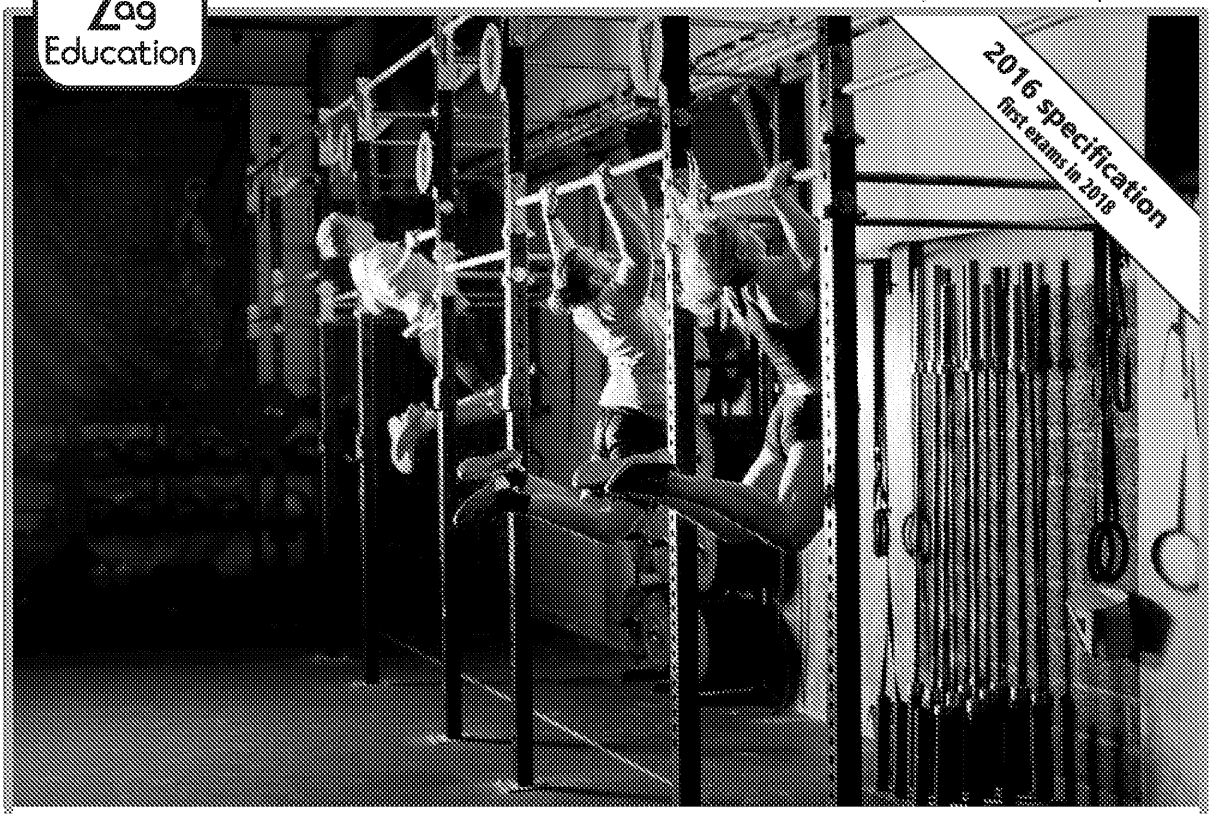
Zig Zag Education

PE

GCSE (9–1) | Edexcel | 1PE0



Tricky Topics for GCSE Edexcel PE

Topic 3: Physical Training

zigzageducation.co.uk

POD 12106

Contents

Teacher's Introduction

This resource has been created to supplement your teaching and to support you and your students through the topic of **Edexcel GCSE PE (9–1): Physical Training**. It has been broken down into seven sections ensuring time to fully develop the required knowledge and understanding:

- 3.1.1 – The relationship between health and fitness and the role exercise plays in both
- 3.2.1 – Components of fitness and benefits for sport
- 3.2.2–3.2.5 – How fitness is measured and improved
- 3.3.1–3.3.2 – The principles of training and their application to personal exercise/training programmes
- 3.3.3 – Types of training
- 3.5.1–3.5.5 – How to optimise training and prevent injury
- 3.6.1–3.6.3 – Effective use of a warm-up and cool-down

Remember!
Always check the exam board website for new information, including changes to the specification and sample assessment material.

Please note: *3.4 – The long-term effects of exercise – has not been covered in this pack as we felt it was better covered alongside the body systems the effects relate to.*

Why is Physical Training a tricky topic?
Learning the topic of Physical Training requires students to use analytical thinking in order to link together the various components of fitness, the tests used to measure them, the types of training used to develop them, and the principles of training required to optimise fitness programmes. Physical Training is a very applied topic, where students are often required to use sporting examples to support their answers and use high-level thinking to justify why components of fitness or types of training may or may not be relevant for performers in different sporting activities. Many questions related to Physical Training in past exams have been extended-answer questions requiring students to evaluate and discuss the importance or relevance of different components of fitness and types of training to different sporting contexts. Therefore, a good understanding of the subtopics within this area is crucial to picking up marks in the exam.

When teaching this topic, it is important to break down the different topics and scaffold learning through activities so that students understand basic terms and concepts before applying their knowledge to the context of sport. Additionally, PE students enjoy being practical, so integrating practical extensions throughout this topic is ideal for getting through to students and improving their confidence.

Worksheets provided throughout this pack have been designed to be visual and include a focus on 'doing' through a range of practical activities alongside more theoretical worksheets. There is a range of clear images and diagrams to support the students' understanding, which can also be used as a revision tool throughout the two-year course.

The pack contains seven lessons, guided by the **teacher's overview page**, which highlights *timings*, *equipment required* and *guidance notes* for the activities that students receive. Each lesson then is inclusive of worksheets that include:

1. **Summary notes** – provide background knowledge and information on each subtopic to support students in completing the activities and give them a base to work from.
2. **Theoretical and practical tasks** – progressively build students' understanding of the topic step by step, introducing key terms and concepts individually before combining them as a whole. Tasks provide a variety of different approaches, and include individual, paired and small-group work. Each task is carefully instructed, allowing the students to be independent, and minimal input from the teacher is needed, allowing you to float between the groups and support students who need it. Optional extensions are also provided throughout – these can be supplied as in-class extension activities for the quicker learners or provided as homework.
3. **Top tips** – offer students key advice that can support knowledge retention and exam preparation.
4. **Questions to think about** – provide opportunities for in-class discussion springboards and encourage deeper thinking on the topic to stretch and challenge students.
5. **Practice exam-style questions** – expose students to the exam format for each subtopic and help them put their knowledge and understanding into practice.

Each lesson also contains **thought-provoking visual images and diagrams** to stimulate learners' interest and support their understanding of the tricky topic. Each worksheet is write-on and can be photocopied and handed out to students. The activities included require minimal equipment so can be completed with basic resources.

When using normative date in this resource, we have created data sets that are reasonable estimations of referenced normative data sets. As such, they are realistic and work as intended in this resource. **Please note that for purposes outside this resource, students should compare to real normative data obtained from reliable sources.**

May 2023

Teacher's Overviev

This table provides an overall summary of how to use each worksheet in the lesson, providing timing su consider when setting students each task. You may wish to hand out these for independent learning al students can adapt to complete on their own.

Topic no.	Spec reference and title	Time suggestion	Equipment needed	
1	**3.1.1** – Health and fitness and the [illegible] exe[illegible]	5[illegible]s	None	**5–10 mins:** Discuss the difference between t **5–10 mins:** *Activity 1*. Define the terms healt **5–10 mins:** Discuss the relationship between **10 mins:** *Activity 2*. Come up with examples o improve despite ill health. **5 mins:** *Exam-style questions.*
2	**3.2.1** – Components of fitness	1 hr	None	**5–10 mins:** Introduce the different compone **5 mins:** *Activity 1*. Guess the different comp **10 mins:** *Activity 2*. Provide definitions for th every minute to reflect the 1 mark per minut **10 mins:** Discuss what sports and activities e **15 mins:** *Activity 3*. Justify different compon and activities. **10 mins:** *Exam-style questions.*
3	**3.2.2–3.2.5** – How fitness is measured and improved	1 hr	Fitness test equipm[illegible] [illegible] [illegible]nsion)	**5 mins:** Discuss the values of fitness testing. **5 mins:** *Activity 1:* Write an email to demons **10–15 mins:** Read thr[illegible]gh the main procedu component [illegible], [illegible]d the types of data sports [illegible] but not others. [illegible]**ns:** [illegible]*vity 2A:* Identify the fitness tests [illegible] **mins:** *Activity 2B:* Complete the tables to suitable for the example sports they are use **5 mins:** Read through the information on int **10 mins:** *Activity 3:* Interpret the fitness test relevant to that performer. **5–10 mins:** *Exam-style questions.* **(Optional) Extension:** Demonstrate how dat

Topic no.	Spec reference and title	Time suggestion	Equipment needed	
4	**3.3.1** – Principles of training	1 hr	Calculator Heart rat[illegible] fitn[illegible] tracker (for optional extension)	**5 mins:** Introduce the key principles of traini **10 mins:** *Activity 1.* Apply the principles of tr **5 mins:** Introduc[illegible]y principles of overl **10 min[illegible]** *Activity 2:* Apply the principles of ov **10 min[illegible]** *Activity 3:* Provide advice for how t[illegible]ent performers and their goals. **10 mins:** Read through the different ways th the effectiveness of training. **10 mins:** *Activity 4:* Provide advice for how t their goals. **5 mins:** *Exam-style questions.* **(Optional) Extension:** Students to calculate t running pace for training in each zone.
5	**3.3.2–3.3.3** – Training programmes	1 hr	None	**10–15 mins:** Introduce the different types of **10 mins:** *Activity 1.* Design a training session its suitability. **15 mins:** Discuss the advantages and disadva their appropriateness to different sporting a **15 mins:** *Activity 2.* Evaluate the effectivene considering the advantages and disadvantag **15 mins:** *Exam-style questions.* **(Optional) Extension:** Students to design we of their choice, show[illegible]how to apply the pr
6	**3.5** – Optimising training and pre[illegible] inju[illegible]	1 [illegible]	None	**5 mins:** Disc[illegible]yp[illegible]of information inclu **5–10 mins:** [illegible]*ty 1:* Complete the PAR-Q p [illegible]the information they have given. **10–15 mins:** Discuss the different factors tha **10 mins:** *Activity 2:* Students to come up wit describe how they occurred and how they c **10 mins:** Discuss the different types of injuri **5–10 mins:** *Activity 3:* Identify the different t **10 mins:** Discuss the use of PEDs. **10 mins:** *Activity 4:* Game of true or false ab **5 mins:** *Exam-style questions.*

Topic no.	Spec reference and title	Time suggestion	Equipment needed	
7	**3.6.1–3.6.3** – Warm-ups and cool-downs	1 hr		**10 mins:** Introduce the components of a war **10–15 mins:** *Activity 1:* Design a warm-up an **10 mins:** Discuss the benefits of warming up **15 mins:** *Activity 2:* Explain the potential imp **5 mins:** *Exam style questions.* **(Optional) Extension:** Students to perform o in Activity 1.

Please note: *3.4 – The long-term effects of exercise – has not been covered in this pack as we felt it was*

Student Introduction

Physical training is needed in sport in order to improve performance. You may be
for a sport or an activity and wondering which aspects of performance it is best t
be optimised to reap the greatest rewards. By exploring the topic of Physical Tra
develop the knowledge and understanding needed to excel in your studies and i

This Tricky Topics pack will start off by focusing on health and fitness, including t
fitness and how these are measured. It will then focus on the principles of trainin
different types of training, before ending with a variety of methods for optimisin
including warm-ups and cool-downs.

Each worksheet in this pack covers a separate topic within **Topic 3 – Physical Tra**
specific exercises to do; however if you're tackling a worksheet on your own:

- Read the information at the start of the worksheet.
- Read the relevant section of your textbook which covers this topic. If you don't have a t
words and concepts online.
- Try the activities or questions. If you have the answer sheet, answer as muc
- Check your answers against the answer sheet, or hand in your work to your

Good luck and happy learning!

1. Health and Fitness and the Role of

Health, exercise, performance and fitness are terms used throughout sport that
into the relationship between them, it is important to start with their definitions.

