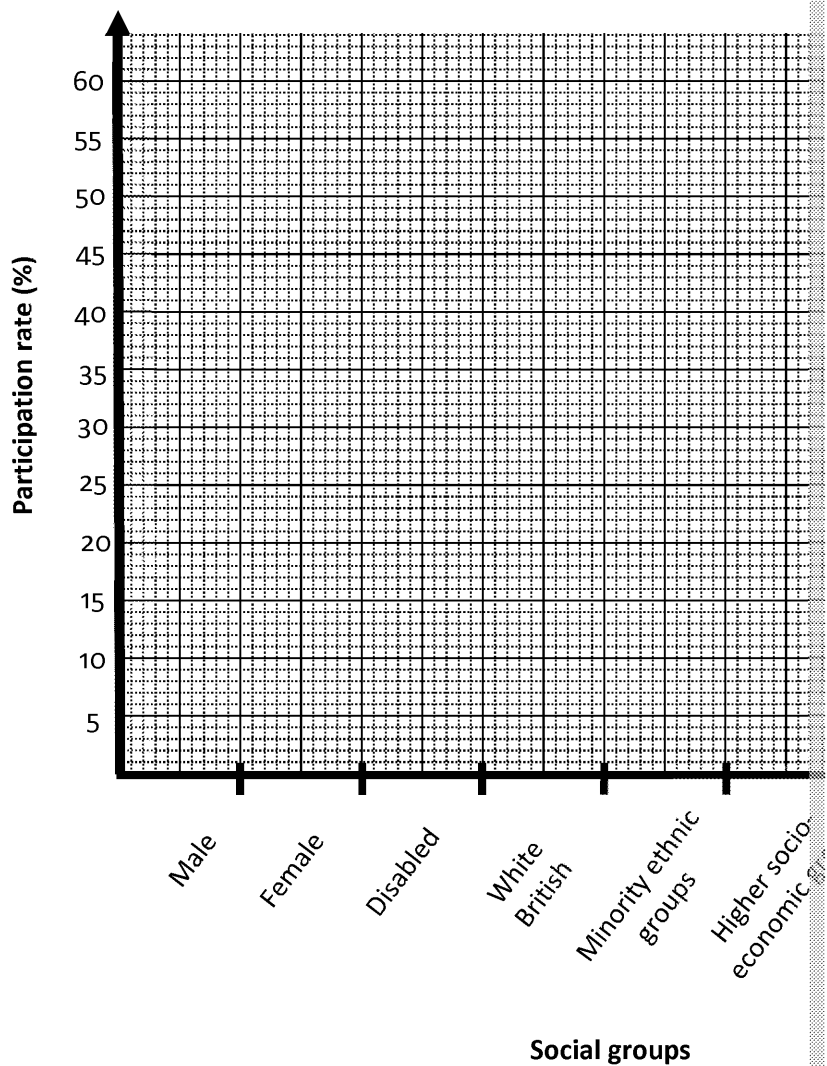
Physical Activity and Sport in the UK: Who

Table 1 below shows the percentage of people from different social groups who meet the recommended level of physical activity by competing in a range of sports. Draw a bar graph in the space below using the data from the table and then discuss it with your partner.

Table 1: Percentage of people in England who engaged in recommended level of physical activity

	Male	Female	Disabled	White British	Minority ethnic groups
Number (million)	8.7	7.1	1.56	13	2.2
Percentage	40.7	31.7	17	36.1	36.1

Data from <https://www.sportengland.org/m>



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i) What is the effect of ethnicity on participation rates?

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ii) Which social group is most 'at risk' and should be targeted by physical education?

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iii) Why does socio-economic status have the observed effect on participation rates?

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iv) How could the participation rates of disabled people be increased?

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v) Why do you think there are differences between male and female participation rates?

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Activity 55 – Participation in Physical Activity

Teacher's Notes and Answers

Plenary Activity: What affects me

Aim of the activity	To allow students to test their knowledge and understand what factors affect participation of certain social groups in physical activity.
Teacher's instructions	Photocopy the activity page and give one copy to each pair. Give them 5 minutes to read each passage and decide which social group it refers to. Then identify and explain which factors affect their participation. Lower-ability students to just identify factors and high-ability students to explain the relation to the scenarios.

