

Year 10:

Chapter 3: Physical Training

Chapter 1: Applied Anatomy and Physiology

Chapter 2: Movement Analysis

Year 11:

Chapter 4: Sports Psychology

Chapter 5: Socio-cultural Influences

Chapter 6: Health, fitness and well-being

Chapter 3: Physical Training

- 3.1: Health and Fitness
- 3.2: The Components of Fitness
- 3.3: Fitness Testing
- 3.4 – 3.14: Measuring the Components of Fitness
- 3.15: The Principles of Training
- 3.16: Training Thresholds
- 3.17: Types of Training
- 3.18: Preventing Injury
- 3.19: Training Seasons
- 3.20: Warming up and Cooling down

3.1 Health and Fitness



Learning Objectives

All:	To know the definitions of 'Health' and 'Fitness'
Most:	To understand what is meant by being physically healthy
Some:	To know the relationship between health and fitness

3.1 Health and Fitness



On your whiteboard write down
what you think the definitions
for Health and Fitness are

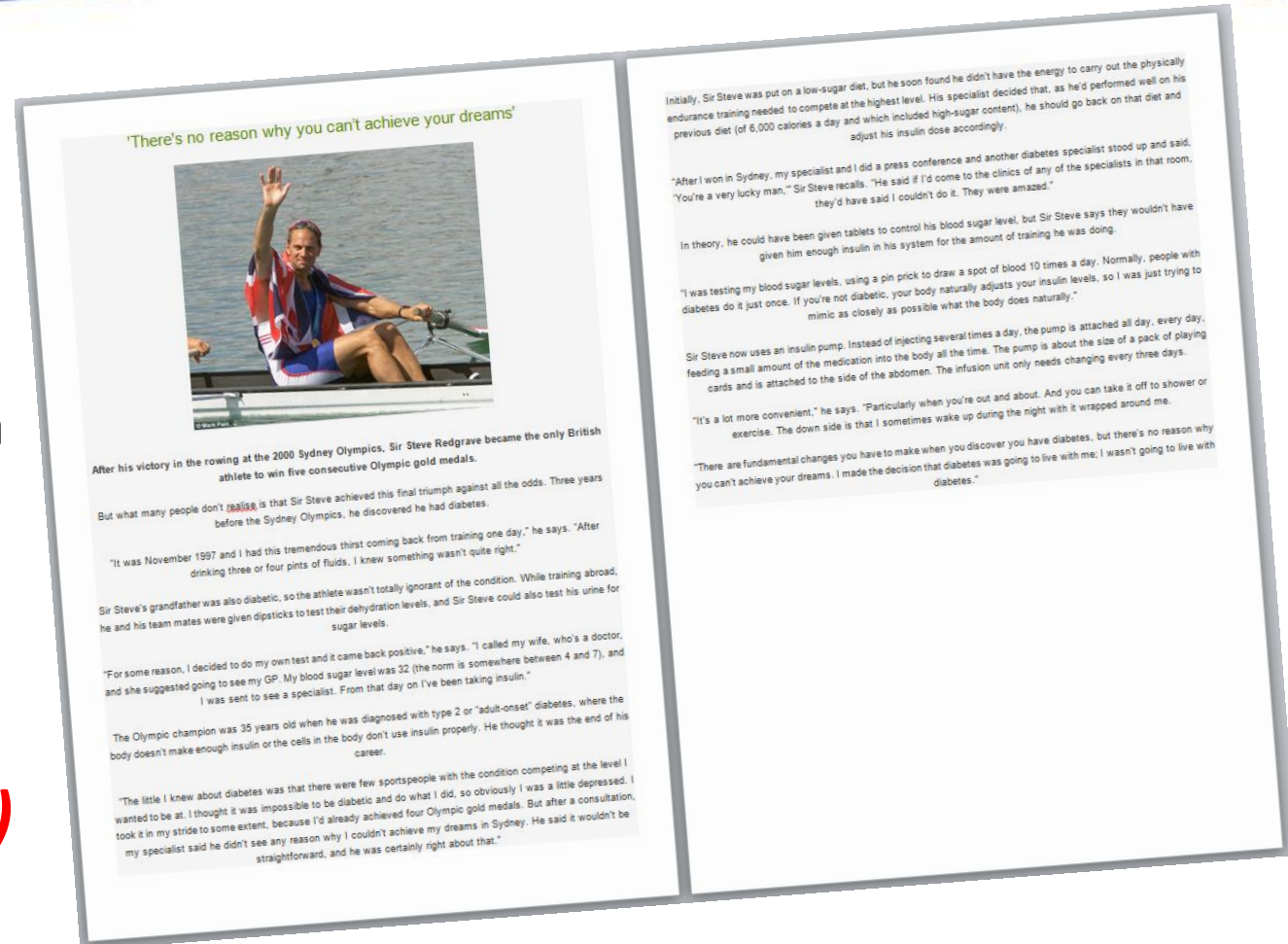


Silently read through the Steve Redgrave article



Think about the following question and be prepared to share your thoughts:

Is it possible to be fit when you are unhealthy? (Page 44)



KEYWORDS



HEALTH

A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity

KEYWORDS



FITNESS

The ability to meet, or cope with, the demands of the environment

HEALTH + FITNESS

What is the relationship?