The World Health Organization (WHO) defines **health** as 'a state of complete phy
being, and not merely the absence of disease or infirmity'.

On the other hand, **fitness** can be defined as the ability of the body to meet or co
environment. The environment in this instance is the sport or activity performed.

Top tip: As fitness relates to the sport or activity someone participates in, the fitness requirements for different sports can vary.

Question to
How might the
differ from thos

Exercise refers to a structured form of physical activity other than sport, and is p
maintain health and fitness.

The final term, **performance**, is simply a description of how well an activity is com

Activity 1 (paired)

Working with a partner, see whether you can recall the definitions for health, ex
fitness above, word for word, without looking (cover them with a piece of paper).

Your partner should check against the definition and record how many words we
Take it in turns with each definition, using the following order:

1. Person 1 defines health
2. Person 2 defines fitness
3. Person 1 defines exercise
4. Person 2 defines performance
5. Person 1 defines fitness
6. Person 2 defines health
7. Person 1 defines performance
8. Person 2 defines exercise

You should repeat this three times to see whether you can improve your definitio

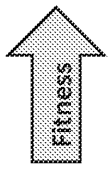
	Attempt 1	Attempt 2	Attem
Health			
Fitness			
Exercise			
Performance			

As seen from the definition on page 6, health is split into three aspects of well-be
Participation in physical activity, exercise and sport benefits each of these aspect
that the benefits of participation have on these aspects in the table below.

Physical well-being	Mental well-being	
• Free from injury	• Increased confidence	•
• Free from illness	• Increased self-esteem	•
• Free from disease	• Reduced depression	•
• All body systems working well	• Positive outlook	•
(You do not need to know specific examples of the different aspects of well-bein useful for understanding health and its relationship to fitness.)		

Ill health is brought on by an individual lacking an aspect of these aspects of positi
determine whether someone is in the position to exercise or not, which can ther
our ability to meet the demands of the sport or activity we are involved in).

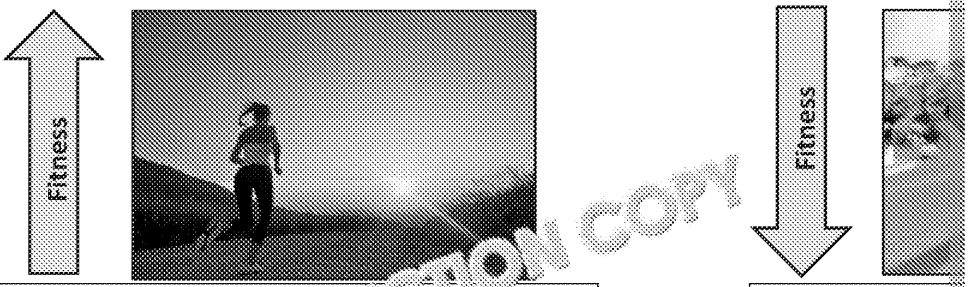
On one hand, ill health can **decrease fitness**. For example, consider someone wh
therefore, is suffering from poor physical well-being. An injury can hold someone
exercising/training as they must rest and recover. Therefore, the period of detra
through will result in a decrease in fitness levels, as any previous gains in fitness



On the other hand, ill health can **increase fitness**. For example, an ind
depression (mental ill health) and, therefore, has poor mental well-be
having ill health. However, as physical activity has proven to be an eff
people with depression, a depressed individual may still be able to ex
their fitness.

Activity 2 (individual)

Come up with your own examples of how ill health can affect an individual's abil
both increase **and** decrease fitness, by filling in the empty cells (overleaf). You ca
physical, mental and social well-being above to help. You can then compare your
add any other examples that they came up with.



e.g. an individual w... ...ng from depressio... ...ld ... ...dered as having poor mental he... ...owever, the individual may find that exerc... ...g helps with their depression and can, therefore, still increase their fitness levels.

e.g. someone ... is currently i... physically unc... period of detr... result in decre...

Increase in fitness despite ill health...	*Decrease in fitn*
Example 1:	*Example 1:*
Example 2:	*Example 2:*
Example 3:	*Example 3:*
Example 4:	*Example 4:*

Top tip: Draw from your own personal experiences to help answer questions on ... relationship between these terms. Has yo... ever affected your ability to exercise, and ... your fitness?

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. a. Complete the statements that define the terms 'health' and 'fitness'.

   Health – a state of complete physical, mental and social _____ absence of disease or infirmity.

   Fitness – the ability of the body to meet or cope with the _____

   b. Which **one** of the following best describes the term 'performance' in sp
   your answer.
   a) How well an activity is completed ☐
   b) How well a performer behaves ☐
   c) The act of performing on a show ☐
   d) Performing to trick an official ☐

   c. Give **one** example of how exercise can improve health.

   .....

2. Components of Fitness

There are many components of fitness that are important to a range of different sports. Having a combination of different components is often required in order to be successful in the specific sport or activity.

Remember
Fitness in sport
the demands of

In order to understand the different components of fitness, you should first be aware of their definitions:

Component of fitness	Definition
Agility	The abilit ange direction quickly without lo
Balance	The ability to maintain centre of mass over the b
Cardiovas tness (aerobic e nce)	The ability of the body to exercise for prolonged
Power	The product of strength and speed.
Muscular endurance	The ability of a muscle to repeatedly contract wit
Flexibility	The range of movement available at a joint.
Body composition	The relative percentage of fat mass to fat-free (m
Coordination	The ability to use two or more body parts, both s
Reaction time	The time taken to initiate a response to a stimulu
Speed	The ability to cover a pre-determined distance as
Strength	The ability of the muscle to apply force to overco

Question to think about

How might fitness requirements vary based on different roles or positions of pe

Activity 1 (group)

Split yourselves into two groups for a game of charades. In your group, one pers up in front of the others and act out a component of fitness. Once guessed, anot act out a different component, until all components have been covered. Make su has a go at acting out a component of fitness. There should be 11 in total.

Activity 2 (individual)

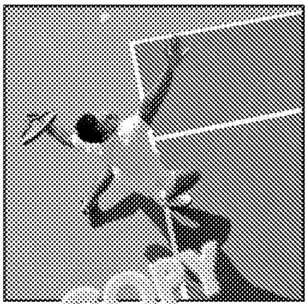
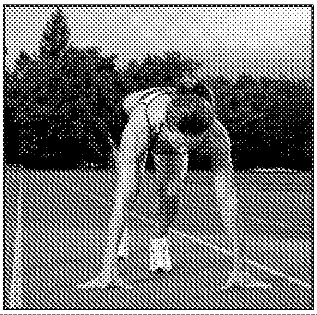
You will often have 1-mark questions in your exam that will require you to define or recognise a correct definition (i.e. multiple choice). Without looking at the not definitions for each component of fitness in the table below. Some key terms are to help you. Swap your responses with a peer and re- -y of their answers wi coloured pen.

Component of fitness	Definition
Agility	
Balance	
Cardiovascular fitness (aerobic endurance)	
Power	
Muscular endurance	
Flexibility	
Body composition	
Coordination	
Reaction time	
Speed	
Strength	

Key terms: *ability, contract, fa- -ing force, pre-determined, control, base of sup stimulus, efficiently, re- -e, product*

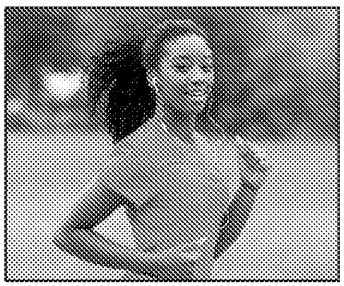
Now that you know the definitions of the different components of fitness, let's t meaning and which sports and activities this means they are suited to.

Skill-related fitness components:

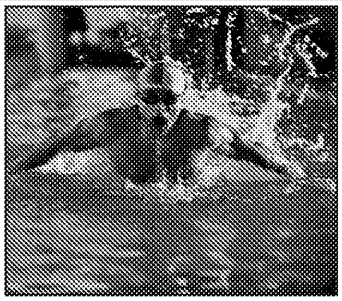
		
Power Power is a combination of strength and speed so it is important in activities where these components are needed to move large resistances quickly, e.g. jumping to overcome bodyweight quickly, as seen in the high jump, and applying force to an object with speed, e.g. when shooting in sports such as football and hockey.	**Coordination** Coordination requires the efficient use of two or more body parts. This is usually hand–eye coordination, such as that required during the tennis serve, where the performer must throw the ball into the air while preparing for the shot, then hit the ball at its highest point.	**Bal** Bal wh gra (i.e to t per wh poi ste
		
Agility A performer requires agility in order to change direction quickly, so it is important in activities where they must evade an opponent, such as in rugby, or when responding to the movements of the opposition, such as moving across the court to return a shot in tennis or badminton.	**Reaction time** Having a good reaction time is important in a range of sports. The most obvious is timed sprint events where the response to the starting gun is a key determinant of getting a good head start in the race.	**Spe** Spe opp tak The spo eve tea foo

Top tip: The components of fitness are often related and skill-related components. A good remember the skill-related components is PC coordination, balance, agility, reaction time an

Health-related fitness components:



Cardiovascular fitness (aerobic endurance)
As implied in the name, cardiovascular fitness is used in endurance events which rely on having a well-developed cardiovascular system to supply the working muscles with oxygen-rich blood during exercise. It is important in all long-distance events, such as marathon running and triathlons.



Muscular endurance
As muscular endurance requires the muscle to contract for an extended period of time, it is important for events that need to overcome the sensations of fatigue, such as during the last 100–200 m of a 400 m race.

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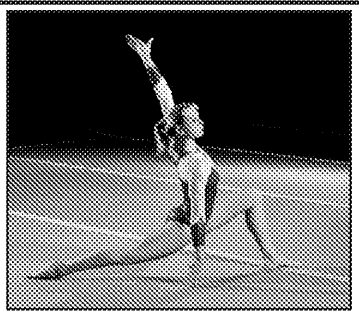
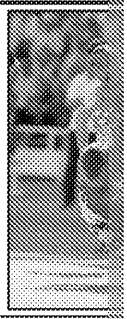


Flexibility
Having good flexibility is important in both sports performance and injury prevention, so is important in a range of sports. For performance purposes, flexibility is required in most gymnastics movements, e.g. split jumps and tumbling.



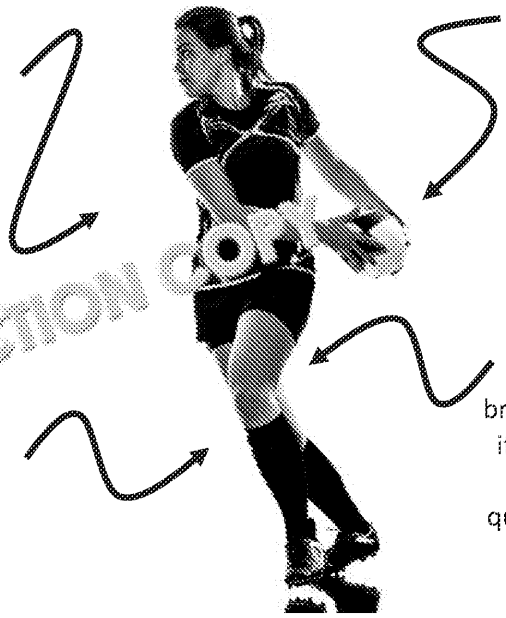
Body composition
Different body compos
sporting activities. For
performer to have a la
mass to maximise cont
the event. On the othe
benefit from having a
increase the weight th
opponent in a tackle o

Top tip: Success in sporting activities usu
depends on a combination of componen
fitness, therefore, think about how the di
components of fitness may interact.

As well as showing an understanding of the components of fitness through defin
you to demonstrate your understanding by applying the different components t
and justifying which are relevant and which are not.

Agility

Rugby requires the performer to evade their opponents to get over the try line, so sidestepping (changing direction quickly) is an important skill for doing this.



Power

Rugby play[illegible] range of explosive [illegible] which combine strengt[illegible] speed, such as jumping to challenge for an aerial ball, lifting a teammate in a line-out, and tackling.

R
brea
if t
n
qui

Components not required by, or less important to, the performer for performan

- **Flexibility** – being able to move the joints through a large range of motion is example, in rugby it could be useful in preventing musculoskeletal injuries. I other components to successful performance. It is also not required in certa where the muscles are undergoing isometric contractions, i.e. are not movi
- For performance of certain skills, some components of fitness may not be re **endurance** is important to continually make tackles throughout the game, b over in one movement, muscular endurance is not required.