Answers

<i>'I gave up playing netball with my local team. My mum could no longer take me to training and matches and I had no other way of getting there especially during the winter when I didn't want to walk all that way as the weather is always horrible.'</i>	Social Group: age/family Factors: access, time, commitment Explanation: Time commitment, lack of opportunity and access to participation. Weather dissuaded them from participating.
<i>'I was interested in playing wheelchair basketball at my local sports centre but they did not have a wheelchair basketball team and the nearest team was 20 miles away.'</i>	Social Group: disability Factors: opportunity/access/commitment Explanation: A lack of opportunity for someone from being able to participate. Distance to afford to travel huge distances.
<i>'After watching Mo Farah at the Olympics on BBC, I have looked into taking up running. If someone from my background could achieve what he did then so can I.'</i>	Social Group: ethnicity Factors: media coverage, role models Explanation: Sport on non-commercial TV. It does not require subscription. Role models from ethnic backgrounds can inspire participation.
<i>'I know that sport is good for you but I'm not that interested in getting involved. I like football but women's football is rarely on TV and when I have tried playing, people sometimes say insulting things. It is also hard being part of my religion as women are often discouraged from playing sport.'</i>	Social Group: gender/religion Factors: media coverage, discrimination Explanation: The lack of role models for women's participation. Additionally, discrimination against women in sport by a religious group.
<i>'It can be difficult for me to take part in physical activity because my time outside of work can be taken up by religious commitments. For example, I am not able to be physically active on certain days and I can't exercise when I am fasting.'</i>	Social Group: religion/culture Factors: time Explanation: A person's religious beliefs can affect when they can take part in physical activity. They can take part in physical activity when they can.
<i>'When I was at school one of my teachers taught me all about the benefits of taking part in physical activity. Because of this teacher I started running with my classmates every week and I have kept doing it since I left school. I really enjoy it.'</i>	Social Group: age Factors: education Explanation: Education by a teacher can lead to positive attitudes towards sport. This can take into your adult life.
<i>'It can sometimes be hard for someone as old as me to keep physically active. Especially as my pension doesn't provide me with much money. However, my local fitness centre offers a range of inclusive activities such as walking football at a discounted price.'</i>	Social Group: age Factors: access / opportunity Explanation: Activities that are inclusive can help encourage participation. Discounts for concessions such as walking football can help participation in sport more affordable.
<i>'All my friends go to gymnastics every Tuesday and Thursday evening, but I can't go, as my parents are always working and they can't afford the expensive membership fees.'</i>	Social Group: age/family/peer pressure Factors: money/time/commitment Explanation: An individual's financial situation can affect their regular physical activity if they can't afford the facilities. Also family commitments can impact whether someone can participate.

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Participation in Physical Activity and Sport

A survey conducted into engagement patterns between different social groups revealed that there were many factors that affected people's engagement in sport. Some of these are listed below. Work with a partner to identify firstly which social group(s) they relate to and then briefly explain which factors it relates to from the lists given.

Social Groups: - gender - ethnicity - age - family - disability - religion/culture - peers	Factors: - access - media coverage - opportunity - time - commitments - environment/climate
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<i>'I gave up playing netball with my local team. My mum could no longer take me to training and matches and I had no other way of getting there especially during the winter when I didn't want to walk all that way as the weather is always horrible.'</i>	Social Group: Factors: Explanation:
---	--

<i>'I was interested in playing wheelchair basketball at my local sports centre but they did not have a wheelchair basketball team and the nearest team was 20 miles away.'</i>	Social Group: Factors: Explanation:
---	--

<i>'After watching Mo Farah at the Olympics on BBC, I have looked into taking up running. If someone from my background could achieve what he did then so can I.'</i>	Social Group: Factors: Explanation:
---	--

<i>'I know that sport is good for you but I'm not that interested in getting involved. I like football but women's football is rarely on TV and when I have tried playing, people sometimes say insulting things. It is also hard being part of my religion as women are often discouraged from playing sport.'</i>	Social Group: Factors: Explanation:
---	--

<i>'It can be difficult for me to take part in physical activity because my time outside of work can be taken up by religious commitments. For example, I am not able to be physically active on certain days and I can't exercise when I am fasting.'</i>	Social Group: Factors: Explanation:
--	--

<i>'When I was at school one of my teachers taught me all about the benefits of taking part in physical activity. Because of this teacher I started running with my classmates every week and I have kept doing it since I left school but I really enjoy it.'</i>	Social Group: Factors: Explanation:
--	--

<i>'It can sometimes be hard for someone as old as me to keep physically active. Especially as my pension doesn't provide me with much money. However, my local fitness centre offers a range of inclusive activities such as walking football at a discounted price.'</i>	Social Group: Factors: Explanation:
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<i>'All my friends go to gymnastics every Tuesday and Thursday evening, but I can't go, as my parents are always working and they can't afford the expensive membership fees.'</i>	Social Group: Factors: Explanation:
--	--

Activity 56 – Development of Children through Physical Activity

Teacher's Notes and Answers

Starter Activity: Make notes

Aim of the activity	To understand the impact of physical activity participation on health, well-being and the development of children.
Teacher's instructions	Photocopy the activity page and hand a copy to each student. Spend 5 minutes identifying as many impacts as they can of physical activity on the development of children. Once they have filled in the worksheet, have a 5 minute group discussion, during which they can present and discuss their findings.

