

Aerobic endurance

Aerobic endurance is one of the six components of physical fitness. It is important for any sustained physical activity.

Aerobic endurance is the ability of the **CARDIORESPIRATORY SYSTEM** to work efficiently, supplying **NUTRIENTS** and **OXYGEN** to working **MUSCLES** during sustained physical activity.

Activities that last for a long time require excellent aerobic endurance. Think of marathon running, long-distance swimming and triathlons.



Marathon runners need excellent aerobic endurance to ensure that they can continue to run over a long distance.

Physical fitness

There are six components of physical fitness:

- aerobic endurance
- muscular endurance
- flexibility
- speed
- muscular strength
- body composition.

You will learn about the other components in the following pages.

Remember

AEROBIC means in the presence of oxygen.
ANAEROBIC means without oxygen.
Aerobic endurance is also known as cardiorespiratory fitness, cardiorespiratory endurance and aerobic fitness.

The cardiorespiratory system

The cardiorespiratory system is made up of the cardiovascular system and the respiratory system.

The table to the right shows the components that make up each of these.

The cardiorespiratory system:

- uptakes oxygen from the air that you breathe in
- transports nutrients and oxygen around your body
- takes oxygen to working muscles
- removes waste products such as carbon dioxide from the body.

Cardiovascular system	Respiratory system
Heart	Lungs
Blood	Airways
Blood vessels	

Worked example

Give **one** reason why top-class sprinters do not require good aerobic endurance. (1 mark)

Sprinters only work for very short periods of time so aerobic endurance is not a physical fitness requirement for them.

There is only one mark available so think carefully about how much to write.

Now try this

Explain **one** reason why aerobic endurance is important for an athlete competing in a triathlon. (2 marks)

Muscular endurance

Muscular endurance is one of the six components of physical fitness. It is important for sustained muscular activity involving light to moderate resistance.

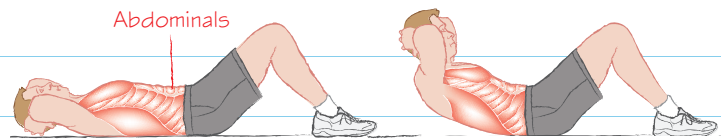
Muscular endurance is the ability of the muscular system to work efficiently, where a muscle can continue contracting continuously against a light to moderate fixed resistance load.

In simple terms it is being able to use your muscles repeatedly without them getting tired.

Voluntary muscles

Voluntary muscles are the muscles attached to your skeleton that help to produce movement.

For example, your abdominal muscles require good muscular endurance if you are going to complete a large number of sit-ups.



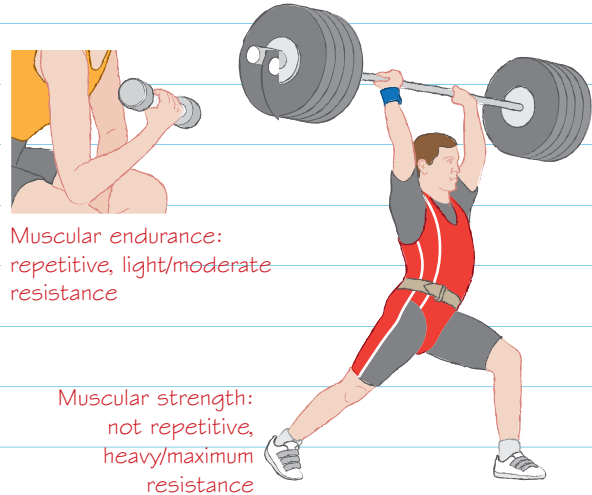
Muscular endurance versus muscular strength

Muscular endurance and muscular strength are different.

Muscular endurance allows you to:

- work the muscles for a long time without getting tired
- work against light to moderate levels of resistance.

Muscular strength is about working for a shorter time against high levels of resistance. Weightlifters need muscular strength. You will revise muscular strength on page 5.



Muscular endurance:
repetitive, light/moderate
resistance

Muscular strength:
not repetitive,
heavy/maximum
resistance

Don't confuse muscular endurance and muscular strength.

Worked example

Look at the image of the rowing crew competing in a race.

Describe why these athletes need good muscular endurance for their event. **(2 marks)**

Rowers have excellent muscular endurance in their legs, back and arm muscles. They have to keep repeating the same movement against the resistance of the water for the duration of their race.



Now try this

Make sure you refer to the length of the event.

Explain why a 1500 m swimmer requires good muscular endurance. **(2 marks)**

Flexibility

Flexibility is one of the six components of physical fitness. Flexibility is important to ensure an adequate range of movement.

Flexibility can be defined as having an adequate range of motion in all joints of the body; the ability to move a joint fluidly through its complete range of movement.

All-round flexibility

Some sports performers require good all-round flexibility. Gymnasts need high levels of flexibility in order to move, bend and flex their bodies around the different pieces of apparatus. Other sports performers might need flexibility in more specific joints.

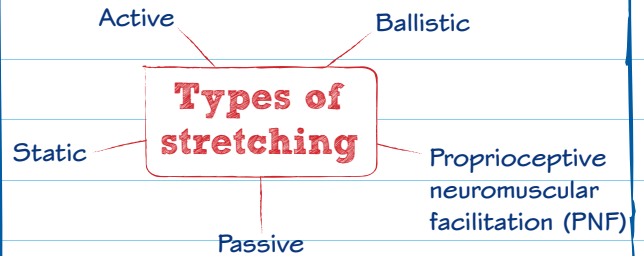
For example, hurdlers need good hip flexibility in order to achieve an accurate hurdling position.



Gymnasts need high levels of flexibility.

Stretching to improve flexibility

You can improve your flexibility by doing STRETCHING exercises. Stretching can help to make muscles more elastic so that your joints can move fluidly through their complete range of movement.



You will learn more about these types of stretches on pages 25 and 27.

Worked example

The image shows a golfer preparing to swing.

Explain **one** reason why shoulder flexibility is important for this performer. **(2 marks)**

Having good shoulder flexibility allows the golfer to increase the range of motion in her swing so that more power can be applied to the ball to make it travel further.



Now try this

Flexibility is important in all sporting activities.

Complete the table below to show how flexibility would be used by each performer. **(3 marks)**

Performer	How is flexibility used in their activity?
A figure skater during their routine	
A tennis player when hitting the ball	
A hurdler when clearing the hurdle	