Most fitness components can be somewhat important to performance in most s justify the use of flexibility for performance in rugby; however, it is best if you se can specifically provide examples for.

Top tip: Success in sporting activities usually d combination of components of fitness, therefor about how the different components of fitnes

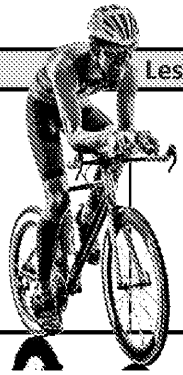
Activity 3 (paired/individual)

For each of the sporting examples below, give **two** components of fitness that ar
skills within the activity, and **two** that are less important. You must give a justifi
with a partner to discuss your selections.

Serving in wheelchair tennis

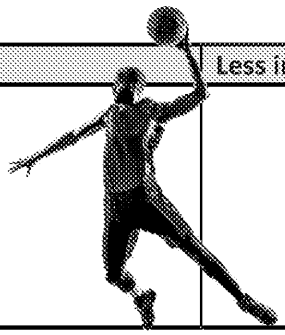
Important	Less important
1.	1.
2.	2.

Cycling st a triathlon



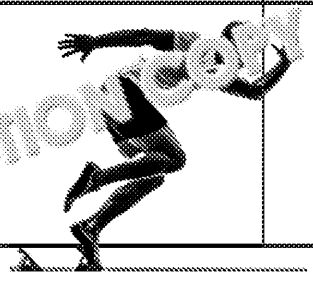
Important	Less important
1.	1.
2.	2.

Slam dunk in basketball



Important	Less important
1.	1.
2.	2.

Sprint start of the 100 m sprint



Important	Less important
1.	1.
2.	2.

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. a. Define the term 'speed'.

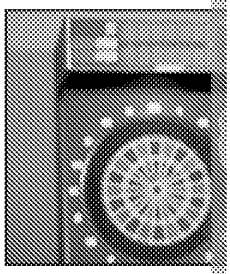
.....

.....

b. Which **one** of these activities is speed most important for?

a) Football ☐
b) Gymnastics ☐
c) Archery ☐
d) Badminton ☐

2. Justify why being powerful is more important to a rugby player than a darts



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3. Complete the table by:
   a) Identifying the component of fitness most important to the given perfo
   b) Stating an advantage of the given component for their performance

Performer	a) Component of f...	b) Adv...
Weightlifter		
G...ast		

3. How Fitness is Measured and Impr

The various components of fitness covered in the previous section can be measu
tests, with specific fitness tests designed to measure each component of fitness.

There is a wide range of values of fitness testing in sport, mainly applied to their
training programmes.

- Compare against norms/others
- Identify strengths and weaknesses
- Indicate baseline fitness
- Inform training requirements
- Set goals and motivate
- Monitor improvements in fitness
- Determine the success of a training programme

Activity (individual/paired)

Decide on a sport in your pairs. Each member in the pair should write a mock ema
fitness coach addressing the head coach in that sport, explaining the values of fitn
season or for an athlete's training programme.

The other member in the pair should play the same role, but they should email th
not be using fitness testing (by explaining its limitations). Alternatively, you could
email just by yourself.

Try to write your mock email without looking at the notes and then swap sheets to

Now you are familiar with the values of fitness testing, it is time to uncover the v
measure the different components of fitness!

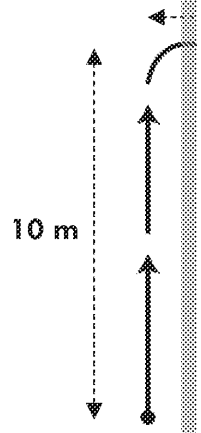
Spend 10–15 minutes reading through the procedures of each of the tests over t
how the test is organised, with reference to:

- the main procedures/protocols that are followed in order to carry out the te
- the facilities and equipment required to set up the test and to collect data
- the measurements that are used as the test score

Agility – Illinois Agility Run Test

Main procedures/protocols:

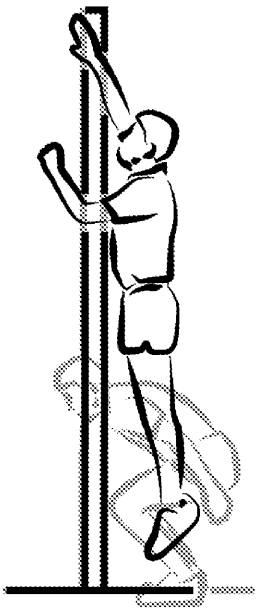
1. The participant warms up while the assistant marks out a 10 m × 5 m course, as shown in the diagram to the right.
2. On the command 'go', the participant should aim to complete the course in the direction shown, as quickly as possible.
3. The assistant uses a stopwatch to time how long they take **in seconds** and this is used as the test score.



Equipment and facilities needed:

- Cones
- Stopwatch
- Non-slip indoor/outdoor surface
- Assistant

Power (Explosive Strength) – Vertical Jump



Main procedures/protocols:

1. The participant warms up then chalks the tips of their fingers (or applies chalk).
2. The participant then stands side-on to the wall and reaches as high as possible to mark the wall with the chalk.
3. The participant then jumps as high as they can and marks the wall with their arm stretched as high as possible.
4. The assistant records the distance between the first mark (while standing) and the second mark (while jumping) and this is used as the test score.

Equipment and facilities needed:

- Chalk
- Ruler
- Vertical wall which can be marked with chalk
- Assistant

Cardiovascular Fitness (Maximal Test) – Cooper 12

Main procedures/protocols:

1. The participant warms up in preparation for the 12-minute Cooper test they are about to perform (run or swim).
2. On the command 'go', the assistant starts the stopwatch and the participant begins the test.
3. The participant must run or swim (depending on the test) as far as possible within 12 minutes.
4. Once the 12-minute time period is up, the participant must stop where they are.
5. The distance they have travelled is recorded in metres and used as the test score.

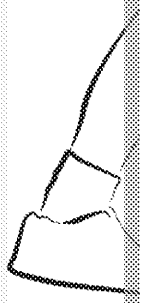
Equipment and facilities needed:

- Running track / swimming pool
- Stopwatch
- Assistant

Cardiovascular Fitness (Sub-maximal Test) – Harv

Main procedures/protocols:

1. The participant begins the test by facing the stepping bench.
2. The test conductor should start a metronome via an audio player at 30 beats per minute.
3. On each beat, the participant should step up onto the bench and back down again, alternating the leading leg each time.
4. They should continue doing this for 5 minutes, at which point the assistant should notify them to stop.
5. The participant should measure their pulse rate on every minute mark after ending the test, for three consecutive minutes. This can be done by counting the last 15 seconds of every minute and multiplying it by four.
6. A test score can be calculated by the equation: **30,000 / (pulse after 1 min + pulse after 2 mins + pulse after 3 mins)**



Equipment and facilities needed:

- Bench or step
- Audio player and recording tra
- Stopwatch
- Assistant

Question to thin

Why might there be alte
measure cardiovascular

Speed – 30 m Sprint Test

Main procedures/protocols

1. The participant should
   marks out a 30 metre t
2. The participant starts f
   between the start cone
3. On the command 'go',
   stopwatch and the par
   distance right through
4. As the participant pass
   s the stopwatch ar
   which is used as the te

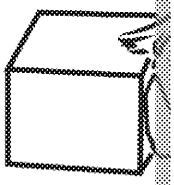
Equipment and facilities ne

- Cones
- Measuring tape/wheel
- Stopwatch
- Running track
- Assistant

Flexibility – Sit and Reach Test

Main procedures/protocols:

1. The participant performs a warm-up to increase flexibility and reduce the risk of injury.
2. They then sit with their feet pressed up against the sit and reach box with legs straight and flat on the floor (as shown in the image on the right).
3. The participant should then reach out in front of them as far as possible on the sit and reach box. They should make sure that the stretch is smooth and progressive.
4. The assistant records the distance **in centimetres** they are able to reach by reading the built-in ruler on top of the sit and reach box. This is used as the test score.

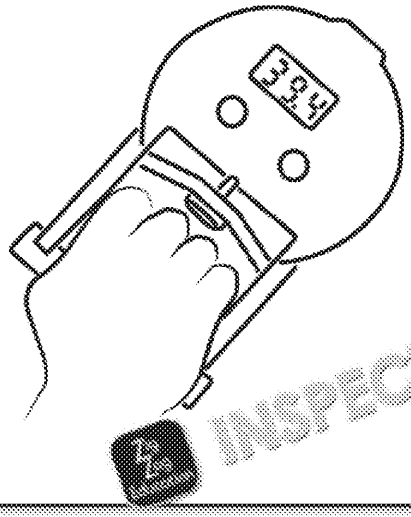


Equipment and facilities needed:

- Sit and reach box (with built-in ruler)
- Exercise mat (optional)
- Assistant

Top tip: Fitness tests that do not require lar
of energy, motivation and time to complete
repeated three times, in order to use the hig
This is because participants tend to improve
warm up or become more familiar with the

Strength – Grip Dynamometer Test



Main procedures/protocols:

1. The participant adjusts the
   comfortably between the fi
   and the palm of the hand.
2. They should then stand hol
   beside them but with the ar
   so that it is not touching.
3. When ready, they should sq
   for one or up to five secon
4. The test score is displayed o

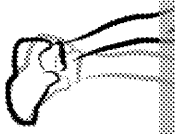
Equipment and facilities needed:

- Handgrip dynamometer

Muscular Endurance – One-minute Press-up or

Main procedures/protocols:

1. The participant lies on an exercise mat, with their legs bent (sit-up), or props themselves up using their hands and feet (see images).
2. On the command 'go', the assistant starts the stopwatch and the participant performs a sit-up (by bringing their elbows to their knees) or a press-up (by lowering their chest to the floor).
3. They then return to their initial position, which counts as one full repetition (rep).
4. Their aim is to perform as many reps as possible within one minute.
5. The test score is the **number of reps** they are able to perform.



Equipment and facilities needed:

- Exercise mat
- Stopwatch
- Assistant

Activity 2A (individual)

Test your knowledge of the different fitness tests by identifying the test that the
without referring back to the information on the previous pages. Some informat
fitness test.

Information	
Participant steps to the sound of a beat for 5 minutes	
Test score is calculated from jump height – standing reach height	
Participant runs as fast as they can in a straight line	
Participant squeezes a handheld de[illegible] as hard as possible	
Participant must co[illegible] 10 m × 5 m course as quickly as possible	
Participant [illegible]ms as many reps as they can in 60 seconds	
Participant must flex at the hips to stretch the hamstrings	
Participant must run or swim as far as possible in 12 minutes	

Not all tests are completely suitable for all sports or activities. For example, the 3
considered unsuitable for a sprint cyclist as they perform the exercise on a bike.
sprint cycling requires the performer to move their limbs as fast as possible, just

Activity 2B (group)

Complete the tables below and overleaf to identify the fitness component tested and then discuss the suitability of each fitness test for the given sports performe it is suitable / not suitable and tick the box, then justify your answer in the box u

Sport:	*Keirin*
Fitness test:	*Ver*
Fitness component:	
Suitable? (✓)	Not suitable? (✓)

Sport:	*Long-*
Fitness test:	*Grip d*
Fitness component:	
Suitable? (✓)	Not suitable? (✓)

Sport:	*V*
Fitness test:	*Sit*
Fitness component:	
Suitable? (✓)	Not suitable? (✓)

It is important when discussing the suitability of fitness tests that you also consider the other side of the argument. For the answer you didn't select above, now discuss how it could be suitable / not suitable.