THINK
PAIR
SHARE



Remember this? →



On your whiteboard write down
what you think the definitions
for Health and Fitness are

PLENARY
SESSION

*Now go back to your whiteboards and
correct your original definitions with what
you have learnt this lesson*

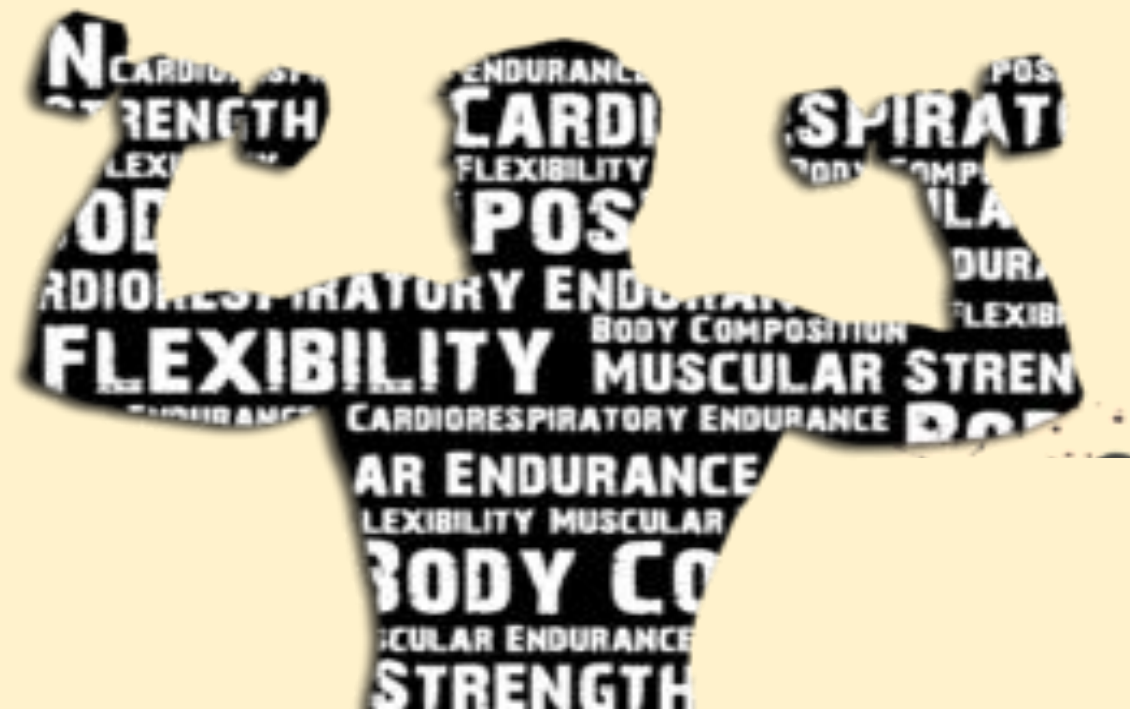
Learning Objectives

- All: To know the definitions of 'Health' and 'Fitness'
- Most: To understand what is meant by being physically healthy
- Some: To know the relationship between health and fitness

3.1 Health and Fitness



3.2 The Components of Fitness



Learning Objectives

- | | |
|--------------|--|
| All: | To know the Components of Fitness |
| Most: | To define each Component of Fitness |
| Some: | To give a sport example for each Component of Fitness |



Fitness for sport and physical activity can be broken down into ten components – using the worksheet provided can you guess what the 10 components are from the pictures?



AGILITY **BALANCE** **SPEED**

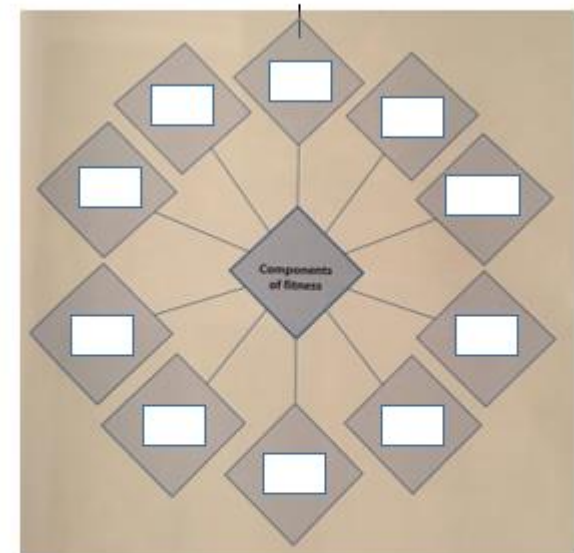
STRENGTH **COORDINATION**

MUSUCLAR ENDURANCE **FLEXIBILITY**

CARDIOVASCULAR ENDURANCE

REACTION TIME **POWER**

3.2 The Components of Fitness



Class Mnemonic to remember the 10
Components of Fitness:

AGILITY:



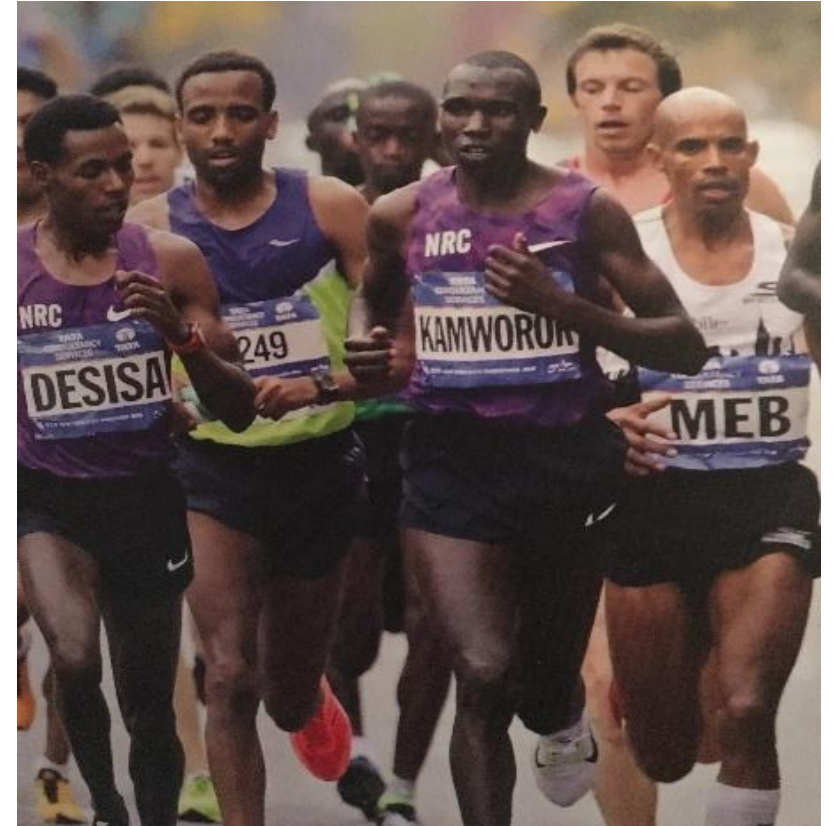
The ability to move and change direction quickly, at speed, while maintaining control