Answers

Students should provide answers similar to the ones below:

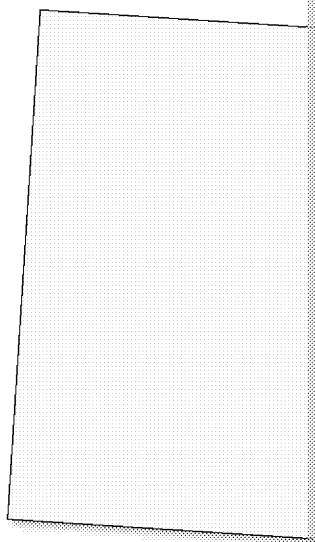
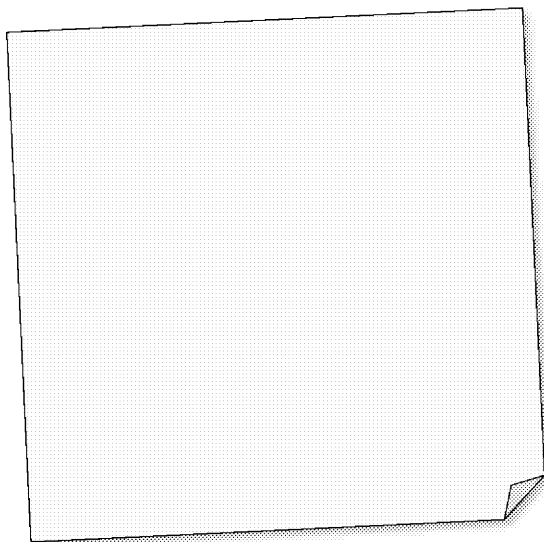
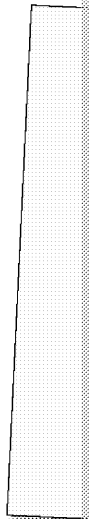
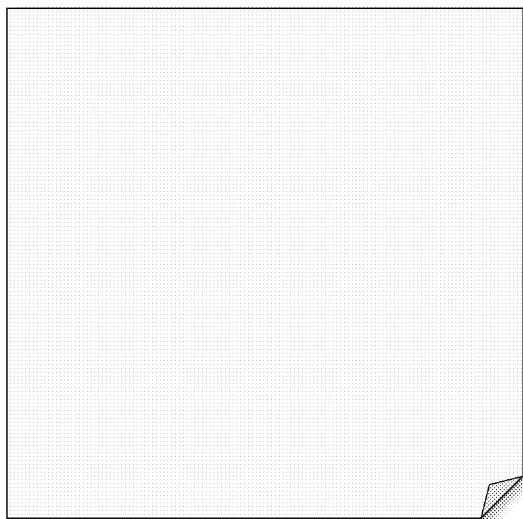
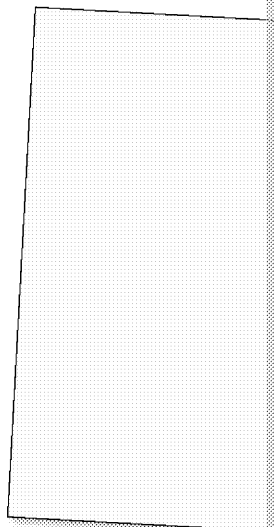
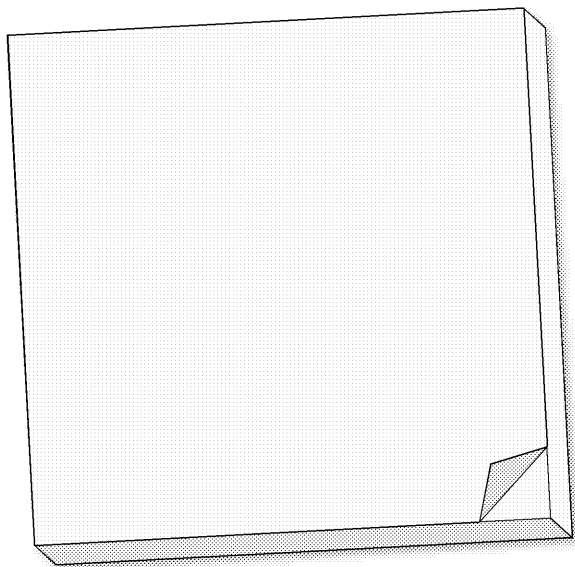
- It is important for children to develop good habits and improve their health, which reduces their chances of developing coronary heart disease and type 2 diabetes.
- It allows them to increase their bone density which will reduce the risk of fractures.
- One of the most important benefits of physical activity for children is the development of friendships with other children that they meet when taking part.
- It can increase the social health of children and give them the social skills to lead a social life as they get older.
- It also allows children to develop self-confidence and improve their mental health, which is important as they progress into adolescence.
- They can improve their physical literacy as physical activity provides a platform for movement patterns to be developed and refined.
- Increased physical literacy can improve their ability to perform physical activities in their lives which could encourage continued involvement.
- Developing physical literacy can also be important for the everyday activities that children involve walking, running, jumping, balance and coordination, e.g. playing sports.