Top tip: When evaluati
test is suitable for a give
cover reasons for why y

Interpretations can be drawn from the test scores of each fitness test by compar
This is data categorised by age and gender which is said to be representative of t
are assigned a rating which describes how well that performer has tested relativ
normative data table is shown below for the example of the 30 m sprint test for

Rating	Males	
Excellent	< 4.0 s	
Good	4.0–4.4 s	
Average	4.5–4.6 s	
Fair	4.7–5.1 s	
Poor	[illegible]	

Estimated and a

The table below shows the [illegible] would be assigned to different subjects:

Subject number	Gender	Age	Score	
1	Male	15	4.8 s	
2	Female	16	4.1 s	
3	Female	16	4.9 s	
4	Male	15	5.3 s	
5	Female	14	4.6 s	

The type of data collected from fitness tests is known as **quantitative data** (i.e. tha
30 m fitness test above, the quantitative data is **seconds**; however, quantitative da

- **Levels** (e.g. in the multistage fitness test[1]*)
- **Centimetres** (e.g. in the sit and reach test)
- **Kilograms** (e.g. in the grip dynamometer test)
- **A number** (e.g. in the one-minute press-up test)

When test scores are compared with normative data scores, they are then assign
qualitative data (i.e. that which is described with words). For this test, the qualit
excellent to poor. However, another qualitative data obtained from fitness tests
on how they felt during the activity; for example, whether they felt as if they gav
fully motivated, or whether they could have done better.

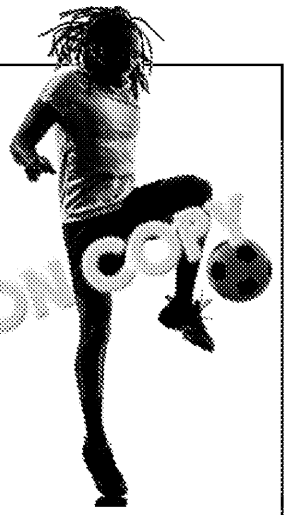
[1] fitness test is not required knowledge for the Edexcel specification

Activity 3 (paired)

Work in pairs to draw interpretations on what the fitness test results show for th
sports and activities below. You should also evaluate whether or not the test is r
sporting activity.

Football players

Interpretation of results:



Relevance of tests to the

Illinois a

Name
Rafae
Eric

Normati
year-old

Ra
Exc
Above
Ave
Below
P

Normative data estimated and adapted from Davis et al. (2000)

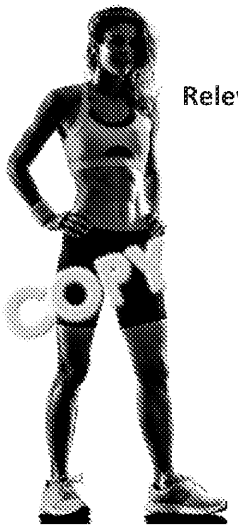
Multistage fitness test results:

Name	Sex	Age	Score
Kate	F	24	L7 S8
Aleesha	F	22	L11 S1

Normative data for female 21–25-year-olds:

Rating	Score
Excellent	> L10 S9
Above average	L10 S9 – L
Average	L
Below	L5 S6 – L5 S1
	< L4 S9

Interpretation of results:



Relevance of tes

Normative data estimated and adap

Extension (optional)

Conduct one of the tests covered in the lesson and collect data from a participan
that all the equipment required is available for you to use, and that you have fan
main procedures to ensure the safety of the participant and increase the validity

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. Which component of fitness is assessed by the vertical jump test? Tick the b
   a) Speed ☐
   b) Muscular endurance ☐
   c) Agility ☐
   d) Power ☐

2. Define the term 'body composition'.

   .....

   .....

3. One value of fitness testing is that it helps to identify strengths and weakne
   State two other values of fitness testing.

   i. .....

   ii. .....

4. a. Describe the protocol for the 12-minute Cooper run test for cardiovasc

   .....

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   .....

   b. The table below shows the changes in fitness test data over a six-week

	Week 1	Week 3
12-minute Cooper run (m)	1,800	2,100
Illinois agility run test (s)	15.6	17.2
30 m sprint test (s)	4.35	4.14

   Analyse the data in the table to identify the trends for each fitness t

   .....

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4. Principles of Training and their Ap
Personal Exercise Programmes

Once the components of fitness that need improving have been identified throu
and the coach/trainer select appropriate training methods to target these compo
different types of training, it is important to understand the key principles that g
optimise fitness improvements, and ultimately performance in sport and physica

SPORT is an acronym used to remember some of the key principles of training.

Specificity	Training methods [illegible] specific to improving t identified [illegible] specific to the actions used
Progressive Overload	[illegible] steady increase in the magnitude of the train
Overtrai[illegible]	The decrease in training performance and quality
Reversibility	The loss of fitness as a result of detraining.
Thresholds of training	The % of heart rate maximum (HRM) which ties i for aerobic and anaerobic fitness.

Another important principle is **individual needs**, which concerns the needs and v
and which are specific to the performer.

When designing a training programme, it is important that the programme consi
applied in each session. For example:

- **Specificity** can be applied by ensuring that the type of training is designed to
  fitness identified, and that the drills and activities within each training sessio
  role in their sport or activity.
- **Progressive overload** can be applied by focusing on the different FITT principle
  they are applied progressively (i.e. minor additions with each training session
- **Overtraining** can be prevented by appropriately applying the other principle
  sufficient rest between sessions.
- **Reversibility** should be avoided by ensuring that training is not regressing an
  the training programme where no training is performed.
- **Thresholds of training** should be selected based on the fitness needs of the perf

Activity 1 (individual)

Read what each of the participants/athletes below is saying about their training, principle of training they should address (options shown below). Provide each pa how they could apply each principle in their training.

SPORT principles of training: Specificity, Progressive overload, Overtraining, Rev

When training for the 5k I alwa run at the same pac the same dista my but t mproving?

Principle:...

How it can b

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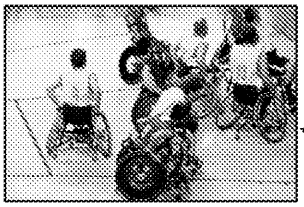

I play basketball but most of my training is performed without a ball and I feel like I'm losing my technical ability.

Principle:...

How it can b

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I took a month off football training and playing during the season and now it is so hard to complete 90 min s.

Principle:...

How it can b

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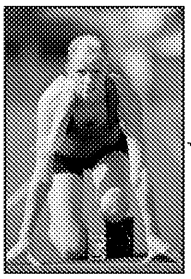

I take part in training for heptathlon with the rest of the athletics club, but most of the training focuses on my strengths and not my weaknesses.

Principle: ...

How it can b

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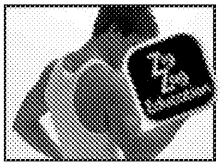

This is my fifth consecutive day training in the gym and now I'm struggling to motivate myself for the session.

Principle: ...

How it can b

.....

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.....

.....

As mentioned, the principle of progressive overload can be applied using the **FIT**

Frequency	How often training is performed
Intensity	How hard training is performed
Time	How long training is performed
Type	Which training method is used

Each FITT principle c

- **Frequency** can
number of train
- **Intensity** can be
percentage of h
performer work
- **Time** can be ap
a training sessio
- **Frequency** can
of different trai

Activity 2 (individual)

Use your understanding of the FITT principles to develop a training goal that you
chosen sport. Underneath your goal, explain how your training programme will m

My goal:

The principles of training (FITT)

Frequency – How my goal will meet this principle:

Intensity – How my goal will meet this principle:

Time – How my goal will meet this principle:

Type – How my goal will meet this principle:

Activity 3 (individual)

Use the performer profiles below to provide advice on how each performer coul
effectiveness by applying the different FITT principles. One has been done for yo

Profile	FITT principl
Name: Youssef **Age:** 23 **Goal:** To improve my muscular endurance to maintain batting performance in cricket.	***e.g. Types of training:*** *make sure y* *endurance training methods (e.g. b* *and exercises that target different* *muscular endurance of key muscle*
Name: Louise **Age:** 31 **Goal:** To improve my coordination skills in swimming.	**Frequency of training:**
Name: Anushka **Age:** 20 **Goal**: To improve high-intensity performance in a game of tennis.	**Intensity of training:**
Name: Timothy **Age:** 27 **Goal:** To build up my running in order to complete the Great North Run.	**Time of training:**
Name: Benjamin **Age:** 16 **Goal:** To improve my flexibility so I am more efficient with gymnastics movements.	**Type of training:**

Calculating intensities

Heart rate can be used as a measure of intensity during training, and is used to calculate training thresholds.

Key ter

Training th
performer
elicit speci

Heart rate is a measure that reflects how hard the cardiovascular system is working in order to supply the body's tissues with oxygen and other essential nutrients. During exercise, heart rate increases due to the the working muscles. This exercising heart rate is different for differe (how hard) that person is working at relative to their level of fitness (fitter indivi lower heart rate due to the increased efficiency of the heart), but also due to ag rate decreases.

Worked example

The relationship between age and maximum heart rate can be c using the simplified Karvonen formula:

Maximum heart rate = 220 – age

Therefore, an individual who is 20 years of age will have a ma heart rate of 220 – 20 = **200 bpm**

Whereas an individual who is older (e.g. 50 years of age) will maximum heart rate of 220 – 50 = **170 bpm**

There are two main training zones that can be calculated using heart rate. These

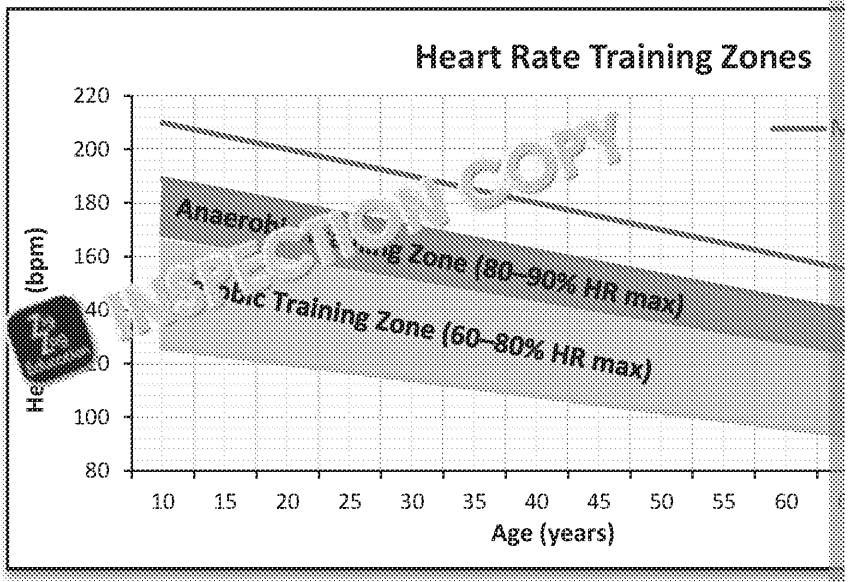
- the aerobic training zone (60–80% HR max)
- the anaerobic training zone (80–90% HR max)

Training in the aerobic zone will bring about adaptations that benefit long durati marathon, whereas anaerobic training will elicit adaptations that benefit higher

Question to think about

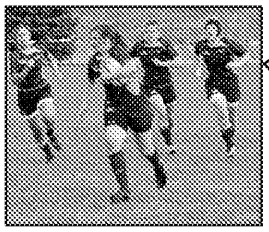
Use the graph below to compare the training zones of the two differently aged individuals used in the worked example above.

Top tip. Different types often use specific traini continuous training is li the aerobic zone, wher likely to involve anaero



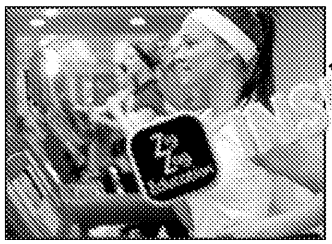
Activity 4 (individual)

Provide advice on how to optimise training effectiveness for the different perfor
should use what you have learnt about calculating intensities to optimise trainin
individual. Show your working. One has been done for you.



Name: Steph
Age: 15
Goal: To be better able to meet the repeated high-intensity demands in rugby.

Advice: *Interval*
performed in the
(80–90% HRM).
220 – age = 205
need to work at



Nam Ali
Age:
Goal: To improve cardiovascular endurance by working in the aerobic training zone.

Advice:

Advice:

Name: Jess
Age: 44
Goal: To improve rowing performance by training in the anaerobic heart rate zone.

Name: Yulia
Age: 18
Goal: To complete the upcoming Manchester Marathon.

Advice:

Advice:

Name: Ahmed
Age: 33
Goal: To qualify for Team
G[illegible]rint cycling team.

Extension

Calculate yo[illegible] intensity zones for heart rate, and trial what pace you need t
stay within each training zone. See how long you can exercise for in each training

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. Which **one** of the following training zones would be recommended to an ind
aerobic endurance? Tick the box to indicate your answer.
   a) 50–60% HR max ☐
   b) 80–90% HR max ☐
   c) > 90% HR max ☐
   d) 60–80% HR max ☐

2. State the meaning of the term reversibility.

   .....