Cardiovascular Endurance:



Often referred to as 'aerobic power'. It is the ability of the heart and lungs to supply oxygen to the working muscles



COORDINATION:



Is the ability to use two or more different parts of the body together, smoothly and efficiently



FLEXIBILITY:



Refers to the range of movement possible at a joint



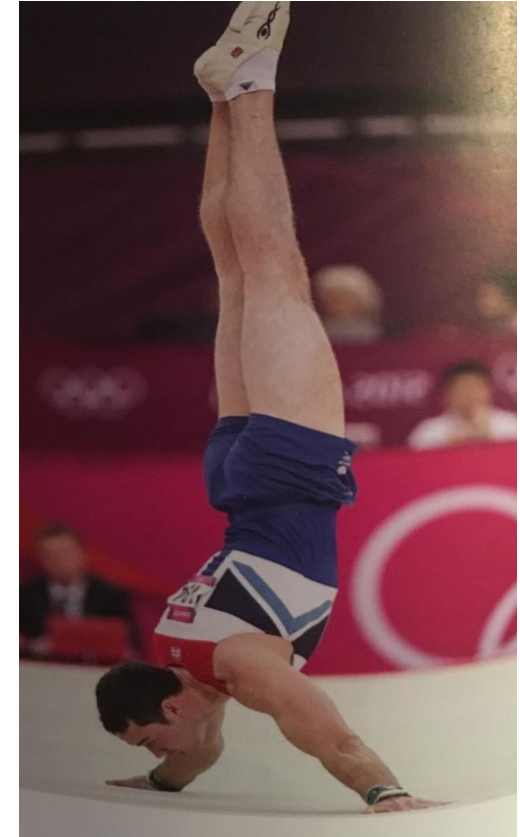
BALANCE:



The ability to keep the body stable by maintaining the centre of mass over the base of support.

There are 2 types

1. Static Balance : Little or no movement
2. Dynamic Balance : When movement takes place during a balance



Muscular Endurance:



The ability of a muscle or muscle group to undergo repeated contractions, avoiding fatigue. Fatigue is a feeling of extreme or severe tiredness due to a build up of lactic acid in the muscles or working for long periods of time

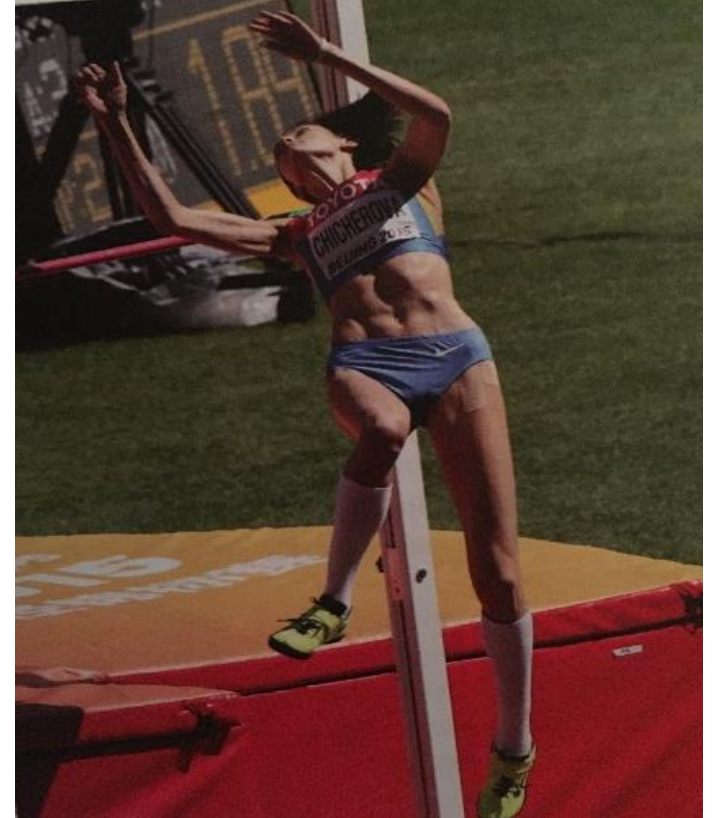


POWER:



Is the product of strength and speed.