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Development of Children through Particip

Think of different reasons why physical activity is important for the development of children. Write your ideas on the sticky notes below (make sure you cover physical literacy, health and well-being, and social skills). After 10 minutes, your class will have a discussion during which you can explain some of your ideas.



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Activity 57 – Improving Participation

Teacher's Notes and Answers

Plenary Activity: Provide the Strategies	
Aim of the activity	To test students' understanding of the different strategies of participation.
Teacher's instructions	Print out a copy of the activity sheet on the next page and students should work in groups of three and spend five minutes on each strategy. They should research these strategies in the next five minutes feeding back their findings to the rest of their group. The teacher should take notes about all three strategies.

Answers

School physical education, extracurricular activities and wider curriculum:

- Many schools have extracurricular clubs and activities which enable students to participate in physical activity every week.
- PE lessons are compulsory up to the age of 16 which ensures that students are involved in physical activity every week.
- The curriculum for PE within schools clearly lays out a development pathway required for lifelong involvement in physical activity.
- Schools can offer a wide range of activities and, therefore, there is likely to be something for each student.
- There can be opportunities to not only play in teams, but to lead and officiate, providing an avenue into sport for many that do not enjoy the participation side of sport.
- They have regular fixtures which increase the opportunities to take part.
- Schools can have a high standard of facilities due to funding from local councils.
- A range of competitive and non-competitive sport is available.

Anti-racism campaigns:

- Campaigns such as Kick It Out raise the awareness of discrimination faced by minorities in sport.
- These campaigns are often designed to provide education about equality and diversity.
- They can provide advice for minority groups.
- They can work to increase the diversity within sport, e.g. by increasing the number of minority players in football.
- They can provide a support network for those suffering from racism.
- They can provide a pathway for reporting incidences of racial abuse so that it can be dealt with by the authorities.
- They can highlight the achievements of minorities within sport, e.g. awarding them with special awards.

Adapted sport for disabled athletes:

- Institutions such as Sport England can provide funding in order to increase the number of disabled athletes.
- Promote adapted versions of sports.
- Provide facilities for adapted sports.
- Increase access opportunities, e.g. disabled access to buildings and improved transport.
- Increase the number of coaches qualified to deliver disability sport coaching.
- Provide community outreach projects to offer disabled individuals an opportunity to participate in sport.
- Subsidies can be provided for disabled athletes if they are receiving benefits or suffer a loss of income caused by disability.
- Highlighting the achievements of disabled athletes through awards and media attention can lead to disabled sports people being promoted as role models.

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Improving Participation: Provide the Strategy

Below are three different ways by which participation in physical activity can be improved. You should think about each of the three and think about and research one of the strategies each. You should write down what you think about each strategy and then you should feed back the information to the other members of your group.

When the other people in your group are telling you about their strategy, you should write down what you think about each strategy.

School physical education, extracurricular activities and

Anti-racism campaigns

Adapted sport for disabled athletes

Activity 58 – Provision for Minorities

Teacher's Notes and Answers

Plenary Activity: Notes on the work	
Aim of the activity	To understand the strategies that can be used to improve physical activity and sport.
Teacher's instructions	Photocopy the activity page and give one copy to each student. Divide the class into groups of three and each provide examples of how physical activity and sport can be provided for minority groups in physical activity and sport before explaining their own group. They should all take notes while their partners are explaining.

Answers

Examples of ideas are not limited to:

Provision:

- provide funding to build new facilities
- ensure the facilities are available in all areas of the community
- ensure that a range of different provisions are provided, e.g. running tracks, football pitches
- build free facilities such as community basketball courts
- improve bus routes to facilities
- provide onsite parking at physical activity facilities
- offer extended opening times, e.g. 24/7 gyms which suit everyone
- encourage cycling with safe places to leave bikes
- provide free gyms in local parks
- provide equipment such as goal posts and other sports equipment
- encourage participation
- advertising opportunities, e.g. flyers and TV commercials
- offer concessions/discounts for certain members with low incomes
- offer trial sessions to give a class a go before paying for membership
- provide free classes
- create links with local businesses so that their staff can exercise at work
- set up initiatives such as cycle to work plans

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Strategies to Improve Participation: Provision for Minorities

You will work in a team of three and take on the role of an organisation involved in increasing provision for minority groups (gender, race and disability). Your job is to work independently to come up with strategies for minority groups. Once you have filled in your section with strategies that could be used, discuss with your team on any ideas you didn't think of.