   .....

3. a. Polly is a 20-year-old 400 m sprinter and has been told that she must a
overload to her training programme in order to improve her performan

   Give an example that shows how Polly could apply the principle of prog
   training sessions.

   .....

   .....

   .....

   .....

   b. Describe, using the Karvonen formula, how to calculate Polly's anaerob

   .....

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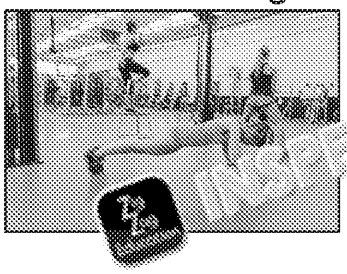
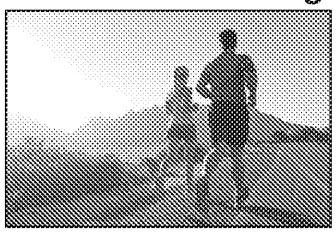
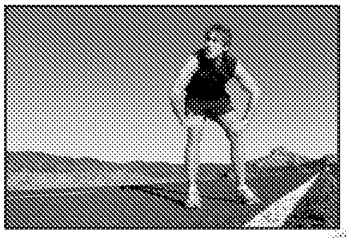
   .....

   .....

   .....

5. Training Programmes

There are many different types of training a performer can participate in to impr
fitness related to their sport or activity. There are clear distinctions between eac
it is carried out. Let's take a look at each below.

Training method	Purpose
Circuit training 	Circuit training involves a range of different e **'stations'**. These exercises are completed for **number of reps**, whic hen followed by a performer mo or to the next station. Eac know **'ci it'**, and this is often repeate The activities included in a circuit can be ada sports and to target different components o rugby could include tackle bag activities, up- scrums.
Continuous training 	Continuous training involves **sustained exerc** period **longer than 20 minutes**. This is perfo described as **steady state**, when the heart ra the body is comfortable meeting the deman Examples: running, swimming, cycling, rowin
Fartlek training 	Fartlek training uses **varying speeds or terra** to intermittently change the intensity of exe work when the intensity is higher, and perio is lower. **Work : recovery ratios** can be calcu given to periods of different intensity. **Top tip**: The term 'fartlek play' which reflects the i of this type of training
Interval training 	Interval training involves **periods of work int** The time of work and recovery periods is exp (e.g. 1 minute work, 30 seconds rest would b There is also hi tensity form known as high r sity work periods followed by re
Weigh Re ing 	Weight/Resistance training involves loading exercises that are performed for a given num range of methods and equipment, such as bo resistance bands and resistance machines. It is important that spotters (assistants) are u weights, so that they are not dropped, causi practise good lifting techniques to reduce th such as muscle strains.

Training method	Purpose
Plyometric 	Plyometric exercises involve an **eccentric co** **concentric contraction**. Examples include box jumps and bounding d the lower body, whereas medicine ball slams develop power in the upper body.
Fitness classes 	There is a range of fitness classes available fo **Body pump** for strength and muscular endurance – a whole-body workout using weights **Aerobics** for cardiovascular fitness – a whole-body workout without the use of weights which is often performed in time to music **Sp** ca fit mu en cy on bik va int

When designing a training/exercise programme and selecting the most appropriate training methods and intensities to work at, it is important to consider the following:

- ✓ Current levels of fitness – lower levels of starting fitness will require more time to build a good aerobic base before progressing with training.
- ✓ Facilities and space available – appropriate facilities may be needed for cert route such as an athletics track for continuous training to make sure it is pe
- ✓ Equipment available – many training methods require the use of equipment equipment (e.g. whether a participant has a gym membership) will need to
- ✓ Fitness/sport requirements – training methods and activities will have to be performance in the participant's sport or activity. This includes components skills required.

Qu
Are
likel
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Activity 1 (paired)

Design and describe the contents of a training session for a performer of your ch
training types discussed in the notes on the previous pages. You should then just
method for that performer.

Sport/Activity: _____ **Type of training:** _

Description:

Justification of the suitability of this training method for a performer in the na

Evaluating training methods

Each training method varies in its appropriateness to specific sporting activities a
the general advantages and disadvantages of each method.

Circuit training	
Advantages:	**Dis**
• Intensity and duration of each station can be tailored to different fitness needs • Types of exercises can be altered to improve different components of fitness • Range of exercises provides variety, which helps prevent tedium • Exercises can target the whole body or isolat different areas used in the sport • Exercises can be made sp specific (e.g. use of treadmills for running, exercise bikes for cycling) • Can be performed in large groups	• May require specia weights and exerci • May take a long tim • Requires a large sp circuit • Not wholly sport-s performed separat • Inappropriate wor and may lead to fa
Continuous training	
Advantages:	**Dis**
• Minimal equipment required • Can be done in simple environments • Can be performed for a variety of modes (e.g. running, swimming, cycling, rowing, skiing) • Easy to gauge intensity • Easy to overload • Improves cardiovascular endurance • Can be performed in a group or on one's own	• Tedious • May result in over • Requires motivatio • Not sport-specific • Little room for ada • Doesn't develop a
Fartlek training	
Advantages:	**Dis**
• Performer can adjust intensity throughout • Improves aerobic and anaerobic fitness • Develops a range of fitness components • No equipment required • Uses many environments so not as tedious • Specific to physical demands of intermittent sports such as football and tennis • Can be performed in a group or on one's own	• Is not wholly speci solely around fitne • Athletes may fatig sprint intervals • Some terrains may • Changes in intensit • Most sports are pe • Difficult to overloa
Interval training	
Advantages:	**Dis**
• Requires minimal equipment • Can be done in many environments • Work-to-rest ratios can be manipul mimic fitness needs • Improves aerobic a fitness • Develo ness components • Easy to progressive overload	• Requires experienc work-to-rest ratio • Increased risk of in • Requires high leve • Requires time to re

Weight / Resistance training	
Advantages:	**Dis**
• A variety of exercises can be performed • A variety of equipment can be used • A number of different methods can be used • Can target isolated muscle groups and perform whole-body movements • Easy to apply progressive overload • Can manipulate load, sets and reps to target a range of fitness components	• A spotter or guide close to 1RM • Correct technique • Increased risk of m • May require acces • Not sport-specific • Requires motivatio
Plyometrics training	
Advantages:	**Dis**
• Can use sport-specific movements • Uses a range of equipment • Effective for developing p[illegible]er • Training sessions a[illegible]ally quick	• High risk of injury • Correct technique • Performer must be • May require acces • Only develops pow

Top tip: A common requirement of the exam is to evaluate th training methods on or in a given sporting activity. You should knowledge of advantages and disadvantages to the specific sp

Activity 2 (individual)

Use your knowledge of the advantages and disadvantages of the different trainin
use of the following training methods for the named sporting activity.

Continuous training for an endurance athlete	
For	
Circuit training for a tennis player	
For	

(Optional) Extension:

Design weeks 1, 3 and 6 of a six-week training programme for a performer in a sp
choice. You should draw knowledge from previous topics to show how the FITT p
applied across the training weeks.

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. State **one** advantage and **one** disadvantage of fartlek training.

2. Mel is a 1,500 m runner who wants to improve her fitness levels for the upc
Identify **two** training [illegible] that Mel could use to improve her fitness lev
Justify your choi

3. Alesha is a 16-year-old rugby player who has been advised to increase her n
performance. She has decided that for the next six weeks she will replace al
weight training.

Evaluate the suitability of weight training for Alesha.

6. Optimising Training and Preventi

If a performer wants to achieve their fitness or sporting goals, it is paramount th measures, train in a safe enough manner and apply the necessary training princi sporting injuries in sport from occurring.

Before commencing a training programme, a physical activity readiness question the participant for the coach or trainer to determine what amendments (if any) participant to train. A typical PAR-Q form consists of questions asking about an i health and fitness information. Example questions may include:

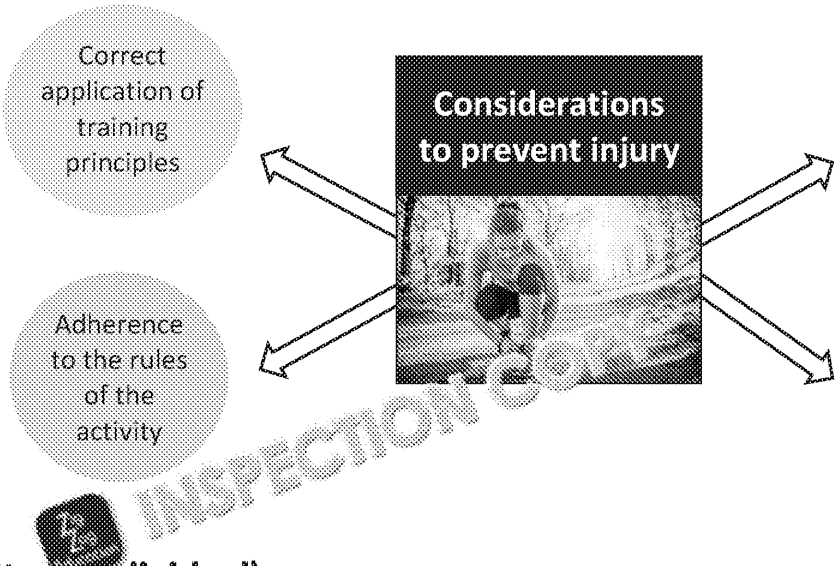
1.	Have you ever been diagnosed with hea p ol ns?
2.	Has anyone in your fami ha diagnosed with heart problems? If y lea your relationship to the family member and the hea ti e been diagnosed with. _____
3.	Do you suffer from any pain or discomfort in the chest when taking par activity?
4.	Have you ever been diagnosed with high blood pressure?
5.	Are you diabetic? If yes, please state which type and any medication you are using. _____
6.	Are you currently taking any forms of medication? If yes, please list which forms of medication you are taking. _____
7.	Do you currently have any muscle or joint injuries/issues which are affe participation in physical activity? If yes, please state your injuries/issues. _____
8.	Do you get easily breathless when participating in physical activity?

Activity 1 (paired)

Working in mplete the PAR-Q in the notes section (above) and swap she will then use nformation to have a go at recommending amendments to tra information given.

If your answers to all the questions are 'no', change one answer to 'yes' and upd so that your partner has something they can at least recommend.

Once the information from the PAR-Q has been digested, there are a number of prevention that the person in charge of the session should consider.

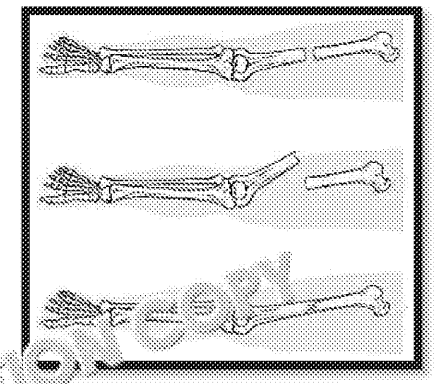


Activity 2 (individual)

Your exam may require you not only to identify the different factors that should injury, but to give examples and explain them too. Come up with examples for e explanation for how each helps to prevent injury.

Factor	Example	
Correct application of training principles		
Wearing protective clothing and equipment		
Adherence to the rules of the activity		
Checking equipment and facilities before use		

Despite the best attempts at preventing injury, there are circumstances beyond
occur. There is a range of types of injury and ways in which each can occur acros
and sports. Below are some of the most common types of injury that you might



Concussion

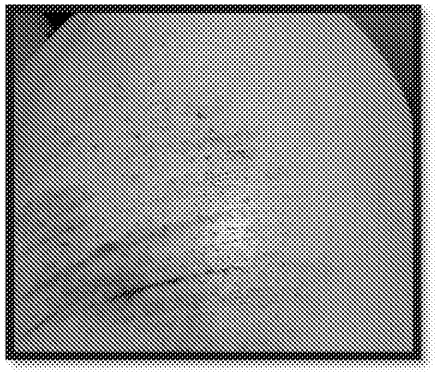
A brain injury caused by sudden impact to the head, such as in a rugby tackle. It can cause a range of short-term and long-lasting symptoms, such as memory loss, blurred vision and headaches.