$$\text{Power} = \text{Strength} \times \text{Speed}$$

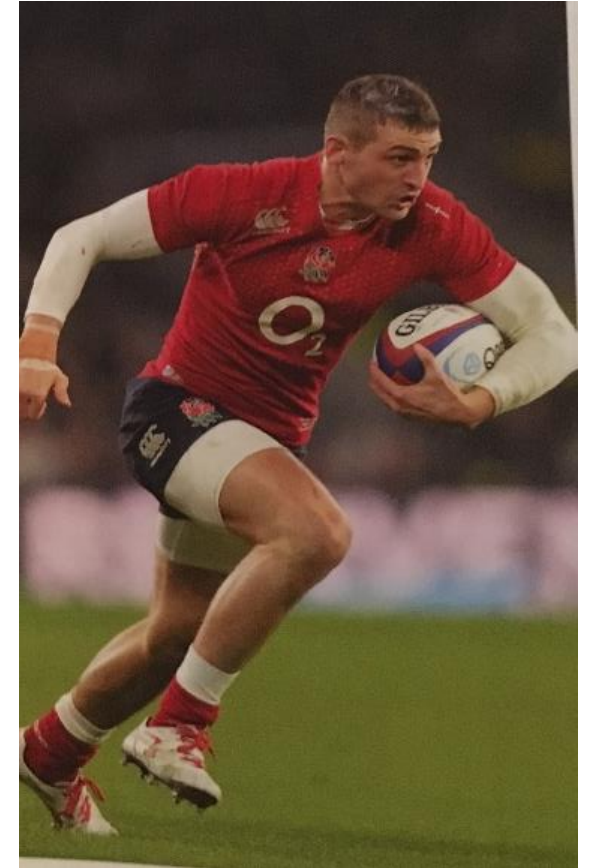


SPEED:



The maximum rate at which an individual is able to perform a movement or cover a distance in a period of time, putting their body parts into action as quickly as possible

$$\text{Speed} = \text{Distance} / \text{Time}$$



KEYWORDS



STRENGTH:

The ability to overcome resistance

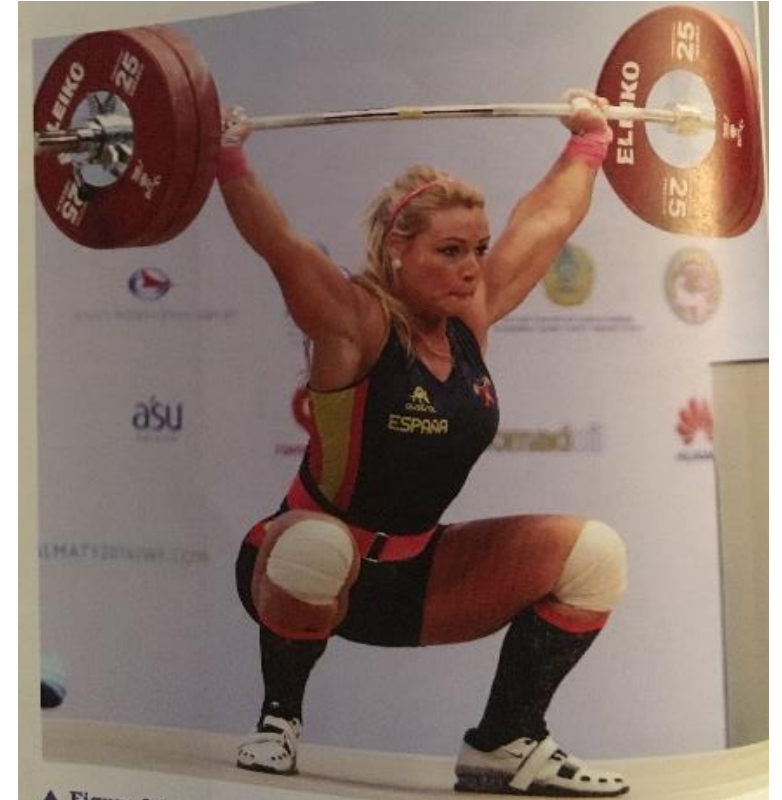
4 types of strength:

Maximal strength: Greatest force possible in a single maximum muscle contraction

Static strength: The amount of force exerted on an object you cannot move

Explosive strength: The amount of force exerted in one quick muscle contraction

Dynamic strength: The amount of force that can be exerted repeatedly by a muscle



REACTION TIME:



The time taken to start responding to a stimulus; the time between the initiation of the stimulus and the performer starting to respond