Your ideas for increasing provision

Team Member 2's ideas

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Activity 59 – Commercialism in Sport

Teacher's Notes and Answers

Plenary Activity: Report	
Aim of the activity	To understand the relationship between physical activity, commercialisation and the media.
Teacher's instructions	Photocopy the activity page and hand one copy to each group. Give them 10 minutes to complete the activity. They should write about the relationship between physical activity, commercialisation, including the relationship between sponsorship, and the media.

Answers

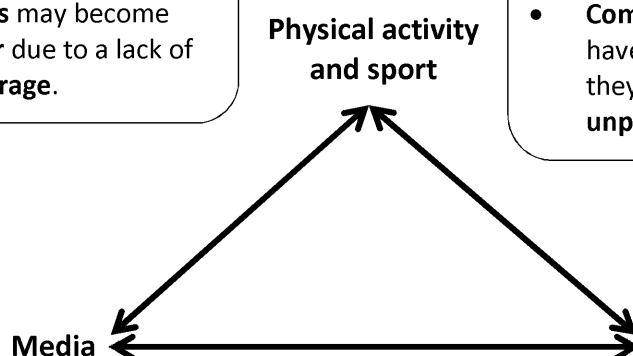
Student reports should include reference to the following points:

Relationship:

- **Popular** sports have a **positive** impact on the media by increasing **viewership**.
- The media can increase the **popularity** of certain **sports** which are **covered** in detail.
- Other **sports** may become less **popular** due to a lack of **media coverage**.

Relationship:

- Sports which are **successful** attract **media attention**.
- Successful **sports** are **promoted** on **platforms**.
- **Competition** have **time** they are **unpopular**.



Relationship:

- **Media** coverage provides a platform for **sponsors** to promote their **product** to a large audience.
- Sponsors pay **high** prices to have **adverts** broadcast during popular **sporting** events.

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Commercialism in Sport: Report

Produce a brief report to explain commercialisation in a sport of your choice between **physical activity and sport**, **commercialisation**, and the **media**.

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A large rectangular area for writing a report, featuring a decorative spiral binding on the left side and horizontal dotted lines for text entry. A dashed rectangular box is located in the bottom right corner of the writing area, containing the labels 'Phys' and 'Media' with arrows pointing towards the center of the box.

Activity 60 – Sponsorship and the Media

Teacher's Notes and Answers

Plenary Activity: Analyse and debate

Aim of the activity	To understand the different types of sponsorship and the media that they have on those involved in sporting activity.
Teacher's instructions	Photocopy the activity page and hand one copy to each student to read through the passage and annotate all the different forms of sponsorship that they can see. Then give students a number – either a 1 (for in sport) or a 2 (against commercialism and the media in sport) – and ask them to write about and write down how these different forms of sponsorship have a positive (1) or negative (2) impact on those involved in sport, and a debate could be performed in a following lesson.

Answers

Television and radio stations from all over the world compete for the right to broadcast the event as their country as the event attracts large audiences. During the event, these companies can increase their popularity by **sponsoring the clothing that the players wear** and **pay to have their logos displayed in various ways** during the event but this is not always seen as positive as it is likely to increase their popularity and make their brand more recognised. One way that a company can ensure that they are noticed is by **sponsoring facilities such as stadiums**. The 2016 match which will be held at the Levi's Stadium.

Alongside television viewership, people can also **keep up to date with the latest news** via the Internet provides a 24/7 opportunity for fans to follow the build-up to the match and it also allows them to follow live updates during the match. This is often done **to engage on social media** which promotes discussion and allows spectators to share their views. This is often done **the more traditional sources of information provided by the press, e.g. newspapers**.

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The following points could be discussed as part of the debate, but are not limited to:

	Positive	Negative
Performer	- financial support allows training and competing to be the main focus - earning potential has greatly increased - role model status - improved facilities, training equipment etc. from the increased revenue - can lead to the performer displaying sportsmanship as they try to gain contracts by presenting themselves as a role model	- Opportunities for commercialism, advertising, etc. can distract from training and competing - Changes to the format of competition can lead to more games played, leading to fatigue and injury - A greater interest in the sport means that the media's attention is focused on the sport - Media can alter the way the sport is presented to suit viewers, which can have a negative effect on the perception of the sport - Commercialisation can lead to performers being seen as performers rather than athletes as they gain sponsorship deals
Spectator	- improved viewing experience - increased range of viewing opportunities - increased opportunities to see live games due to the increased number of competitive matches	- Commercialisation can have a negative impact on the viewing experience - Over-commercialisation can lead to spectators being distracted by advertising and other commercial elements - Over-commercialisation can lead to spectators being distracted by rules and the commercial aspects of the sport - The spectators' experience of the sport can become tedious
Sport	- popularity is increased for the sports that receive revenue from sponsorship - increased coverage - increased financial strength - the competition organisation is improved - new competitions are created	- A greater gap between the more popular sports and the less popular sports - Business becomes more important than the sport - Sports become more commercialised
Sponsor	- increased revenue if associated with a popular/successful team/athlete - provides an opportunity to increase brand exposure	The brand may become associated with a team/athlete who is not successful

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Sponsorship and the Media in Sport: Analysis

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1. Read the following description of a sporting event and identify the sport and media that are involved.

Television and radio stations from all over the world compete for the right to broadcast the event as the event attracts large audiences. During the event, companies can increase their popularity by sponsoring the clothing the players wear.

Companies pay to have their logos displayed in various ways during the event. This is an investment as it is likely to increase their popularity and make their brand more well known. One way that a brand can ensure that they are noticed is by sponsoring the event. For example of this is the 2016 match which will be held at the Levi's Stadium.

Alongside television viewership, people can also keep up to date with the event through the Internet. The Internet provides a 24/7 opportunity for fans to follow the build-up to the event, the latest news and it also allows them to follow live updates during the event. This allows people to engage on social media which promotes discussion and allows for more information to be involved than the more traditional sources of information provided by television and radio.

2. You will be told if you are arguing **for** or **against** commercialisation and you will be given some notes in preparation for a class debate that will discuss the pros and cons of sponsorship and the media on the *performer, spectator, sport, sport organisation*.

I am **for/against** commercialisation and media in sport

Impacts on...

Performer	
Spectator	

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Activity 61 – Globalisation of

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Teacher's Notes

Starter Activity: Around the globe	
Aim of the activity	To understand the impact that globalisation has had on two
Teacher's instructions	Photocopy the activity page and hand out one copy to each minutes to complete the activity by writing down the impact exposure, and freedom of movement for performers has had the twenty-first century. Then spend five minutes discussing any answers which they did not provide.

Answers

Greater exposure:

- Due to increased media coverage which allows people to view more
- Due to improved transportation which allows people to attend events
- Due to increased disposable income and leisure time which allow people
- This has led to a greater number of elite athletes due to the increase which clubs and teams can pick athletes.

Freedom of movement for performers:

- Athletes are able to take part in sporting competitions in countries where they were born.
- This has allowed large tournaments, such as the Olympics and FIFA, to be held around the world and increase the popularity of sports within the host countries.
- Sports teams also embark on preseason tours to different areas of the world to increase the popularity of a sport.

Media coverage:

- Increased media coverage has allowed more people to be involved in sports.
- It has led to increased popularity for those sports which receive large amounts of media coverage.
- Twenty-four-hour sports news channels highlight this increased popularity.
- Dedicated sports channels also highlight the popularity of sports.
- Increased media coverage has also increased the ability of sports to generate advertising.
- Advertising money has been used to increase the quality of sports and increase their popularity.

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Globalisation of Sport in the Twenty-first Century

Around the globe

Using the annotations and titles given, explain each one in further detail and how it has become globalised in the twenty-first century.

Greater exposure

Freedom of movement



Media coverage

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Activity 62 – Trends in Commerce

Teacher's Notes and Answers

Starter Activity: Data discussion

Aim of the activity	To be able to interpret and analyse graphical representation in the commercialisation of physical activity and sport.
Teacher's instructions	Get the students into small groups of four or five and photograph each student. Give each group five to ten minutes to look at the data and discuss it using the questions provided to aid their discussion. Go round the groups discussing to ensure that they are staying on track and to support their discussions.

Answers

- Advertising prices steadily rose between 1966 and 1990 and then rose more rapidly.
- This trend is likely to have occurred due to the increasing worldwide reach of television which has increased the viewership. With more people watching the event, having an advertisement shown during the match have greatly increased the competition has led to greater prices.
- The importance of the advertisements for companies involved in the event. The advertisements during the match which may reduce the viewing time on television. There is less time for analysis to occur due to the event. Some fans might find that it distracts from the event.
- Due to the popularity of the sport and the worldwide reach, companies can promote themselves to large numbers of people. For them the cost is worth the money as it will have a positive impact on their popularity.
- The television networks are able to charge this much money for advertising during the event. A lot of competition for the right to be able to advertise during the event. Companies that compete for the chance to promote themselves during the event. The television networks will be able to charge for the rights.