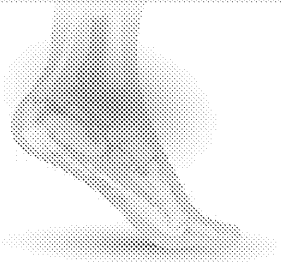
Fracture

A break in the bone as a result of direct, forceful impact. There is a range of different types of fracture, including open, closed and stress fractures.

Question to think about

What is the difference between open, closed and stress fractures? Can you identify them in the image?





Abrasion

This can be either in the form of a **graze**, where the skin is scraped but does not bleed excessively, or a **cut**, where damage to the skin results in loss of blood through a small opening.

Sprain

Twisting of the **ligaments**, often caused by a sharp or sudden change in direction. The joint does not dislocate but the ligaments are either overstretched, partially torn or completely ruptured.

Abrasions, sprains and strains are all examples of **soft-tissue** injuries. Other soft-tissue injuries include:

- **Torn cartilage** – this is the connective tissue covering the surface of the bones to prevent them rubbing. When it is torn, friction can occur between the bones that meet at a joint.
- **Tennis and golfer's elbow** – this is inflammation of the tendons that connect elbows. It occurs as a result of repetitive muscle actions when swinging the a

RICE is the acronym given to the treatment method for soft-tissue injuries. It act
inflammation of the affected area, and is also effective in alleviating pain.

Rest	The injured body part should not be exercised, to allow
Ice	Applying ice to the injured area helps to reduce swelling.
Compression	Applying pressure on the injured area helps to further re
Elevation	This means raising the injured body part above heart leve

Activity 3 (individual)

Identify ea e nes from the examples below, and identify whether or n
method for g that injury. Then, complete the final row to identify an injury
provide an example of how it occurs, and identify whether RICE would be used a

Type of injury	Example
	A rugby player attempts to wrap their arms ar opponent in a tackle, but is unable to do so, a impact of the player knocks the bone out of p tackling player's shoulder joint.
	A tennis player dives for a shot and scrapes th on the surface of the court.
	A football player is sprinting for the ball but p holding their hamstring.
	A cricket player gets hit in the ankle with the b breaks the bone.
	A long-distance run u bles on a pothole road and goes ve their ankle, damaging t lig m

Many performers resort to illegal means of optimising their performance in spor
(PEDs) is the umbrella term for any substance or method which results in positiv
effects on the body that enhance performance, but which has a potential negati
health and lifestyle. Below are the most common PEDs that are used in sport.

PED/Method	Positive effects for the performer	Negative
Anabolic steroids	• Increased muscle mass • Reduced fat mass • Improved strength and power production	• Increas complic stroke) • Mood c
Beta blockers	• Improved fine motor contr • Reduced anxiety	• Low blo • Tiredne
Narcotic ana[illegible]sic	• [illegible] • [illegible]ow training to continue despite fatigue	• Overex • Increas • Impair
Diuretics	• Help with short-term weight loss • Can mask other drugs in the system	• Severe • Headac
Erythropoietin (EPO)	• Increased red blood cell count • Greater oxygen-carrying capacity • Enhanced aerobic performance	• Increas • Increas • Increas
Growth hormones	• Increased muscle mass • Increased stamina • Reduced fat mass	• Liver da • Increas • Abnorm
Stimulants	• Increased alertness • Reduced fatigue • Greater high-intensity exercise performance	• Overex • Increas • Impaire • Nausea
Blood doping	• Increased red blood cell count • Greater oxygen-carrying capacity • Enhanced aerobic performance	• Increas • Increas borne i • Increas

Top tip: EPO and growth hormones are both classed as peptide hormones.

Activity 4 (paire[illegible]

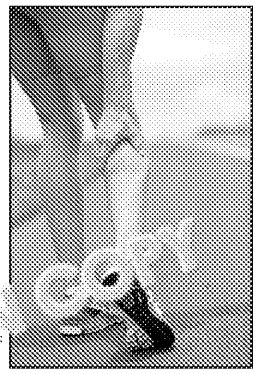
Play a game[illegible]e or false with a partner. The rules are as follows:

1. Take it i[illegible]ns to identify either a positive effect or a negative effect of each has to guess is true or false.
2. Each person starts with three lifelines. If someone guesses incorrectly, they l
3. The first person to lose all three lifelines loses the game. Play to the best of t

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. The image below shows a runner who has suffered a calf strain during train



State, giving an example for each, **two** methods to reduce calf strains when

i. .....

.....

.....

.....

ii. .....

.....

.....

.....

2. Describe the difference between a sprain and a strain.

.....

.....

.....

.....

3. Explain why a boxer may use different sport.

.....

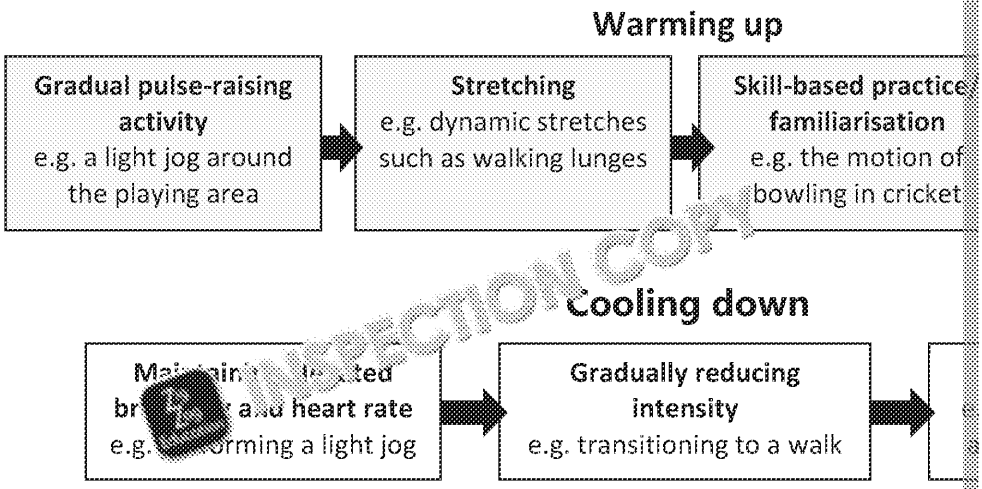
.....

.....

.....

7. Warm-ups and Cool-downs

The warm-up and cool-down are essential aspects of any training session, in term
preventing injury and enhancing recovery. Each consists of different phases.



Question to think about

How might the activities for each phase of the warm-up differ for different sporting activities?

Activity 1 (group)

Work in groups to design a warm-up and a cool-down for a sporting activity of yo
different phases for each.

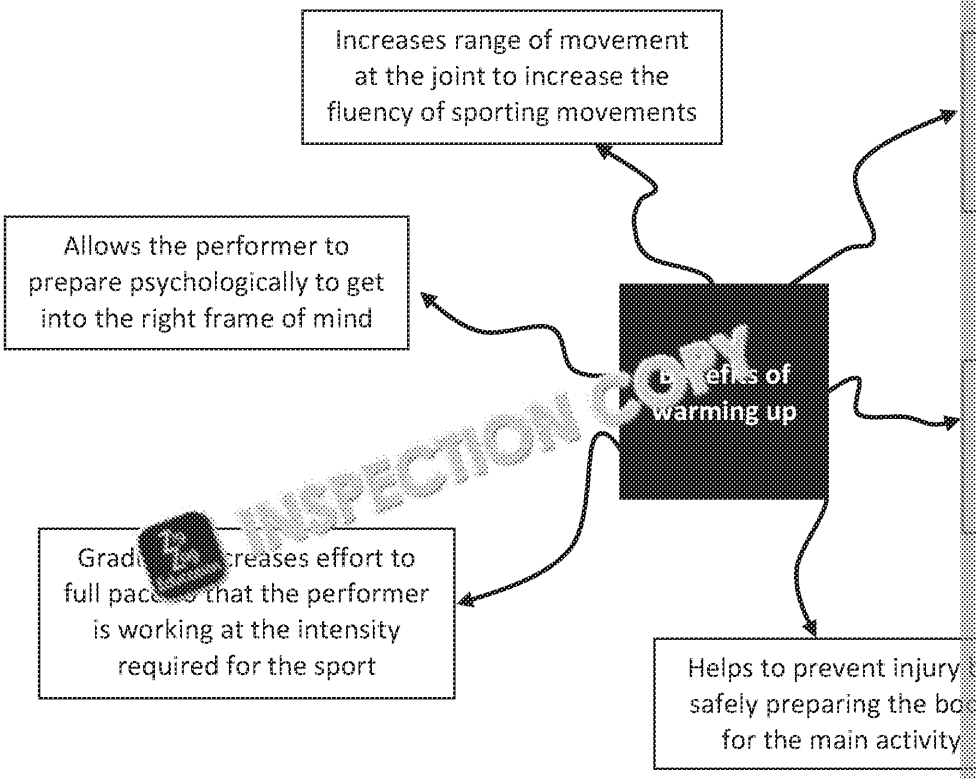
Warm-up

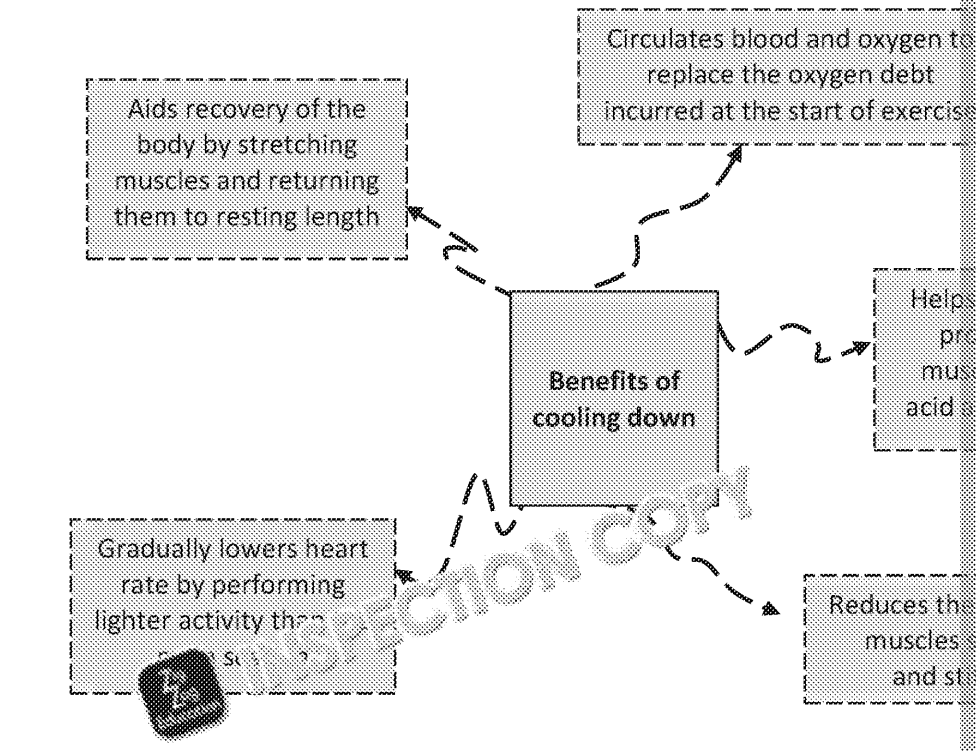
Activity	Phase	Instructions

Cool-do

Acti	Role	Instructions

As mentioned previously, performing a warm-up and a cool-down is important a





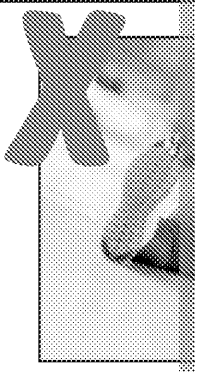
Top tip: Each benefit of the warm-up and cool-down is achieved by specific phases, so if you are struggling to think of benefits, think about the purpose of the different parts of the warm-up and cool-down.

Ques
Can yo warm-

Activity 2 (paired)

Now that you are familiar with the benefits of warming up and cooling down, yo
potential impact on a performer if they fail to warm up or cool down. You may w

Potential impacts of failing to warm up	Potential impac



(Optional) Extension

In your own time, you may wish to perform or lead a warm-up and a cool-down
designed in Activity 1.

Exam-style questions

Complete the following exam-style questions to practise what you have learnt.