CLASSROOM DISCUSSION

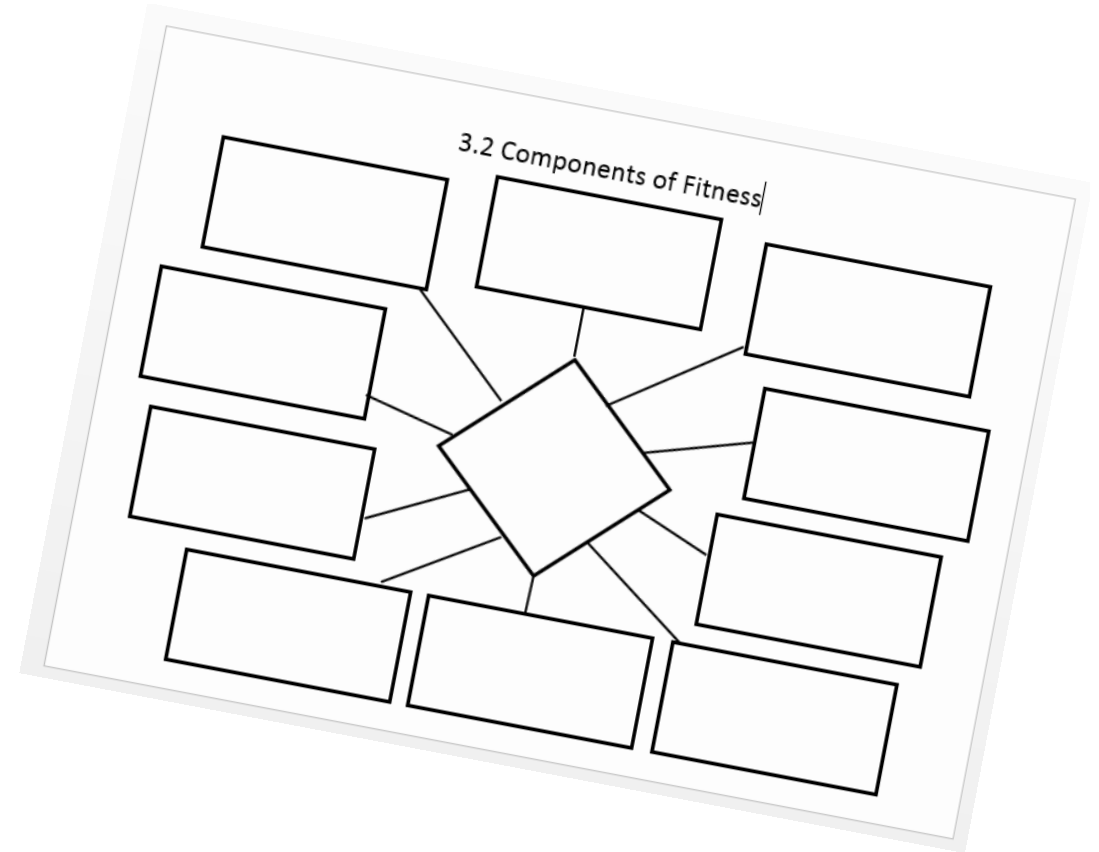


The teacher will call out each component of fitness. Using your whiteboards write down a sport example where the specific component of fitness is evident and justify your answer!

PLENARY
SESSION



Using a Sport of your choice, explain and give specific examples of how each component of fitness is used in your chosen sport



Learning Objectives

- All:** To know the Components of Fitness
- Most:** To define each Component of Fitness
- Some:** To give an example for each Component of Fitness

3.3 – 3.14 Fitness Testing



Learning Objectives

- | | |
|--------------|---|
| All: | To understand the purpose of fitness testing |
| Most: | To know and explain how to carry out each fitness test |
| Some: | To link each test to the components of fitness |



Fitness Testing is used to measure a person's level of fitness in one or more of the ten components of fitness.

What do you think are the 4 main reasons for carrying out fitness tests?

Reasons for Fitness Testing (page 52)

- Identifying strengths and weaknesses to inform training requirements
- Motivation
- Establishing a starting level of fitness and monitoring improvement
- Providing variety



Quantitative and Qualitative Data

Quantitative data: Data that focuses on measuring things and involves numbers. Quantitative data involves facts and, therefore, gives you an objective answer to your question.

Qualitative data: Data that focuses on understanding things; it involves descriptions about people's opinions, about the way they feel, think and behave. Analysing qualitative data gives you a subjective answer to your question.

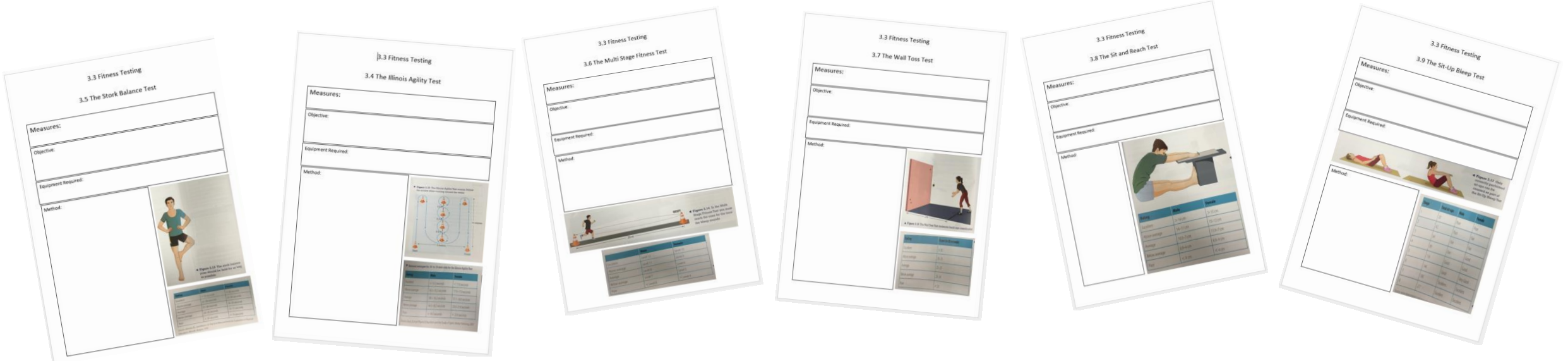


Complete the Activity on Page 54

KEYWORDS



Using the Fitness Test worksheets and the exercise books... fill in the gaps using pages 55 - 65





Keywords

Rush -

Draw a table
like below

PLENARY
SESSION

Keyword – Fitness Test (10 seconds)	What does it measure? (20 seconds)	What is the objective of the test? (30 seconds)

Learning Objectives

- All:** To understand the purpose of fitness testing
- Most:** To know and explain how to carry out each fitness test
- Some:** To link fitness to the components of fitness