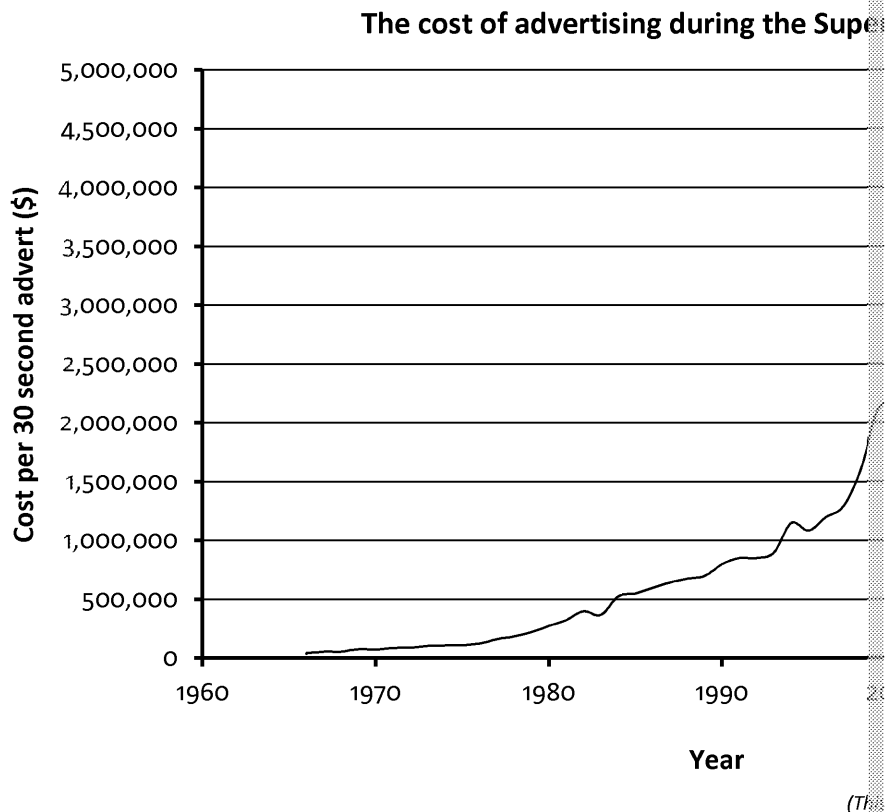
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Trends in Commercialisation: Data discussion

The graph below shows the cost of advertising during the Super Bowl over a 48 years. Discuss what the data shows, using the questions below to guide you.



i) Discuss the trend in advertising prices.

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ii) Why do you think this trend has occurred?

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iii) What effect has this trend had on the spectators?

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iii) Why are companies willing to pay this amount of money for advertising?

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v) Why does it cost this much to advertise during the Super Bowl?

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Activity 63 – Ethics in Sport

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Teacher's Notes and Answers

Plenary Activity: Tri-answers

Aim of the activity	To understand the different types of sporting behaviour and consequences of, deviance in sport.
Teacher's instructions	Photocopy the activity sheet and hand one copy to each group. Give them 10 minutes to complete the triangle of information by filling in appropriate information. They should work from the triangle building their knowledge for longer-answered questions.

Answers

Possible keywords:

- **Sportsmanship** – fair, rules, adhering, lawful
- **Gamesmanship** – unfair, bending rules, gaining advantage, obstruct

Possible definitions:

- **Sportsmanship** – treating your opponents justly and competing in a fair manner
- **Gamesmanship** – pushing the sports codes to their limits in order to win

Any appropriate example of each:

- **Sportsmanship** – e.g. shaking an opponent's hand after the match or a game to show respect
- **Gamesmanship** – e.g. time-wasting near the end of a match to run out of time winning

Possible reasons for gamesmanship and deviance:

- to gain an advantage
- importance of the event
- pressure from coaches
- financial pressure to win
- drive to win

Possible consequences of deviance:

- experience success
- increased fame
- increased wealth
- receive a ban
- receive a fine
- damage to the athlete's reputation
- damage to the sport's reputation
- damage to the sport's credibility