1. Which **one** of the following is a benefit of cooling down? Tick the box to ind
   a) Psychological preparation ☐
   b) Prevents delayed-onset muscle soreness (DOMS) ☐
   c) Prevents risk of injuries occurring ☐
   d) Increased range of movement at a joint ☐

2. a. All exercise/training programmes should start wi warm-up.
   Explain why it is important for a pulse rai to be included as part of th

   .....

   .....

   .....

   .....

   b. State **two** examples of activities other than the pulse raiser which shou

      i. .....

      .....

      ii. .....

      .....

Answer Section

1. Health and Fitness and the Role of Exercise

Activity 1

Students should attempt to define the terms 'health', 'exercise', 'performance' and 'fitne
using the notes to check their answers.

Activity 2

Examples for **increased fitness despite ill health** may include:

- Someone with low self-confidence may wish to improv f.ness through exerci activities that boost their confidence levels
- Someone who has poor cardiovascu f.n g may wish to improve their health increasing their fitness levels at the same time
- Someone with few fr is.a wish to make more friends by joining a sports club o to impro ir f as well
- Someon oes not consider themselves valued within society may look for opp joining a local exercise class) in which they can also improve their fitness levels

Examples for **decreased fitness due to ill health** may include:

- Someone who has an illness and may not be able to access public facilities to exercis illness to others, or due to the illness affecting their health
- Someone with a disease such as chronic obstructive pulmonary disease (COPD) may breathing difficulties
- Someone who isn't good at mixing with others may refrain from exercising with grou missing out on potential opportunities to improve their fitness
- Someone with a negative outlook on life may not see the value of exercising, impact

Exam-style questions

1. a. **1** mark for correct identification of missing word in each definition (AO1):
   - Health – well-being
   - Fitness – demands

   b. Award **1** mark for the correct answer (AO1)
   - The only correct answer is **A** – How well an activity is completed
   - **B** is incorrect as it is linked to behaviour
   - **C** is incorrect as it is not in the context of sport
   - **D** is incorrect as it is an example of gamesmanship/deviance

   c. Award **1** mark for an appropriate example (AO1), e.g.:
   - Exercise can improve the functioning of the body s tems
   - Exercise can reverse conditions such as hig b d p essure
   - Exercise can improve mental well b in by making someone feel good

   Accept other suitable exampl

2. Components of Fitness

Activity 1 and Activity 2

Students to take part in charades (Activity 1) and define each component of fitness (Activ
check answers.

Activity 3

Students to give two components of fitness that are needed for skills in each sporting ex
provide a justification for each. Examples are shown below:

Serving in wheelchair tennis

Important:

1. Coordination – required for using the eyes to track the ball and using the racquet to
2. Power – required to combine strength and speed when hitting the ball so that it give
a return

Other components could be include (with justifications): *balance, flexibility, muscular*

Less important:

1. Reaction time – this is performed in the performer's own time; therefore, the
not nee
2. Cardiova fitness (aerobic endurance) – the serve is an anaerobic action; theref
oxygen delivery to the working muscle to supply energy

Cycling stage of a triathlon

Important:

1. Cardiovascular fitness (aerobic endurance) – the triathlon is a long duration sport in
before the cycle stage, so requires sustained oxygen delivery to the working muscles
2. Muscular endurance – cycling requires repeated contraction of the quadriceps musc

Other components could be included (with justifications): *balance, power, speed*

Less important:

1. Strength – the performer is not required to apply a maximal force, but instead shoul
force production for the duration of the stage
2. Flexibility – cycling involves a limited range of motion at the hip and knee due to bei
needed for successful performance

Slam dunk in basketball

Important:

1. Flexibility – basketball requires the performer to be flexible to reach over opponents
2. Speed – performers are required to run with the ball with speed in order to generate

Other components could be included (with justifications): *power, coordination, agility*

Less important:

1. Muscular endurance – the slam dunk is one movement, and, therefore, the muscle i
2. Strength – basketball players need to be explosive with the slam dunk, so require po

Sprint start of the 100 m sprint

Important:

1. Reaction time – performers need to explode out of the blocks as soon as they hear t
2. Speed – the performer must pump their arms and legs quickly to cover the early dist
of time

Other components could be included (with justifications): *power, coordination*

Less importa

1. Agility – sprint start occurs in a straight line and does not require changes of dire
2. Cardiova fitness (aerobic endurance) – the sprint start is an anaerobic action a
therefore, the muscles will not be relying on oxygen delivery to fuel muscle contract

Exam-style questions

1. a. Award **1** mark for the definition of speed (AO1)
   - The time taken to respond to a stimulus

   Accept any other suitable definition.

   b. Award **1** mark for correct answer (AO2):
   - The only correct answer is **A** – Football
   - **B** is incorrect as balance, strength and flexibility are most important
   - **C** is incorrect as it is performed while standing still
   - **D** is incorrect as it is played on a small court that requires agility more th

2. Award **1** mark for each of the following points, up to a maximum of **2** marks (AO3):
   - A rugby player needs to be powerful as the sport inv[illegible] actions such as tack[illegible] ball, which require explosive movements
   - Darts players do not need to be as [illegible]ul as rugby players because throwin[illegible] movement than it is an ex[illegible]

   Accept any other suita[illegible]n for each sport.

3. **Weigh[illegible]**
   Compon[illegible]trength/Power (1)
   Advantage – The performer is able to lift heavier weights (1)

   Gymnast
   Component – Flexibility/Balance/Power (1)
   Advantage – One from:
   Flexibility – The performer is able to perform movements such as the split jump (1)
   Balance – To stop the performer from stepping out of position when landing (1)
   Power – To generate height when tumbling (1)

   Accept other suitable advantages of named components.

3. How Fitness is Measured and Improved

Activity 1

Students should cover the values of fitness testing included in the notes, as well as any o

Activity 2A

Information
Participant steps to the sound of a beat for 5 minutes
Test score is calculated from jump height – standing reach height
Participant runs as fast as they can in a straight line
Participant squeezes a handheld device as hard as possible
Participant must complete a 10 m × 5 m course as qui[illegible]as [illegible]ssible
Participant performs as many reps as they c[illegible] s[illegible]nds
Participant must flex at the hips to stret[illegible] h[illegible] hamstrings
Participant must run a[illegible]s [illegible] as possible in 12 minutes

Activity 2B

Students only need to complete one suitable or unsuitable box for each sport or fitness t

Sport:	*Keiri*
Fitness test:	*Ver*
Fitness component:	
Suitable? (✓)	**Not suitable? (✓)**
The keirin is a sprint event where cyclists must complete ~3 laps as quickly as possible. This requires a high power output from the leg muscles. The vertical jump test measures the power of the legs; therefore, it is a suitable test to assess performance potential for the keirin.	The vertical jump test in whereas the keirin involv might not offer the best explosive power across t

Sport:	*Long*
Fitness test:	*Grip d*
Fitness component:	
Suitable? (✓)	**Not suitable? (✓)**
Rowers are required to grip the oars and pull them through the resistance of the water. This requires strength of the forearm muscles to overcome the resistance of the water. This test provides a measure of forearm strength.	This test measures force contraction, so might no the more prolonged grip other factors come into forearm muscles.

Sport:	U
Fitness test:	*Sit*
Fitness component:	
Suitable? (	**Not suitable? (✓)**
Certain mov[illegible]s in weightlifting require a large range of movement at the joint in order for a lift to be eligible or performed with the correct technique, e.g. flexing at the hips during a deadlift. Therefore, the sit and reach test can provide a suitable measure of the ability of the performer to adopt such positions.	Upper body weightlifting flexibility of the hamstrin and reach test. Therefor unsuitable for assessing

Activity 3

Football players

Interpretations, e.g.:

- Eric has a greater agility than Rafael
- Eric's agility would be rated as above average, whereas Rafael's would be rated as b

Relevance of tests, e.g.:

- Agility is important to Eric in football, such as closing down opposition players, dribb being a goalkeeper
- The Illinois agility test is not wholly specific to football as it is performed without a b

Long-distance runners

Interpretations, e.g.:

- Aleesha has a superior cardiovascular endurance to Ka
- Aleesha's cardiovascular endurance is rated excellent, whereas Kate's is rated avera

Relevance of tests, e.g.:

- Cardiovascular endurance is important for long-distance runners as they rely on the supply the muscles with oxygen for sustained periods
- The multistage fitness test involves turns, which are irrelevant for long-distance runn
- The latter stages of the multistage fitness test may involve anaerobic activity, which long-distance runners

Exam-style questions

1. Award **1** mark for the correct answer (AO1)
   The only correct answer is **D** – Power
   A is incorrect as it is assessed using the 30 m sprint test
   B is incorrect as it is assessed using the one-minute sit-up test
   C is incorrect as it is assessed using the Illinois agility run test

2. Award **1** mark for correct definition (AO1)
   - The relative proportion of fat and fat-free mass

3. Award **1** mark for any of the following, up to a maximum of **2** marks (AO1)
   - Allows comparison against norms/others
   - Provides an indication of baseline fitness
   - Informs training requirements
   - Allows the performer to set goals
   - Helps motivate the performer
   - Allows improvements in fitness to be monitored
   - Determines the success of a training programme

4. a Award **1** mark for each of the following (AO1)
   - The participant must run or swim (depending on the test) as far as possib
   - For 12 minutes
   - The distance they have covered is recorded in metres

   b. Award **1** mark for each of the following (AO3)
   - Cooper run distance is increasing, which means the hockey player is able of time has superior cardiovascular fitness
   - Illinois agility run time is taking longer, which means the player is taking l red from a decrease in agility
   - 30 m sprint time is decreasing, which means the player is covering the sa superior speed

4. Principles of Training and Their Application to Persona

Activity 1

Students should identify the principle of training each participant needs to address, and g

'When training for the 5k I always run at the same pace for the same distance. Why isn't
Principle: Progressive overload
Advice: The distance or pace should be gradually increased so that you are adding extra s
race pace to increase.

'I play basketball but most of my training is performed without a ball and I feel like I'm lo
Principle: Specificity
Advice: Try to incorporate the ball into running drills so that you are practising basketbal

'I took a month off football training and playing during the seas[illegible]d now it is so hard t
Principle: Reversibility
Advice: Try not to take long breaks from trai[illegible]ing the season, or try to perform som

'I take part in training for heptat[illegible] with the rest of the athletics club, but most of the t
not my weaknesses.'
Principle: In[illegible]ne's
Advice: It is i[illegible]t to tailor the training programme to the requirements of an indivic
them, i.e. focusing more on the athlete's weaknesses.

'This is my fifth consecutive day training in the gym and now I'm struggling to motivate m
Principle: Overtraining
Advice: It is important to schedule rest days in training to allow the body to recover both

Activity 2

Students should accurately apply each principle of training to the goal they identify.

Activity 3

Students to use their knowledge of FITT principles to provide relevant advice to the perfo

Advice to Louise:

- e.g. start off by training once a week and steadily build it up fortnightly by one sessio

Advice to Anushka:

- e.g. steadily increase the % of HR max you are working at in the anaerobic training z

Advice to Timothy:

- e.g. extend the duration of running sessions by 5 minutes each time, but remain at t
  increasing the distance run with each training session in a progressive manner

Advice to Benjamin:

- e.g. perform different exercises that target a variety of muscles used in gymnastics r
  stretching techniques (e.g. yoga)

Activity 4

Students to use the calculations of relevant trainin[illegible]in their advice to the perf

Advice to Sally:

- Train within a heart rate r[illegible]at corresponds to the aerobic training zone (60–80
- Maximum h[illegible]rt r[illegible] – 27 = 193 bpm
- Aerobic [illegible] zo[illegible]e = 193 × 0.6 to 193 × 0.8 = **116 to 154 bpm**

Advice to Jess:

- Train within a heart rate range that corresponds to the anaerobic training zone (80–
- Maximum heart rate = 220 – 44 = 176 bpm
- Aerobic training zone = 176 × 0.8 to 176 × 0.9 = **141 to 158 bpm**

Advice to Yulia:

- Aerobic fitness is important for the marathon
- Train within a heart rate range that corresponds to the aerobic training zone (60–80
- Maximum heart rate = 220 – 18 = 202 bpm
- Aerobic training zone = 202 × 0.6 to 202 × 0.8 = **121 to 162 bpm**

Advice to Ahmed:

- Anaerobic fitness is important for sprint cycling
- Train within a heart rate range that corresponds to the anaerobic training zone (80–
- Maximum heart rate = 220 – 33 = 187 bpm
- Aerobic training zone = 187 × 0.8 to 187 × 0.9 = **150 to 168 bpm**

Exam-style questions

1. Award **1** mark for the correct answer (AO1)
   - The only correct answer is **D** – 60–80% HR max
   - **A** is incorrect as it is too low to improve aerobic endurance
   - **B** is incorrect as it targets anaerobic endurance
   - **C** is incorrect as the intensity is near maximal exercise

2. Award **1** mark for the correct definition (AO1)
   - **Reversibility** – The loss of fitness as a result of detraining

3. a. Award **1** mark for ... appropriate example, up to a maximum of **2** marks (AO
   Progressive ...
   - ...asing the number of training sessions per week from 3 to 4 (frequen
   - ...forming runs at a greater pace to improve anaerobic fitness (intensity
   - Extending the duration of work intervals during interval training (time)
   - Adding different training methods (e.g. weight training and interval train performance (type)

   Accept any other explanations. Must be linked to 400 m sprinting.

   b. Award **1** mark for each linked statement:
   - Calculate maximum heart rate by subtracting age from 220 (220 – 20) (A
   - Then calculate 80% of maximum heart rate for lower threshold of anaero
   - Then calculate 90% of maximum heart rate for upper threshold of anaero

   AO2 mark awarded if age (20) is used in the statement.