3.15 The Principles of Training

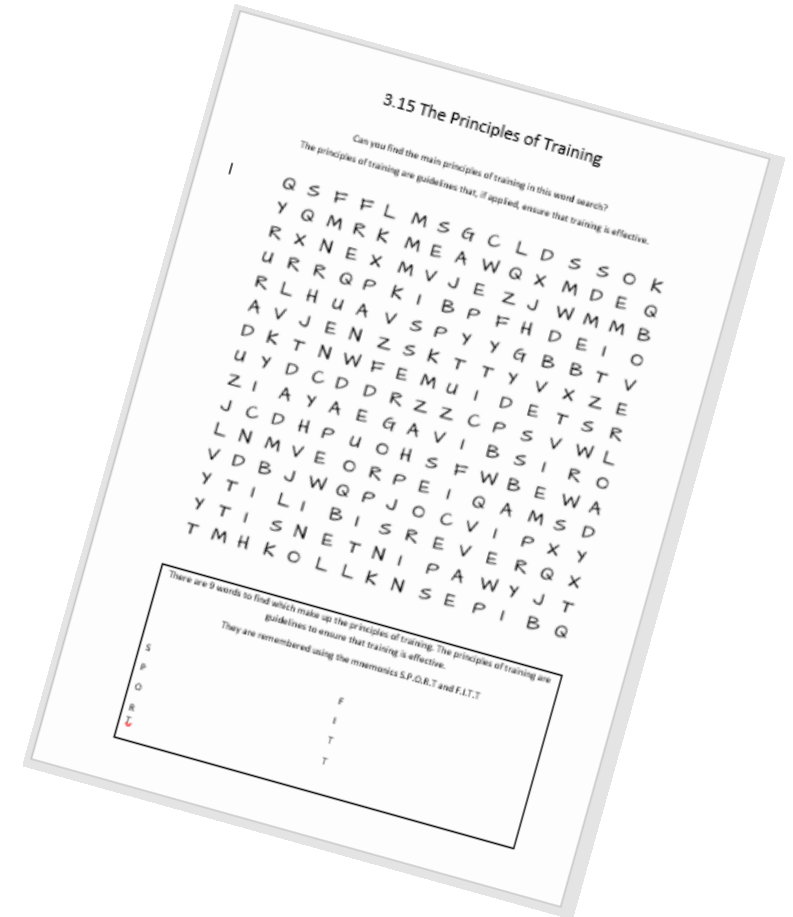


Learning Objectives

- | | |
|--------------|---|
| All: | To identify the principles of training |
| Most: | To define the principles of training |
| Some: | To relate the principles of training to a specific sport |



Complete the
starter word search
with the aim to find
out what the
principles of
training are!



S.P.O.R.T

Specificity

Progressive **O**verload

Reversibility

Tedium

The principles of training are guidelines that, if applied, ensure that training is effective

KEYWORDS





F.I.T.T

Frequency

Intensity

Time

Type

The F.I.T.T principle is used to increase the amount of work the body does in order to achieve overload.

KEYWORDS



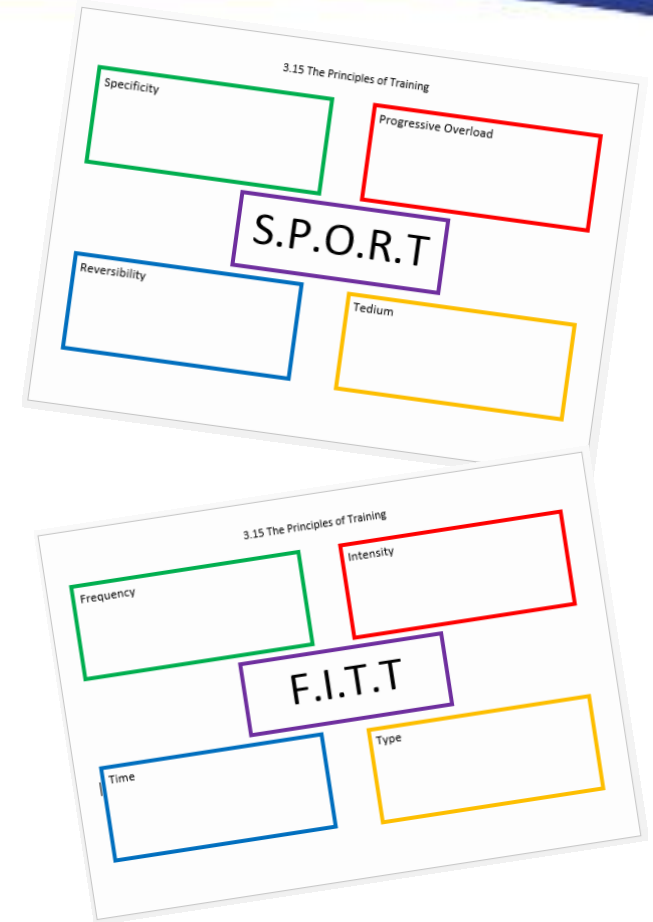
What do you know about the principles of training? 2 minutes to discuss

- These key principles should be considered when designing a training programme.
- They act as a guide and should be considered for prolonged periods of training.
- The correct application of the principles of training will help to develop performance in a given sport.



Class task – you will be divided into 8 teams. Each team will be responsible for researching 1 principle of training. You will have 8 minutes to create a clear and informative poster on that specific principle of training.

In your groups you will then rotate round each component and fill in the work sheets provided accordingly



Let see how much you can remember!



PLENARY
SESSION



Choose your main sport

Can you relate S.P.O.R.T and F.I.T.T to your chosen sport, specific to how you would train for that sport?

Homework

- You are a football coach and have a 15 year old player that is coming back from injury, using the principles of training, what needs to be included in their program?

(12 marks)

I am the coaching of a football player who is coming back to training after taking 6 weeks off after suffering a badly sprained ankle. Using the principles of training, a training programme that is specific to their personal needs and sport is essential for them to return perform at a pre-injury level.

Firstly, I need to ensure that training is specific, meaning that within the programme a lot of football based activities are incorporated, that are game and fitness specific, such as passing and attacking working on their skills level, alongside improving their aerobic fitness.