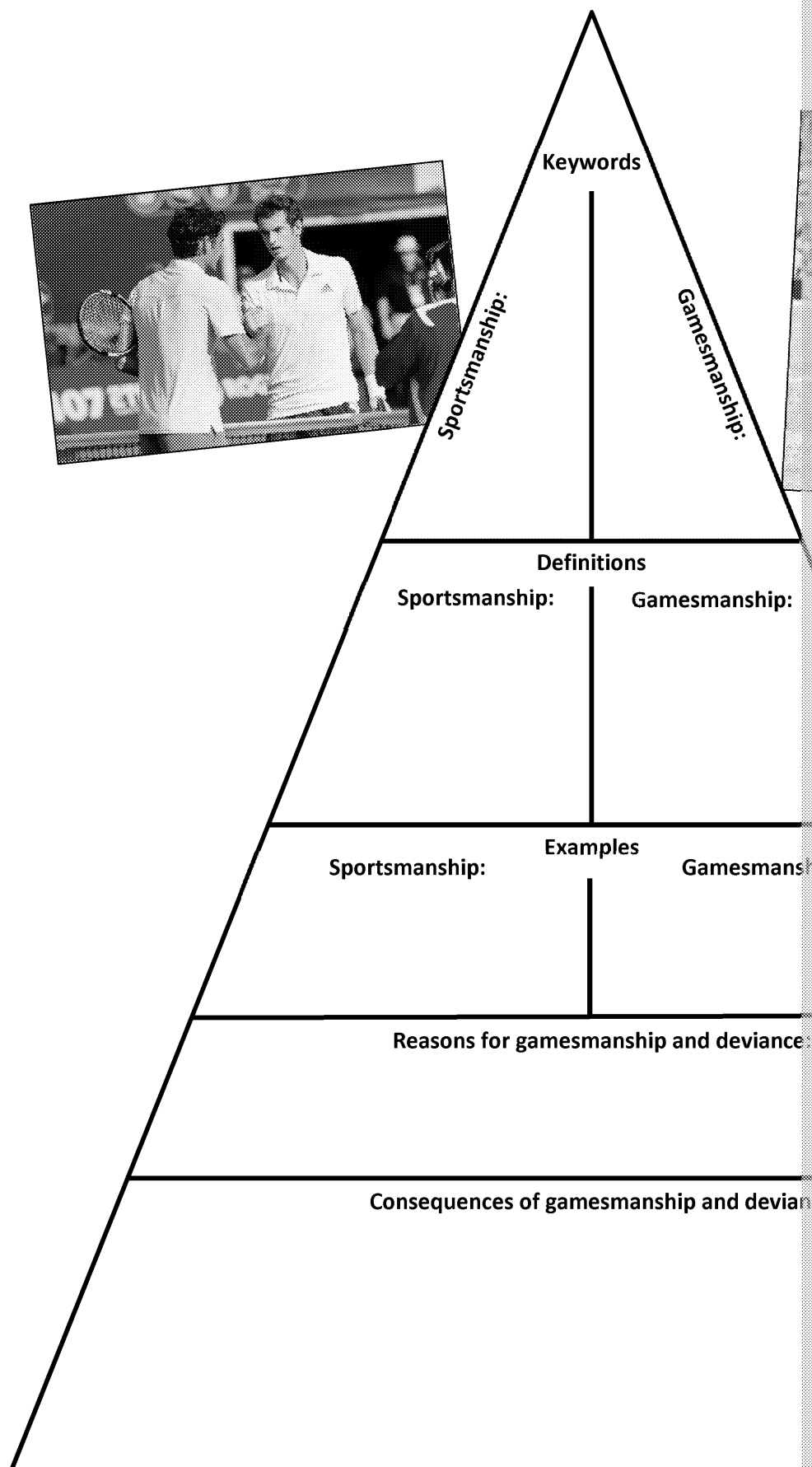
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Ethics in Sport: Tri-answers

Complete the sections of the triangle below to summarise your knowledge of

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TIP: This is a great way to practise constructing your answers for long

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Activity 64 – Drugs in Sport

Teacher's Notes and Answers

Plenary Activity: Positives and negatives	
Aim of the activity	To understand the positive and negative effects of taking PEDs on a performer's lifestyle.
Teacher's instructions	Photocopy the activity page and hand one copy to each group. Give the students 5–10 minutes to discuss the advantages and disadvantages of PEDs and write them down. Then open up a group discussion and ask the groups to share their findings.

Answers

Advantages to performer:

- improved performance
- increased strength
- improved training
- improved emotional control
- greater energy levels
- experience success
- increased fame
- increased wealth
- able to compete with others who are using PEDs

Disadvantages to performer:

- damage their reputation
- damage their health
- at risk of being fined
- at risk of being banned
- at risk of addiction
- increased aggression
- reduced psychological health
- greater impact of injury if it allows the athlete to continue to participate

Disadvantages to sport:

- damage to reputation
- loss of credibility
- reduced popularity
- loss of sponsorship

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Drugs in Sport 2: Positives and negatives

A number of elite athletes have been accused or found guilty of taking PEDs. Discuss the reasons why an athlete might take PEDs when competing in competition. List the advantages and disadvantages below. Then discuss the disadvantages to the sport.

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Discuss the disadvantages using PEDs can have for the sport:

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