5. Training Programmes

Activity 1

Student answers will vary depending on the sporting activity and type of training chosen

e.g. Plyometrics for a long jumper

- Performing box jumps at increasing heights
- Performing single-legged hops up onto a box or for distance in front
- Performing lateral single-legged hops up onto a box or for distance
- Performing single-legged step-ups onto a box and transition to a jump

Justification of suitability:

- A long jumper requires good lower-body power to perform an explosive jump
- Good lower-body power allows the long jumper to exert force in a short time to jump further
- The plyometric activities chosen target lower-body power

Activity 2

Continuous training for an endurance athlete	
For	
• Minimal equipment required • Can be done in simple environments • Can be performed for a variety of modes (e.g. running, swimming, cycling), so can be performed by all endurance athletes • Easy to gauge intensity so the performer can ensure they are working in the aerobic training zone • Easy to overload so that the performer can lower the risk of injury • Improves cardiovascular endurance, which is an important component of fitness for an end[illegible] athlete • Endurance events tend to [illegible] long time (> 20 mins required for conti[illegible]ining) • Can be [illegible]me[illegible] a group or on one's own so perform[illegible]efits both ways as they can train alongside training partners **and** do not have to rely on others to train	• Continuous training [illegible] therefore, performe[illegible] • Continuous training [illegible] large training loads, [illegible] injuries if little rest i[illegible] • Exercising at a const[illegible] there will be times w[illegible] to change pace, e.g. [illegible] • [illegible]ittle room for adapt[illegible] [illegible]o train at different i[illegible] fitness alongside aer[illegible] needed for last-minu[illegible] • Other training metho[illegible] efficient (e.g. interva[illegible]
Circuit training for a tennis player	
For	
• Duration of each station can be tailored to the typical time taken to contest a point • Recovery period during each station can be tailored to match the typical time between play • Types of exercises can be adapted for different circuit training sessions to improve multiple components of fitness required in tennis, e.g. power and muscular endurance • Circuit training can improve aerobic and anaerobic fitness, which are both required in tennis • Tennis uses the whole body, and exercises can be used which involve whole-body movements • Exercises can be made sport-specific (e.g. repeated serves) • Range of exercises avoid tedium, keeping the performer motivated	• Tennis uses the who[illegible] isolate areas of the b[illegible] • Circuit training requ[illegible] organise the circuit, [illegible] • Not wholly sport-spe[illegible] to link skills (e.g. ser[illegible] circuit training exerc[illegible] separately • An inappropriate wo[illegible] and lead to fatigue-r[illegible] • Circuit training cann[illegible] of tennis, e.g. action[illegible] • Circuit training is typ[illegible] tennis is an individua[illegible] worth the effort sett[illegible]

Exam-style questions

1. Award **1** mark for any advantage (AO1)
   - Performer can adjust intensity throughout
   - Improves aerobic and anaerobic fitness
   - Develops a range of fitness co[illegible]ne[illegible]
   - No equipment require[illegible]
   - Uses many env[illegible]n so not as tedious
   - Sr[illegible]o p[illegible]ar demands of intermittent sports such as football and tennis
   - Ca[illegible]rformed in a group or on one's own

   Award **1** mark for any disadvantage (AO1)
   - Is wholly specific to team sports as focus is solely around fitness
   - Athletes may fatigue more quickly due to the sprint intervals
   - Some terrains may increase risk of injury
   - Changes in intensity may increase risk of injury
   - Most sports are performed on a flat terrain
   - Difficult to overload due to varying intensities

2. Any **two** of the following:
   - Continuous training helps build an aerobic base (1), which can be used to mai relying on aerobic energy production for a large portion of the event (1)
   - Fartlek training helps the performer become familiar with changes in intensity change of pace at different stages of the race (e.g. when overtaking) (1)
   - Interval training will help to improve anaerobic fitness (1), which is important order to tolerate lactic acid build-up (1)

   Reason given for choice of training method (AO2)
   How the chosen training method improves fitness for the 1,500 m (AO3)
   Accept other appropriate reasoning.

3. Example of content:
   (AO1) Knowledge of weight training
   - Use of resistance exercises that target different muscles in the body
   - Can improve strength/power/muscular endurance
   - Exercises performed for a number of repetitions for a given number of sets

   (AO2) Application to Alesha:
   - Weight training is appropriate for Alesha because it can help increase muscle m
   - It will improve Alesha's strength/power, which is important in rugby for tackling
   - Can also be used to improve Alesha's muscular endurance, which is important when passing
   - Alesha will neglect other components of fitness if she only performs weight tra

   (AO3) Evaluation of the suitability of weight training for Alesha and the impact on p
   - Alesha's body shape may change / Alesha may become more of a mesomorph, m
   - Greater muscular strength / power will allow Alesha to be more successful at limiting the number of metres they are able to make
   - Greater power will allow Alesha to jump higher and increase the chance of wi
   - Greater muscular endurance may help to increase Alesha's pass success rate
   - Alesha may pick up an injury if she uses the wrong technique / does not apply she should have appropriate knowledge of this
   - Weight training can result in muscle soreness, which prevents Alesha from co she should plan appropriate recovery
   - Alesha may put on too much weight as a result of increases in muscle mass, w
   - Alesha may not have a spotter to help her lift the heavy weights needed to im
   - Plyometric training may be more applicable to developing power for rugby
   - Alesha may experience declines in cardiovascular endurance if she is only usin

   Credit other suitable responses.

Level 3 (7–9 marks)	• In-depth knowledge throughout and very clear understanding o precise use of relevant vocabulary throughout (AO1) • Knowledge accurately applied within the context of training for • In-depth reasoning allowing a well-balanced conclusion to be re
Level 2 (4–6 marks)	• The answer often contains substantial knowledge and understa includes frequent use of relevant vocabulary (AO1) • Knowledge is often accurately applied within the context of trai • Effort is made to provide a reasoned response, but conclusions
Level 1 (1–3 marks)	• Restricted knowledge and understanding of weight training (AO • Restricted application of knowledge within the context of traini • Limited/no attempt to make a logical conclusion (AO3)
(0 marks)	No answer provided, or answer provided does not meet the requirem

6. Optimising Training and Preventing Injury

Activity 1

Students to give an appropriate recommendation based on the answers given in the PAR
For example, answering 'yes' on the 'Are you diabetic?' question will elicit a recommend
exercise or ensuring the participant has had glucose or an insulin medication prior to par

Activity 2

Students to give an example and appropriate explanation for how each factor helps to pr

- **Correct application of training principles** – e.g. progressively overloading each trai
abrupt spike in workload that the body is unprepared for
- **Wearing protective clothing and equipment** – e.g. cricket pads and helmet when b
if struck with the ball
- **Adherence to the rules of the activity** – e.g. follo
to prevent coming into contact with th
- **Checking equipment and fac**
playing surface in ord

Activity 3

Students to id each type of injury from the description and indicate 'yes' for RICE a
injuries only.

Type of injury	Example (reference)	RICE as a treatment metho
Dislocation	*Rugby player tackling*	No
Abrasion	*Tennis player diving*	Yes (if there is swelling)
Strain	*Football player sprinting*	Yes
Fracture	*Cricket player getting hit*	No
Sprain	*Long-distance runner stumbling*	Yes
Additional injury, e.g. concussion	*e.g. being on the receiving end of a high tackle in rugby*	*No*

Activity 4

Students to use the positives and negatives in the table in the notes section for the game

Exam-style questions

1. Award **1** mark for stating method and **1** mark for an applied example to [sport], up
   - Correctly applying training principles (AO1) by steadily building up the distanc
   overload) (AO2)
   - Wearing appropriate footwear (AO2), e.g. running shoes with a foam midsole
   (AO2)
   - Using preventative equipment (AO1), e.g. kinesiology taping of muscles (AO2)
   - Warming up before the activity (AO1), e.g. by stretching muscles used in runn

   Accept any other suitable answer.

2. Award **1** mark for each of the following, up to a maximum of **2** marks (AO1)
   - A sprain is damage to the ligament, where it is overstretched or torn
   - A strain is damage to the muscle or tendon, where it is overstretched or torn

3. Award for the role of diuretics (AO1) and **1** mark for the importance of diur
   - Di educe the water content of the body / act as a masking agent for PE
   - Enabling the boxer to qualify for a lower weight division / covering up the use
   performance gains

7. Warm-ups and Cool-downs

Activity 1

Student warm-ups and cool-downs will vary for the sporting activity chosen. Examples of provided below.

Warm-up, e.g.:

Activity	Phase	Instructions
Jogging	Pulse-raising activity	Jog the width of the pitch and back as in a long line
Dynamic stretches	Stretching	In a circle, perform a range of dynamic glute bridges and lunges
Passing	Skill-based practice	Separate into three lines at either side line of three players will perform passi move across the side of the pitch, at pass the ball to the next group of three
Mental rehearsal	Mental preparation	Players given time to prepare themsel for performance, by playing out a sequ their head, such as set-piece plays and

Cool-down, e.g.:

Activity	Role	Instructions
Light jog	Elevated breathing and heart rate	Jog gently one behind the other in two mark, then walk back and repeat
Skipping	Gradual reduction in intensity	Perform the same activity but replace skip, keeping the knees low
Static stretches	Stretching	Lie down in a supine position and perf stretches, such as lying on the side and the buttocks to stretch the quadriceps

Activity 2

Potential impacts of failing to warm up:

- No increase in body temperature, so muscle contraction during the main activity is
- Stiffness at the joint and less fluency with sporting movements
- Poor psychological preparation, meaning the performer is not focused or motivated
- Game intensity is off-pace as the performer has not been able to gradually increase required for the sport
- Increased risk of injury due to lack of muscle and joint flexibility
- Poor skill execution as no opportunity to practise/familiarise

Potential impacts of failing to cool down:

- Body takes longer to recover as oxygen replenishment is delayed
- Muscles take longer to recover as waste products have not been flushed
- Muscles may feel sorer and stiffer
- Muscles may cramp as they have not been stretched
- Heart rate may remain elevated for a longer period

Exam-style questions

1. Award **1** mark for correct answer (AO1)
   - B – Prevents delayed-onset muscle soreness (DOMS)

2. a. Award **1** mark for identifying response or pulse raiser (AO1) and **1** mark for impact
   - Increases heart rate / breathing rate (1) so that oxygen delivery to the m increases intensity of activity throughout the warm-up (1)
   - increases muscle temperature (1) so that muscles are able to contract wi the warm-up / the muscles become more flexible, ready for the stretc
   - increases the amount of oxygen being delivered to the working muscles tired or fatigued during the remaining warm-up activities due to delayed products from working anaerobically (1)

   b. Award **1** mark for any of the following points, up to a maximum of **2** marks (A
   - Stretching to increase range of movement at the joint and flexibility of th with legs straight to stretch the hamstrings
   - Skill-based practice to become familiar with actions/movements involved
   - Mental preparation to improve concentration and motivation for the act

   Accept any other suitable examples.