Secondly, I need to make sure progressive overload is achieved, particularly as this player is coming back from injury and should be adapting and improving with the progression of physical performance, however this should not be done too quickly so overtraining does not occur. Progressive overload, should use the FITT principle to help overload the body and make improvements. The training needs to be frequent and happen a number of times a week ranging from skills sessions to training in the gym, however, my player will start with only one session a week because they will still have an ankle weakness. Intensity of training should also be increased to a sensible level that reflects in the development of fitness, for example the number of football drills performed and the speed that is run on the treadmill. Time spent will also increase as fitness and performance improves, therefore taking part in training sessions for a longer durations of time.

I will make sure there are different types of training used, for example, skill specific training, continuous, fartlek and circuit training, however, these types of training must be suitable for the specific training benefits that are required. Since the player will have been affected by reversibility due to not training when injured, losing performance and fitness levels, this needs overcome. It is likely they need to recommence with regular training to improve their muscular and cardiovascular endurance, which is essential for a good football player.

Finally, the training programme needs to avoid tedium occurring, ensuring training is not boring by making sure training is altered and varied to prevent an individual suffering from this.

Training programme

Week 1

1 x football skills session, focusing on simple dribbling and passing

(30 minutes)(low intensity)

Week 2

1 x football skills session, focusing on simple attacking, defending and tackling

(40 minutes)(low intensity)

1 x gym session, 20 minutes of cycling, 10 minutes resistance exercises for ankles and lower legs

(30 minutes)(low intensity)

Week 3

1 x football skills session, practice skills in pressurised situations, introduce player back into small sided games.

(1hour)(medium intensity)

1 x gym session, 30 minutes of cardio and 30 minutes of weights (medium resistance)

(1 hour)(medium intensity)

1 x circuit training session focusing on muscular endurance and cardiovascular endurance

(30 minutes)(medium intensity)

Week 4

2 X football skill session, full applied football skills into drills and game situation, session should be competitive

(1 hour each)(high intensity)

1 x gym session, 30 minutes of cardio and 30 minutes of weights (low-medium resistance for lower legs)

(1 hour)(medium-high intensity)

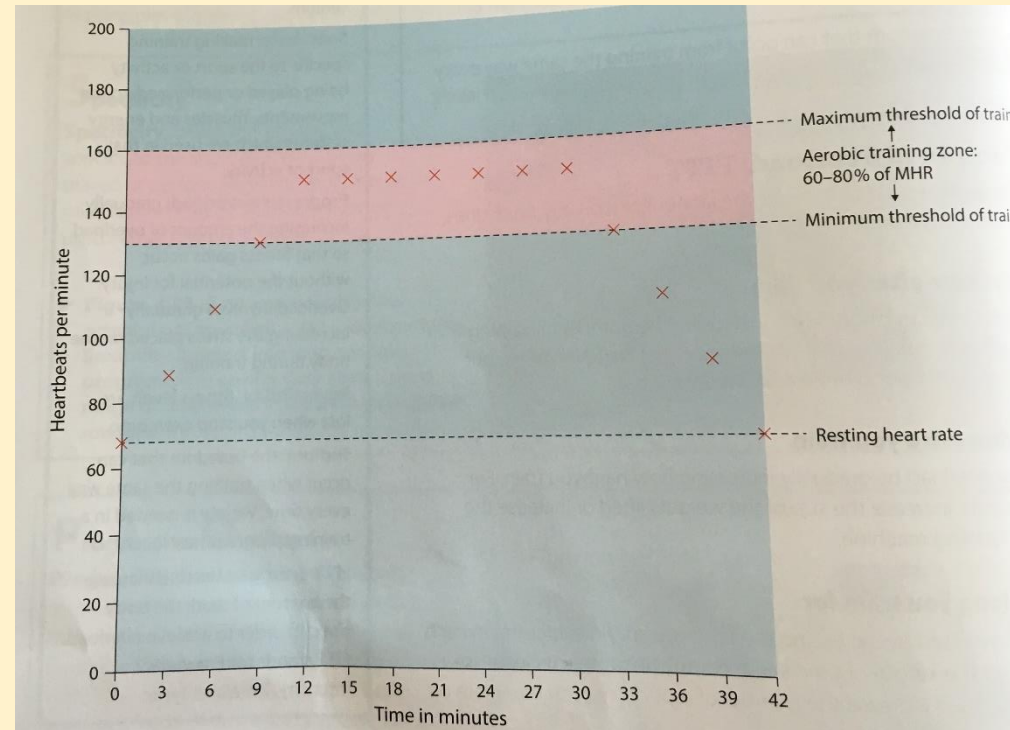
1 x fartlek training – running

(1 hour)(medium-high intensity)

Learning Objectives

- All:** To identify the principles of training
- Most:** To describe the principles of training
- Some:** To give examples for each principle of training

3.16 Training Thresholds



Learning Objectives

- | | |
|--------------|--|
| All: | To understand what Training thresholds are |
| Most: | To be able to calculate Training thresholds |
| Some: | To know the difference between aerobic and anaerobic training zones |



Wordles



- teahr tear
- sernitg teahr tear
- rownikg teahr tear
- xamimmu teahr tear
- atregt enzo
- ciborea
- ciboreana aerobic
- ercorevy atre
- Heart rate
- Resting heart rate
- Working heart rate
- Maximum heart rate
- Target Zone
- Aerobic
- Anaerobic
- Recovery rate

Types of Heart Rate – what is?

✓ **Heart rate is...**

the number of times the heart beats per minute (bpm)

✓ **Resting heart rate is...**

the heart rate at rest (usually 60-80 bpm)

✓ **Working heart rate is...**

the heart rate during (or immediately after) exercise

✓ **Maximum heart rate is...**

$220 - \text{your age} = \text{maximum heart rate (bpm)}$

✓ **Recovery rate is...**

how long it takes for heart rate to return to its resting level after training

Analysing training sessions

Jane

RHR:	62
2mins:	104
4mins:	143
6mins:	144
8mins:	146
10mins:	152
12mins:	157

1min:	139
2mins:	101
3mins:	77
4mins:	66
5mins:	64

Pamela

RHR:	71
2mins:	163
4mins:	173
6mins:	177
8mins:	181
10mins:	183
12mins:	184

1min:	162
2mins:	147
3mins:	136
4mins:	117
5mins:	93

Analysing training sessions



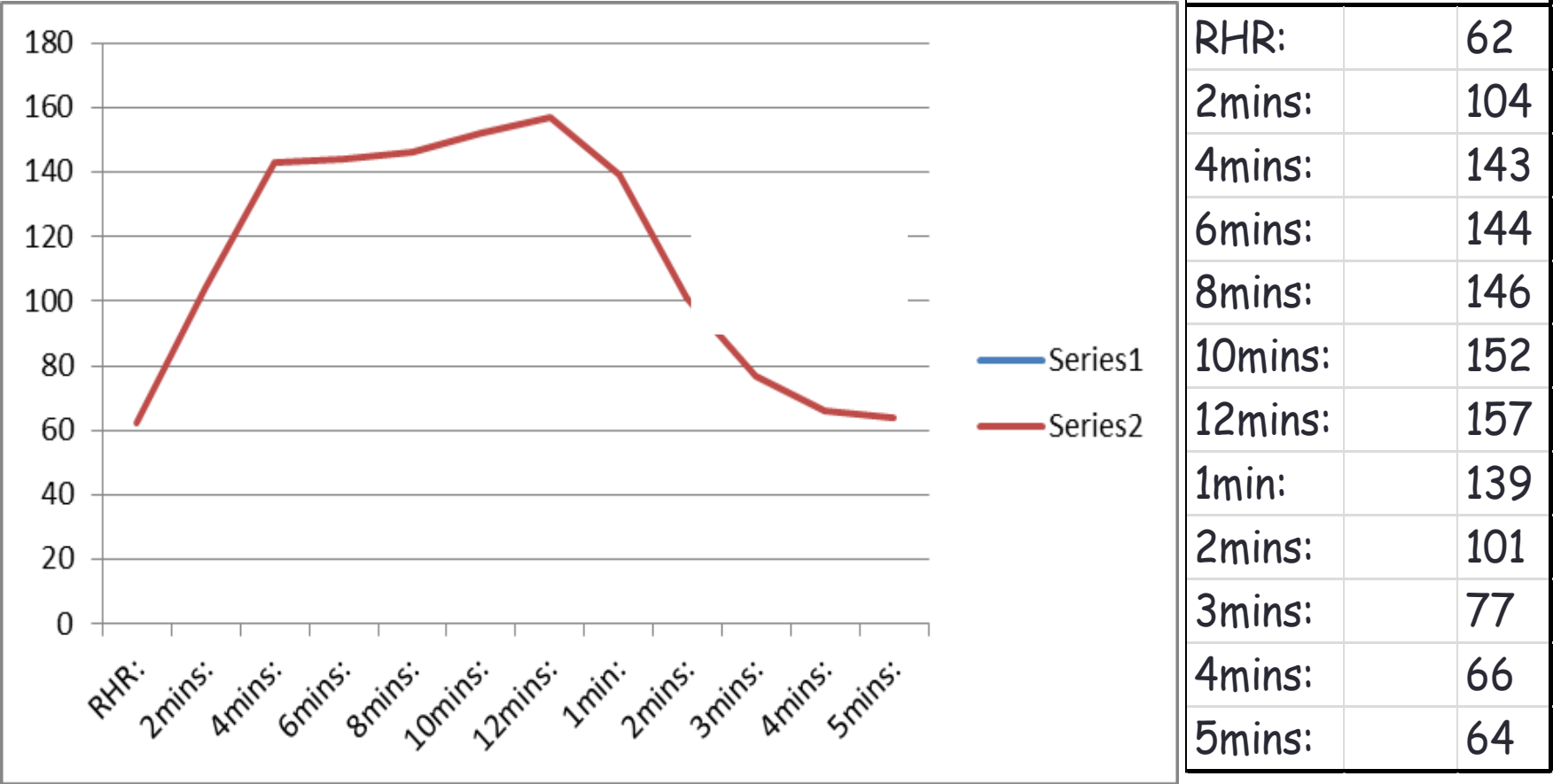
- Using a ruler, you should now try to plot the results onto 2 separate graphs

Plot the resting heart rate at 0mins, and continue to plot recorded scores across the graph, every 2 minutes - including the recovery rate.

- Mark out the **aerobic target** training zone
(60-80% of MHR) / 124 -163bpm
- Mark out the **anaerobic training** zone
(+80% of MHR) / 163bpm +



Graphs – Jane



Graphs – Pamela



RHR:	71
2mins:	163
4mins:	173
6mins:	177
8mins:	181
10mins:	183
12mins:	184
1min:	162
2mins:	147
3mins:	136
4mins:	117
5mins:	93



Long, slow runs, easy or recovery runs - 60-70%

Training in this zone improves the ability of your heart to pump blood and improve the muscles' ability to utilize oxygen. The body becomes more efficient at feeding the working muscles, and learns to metabolise fat as a source of fuel.

Aerobic zone or "target heart rate zone" - 70-80%

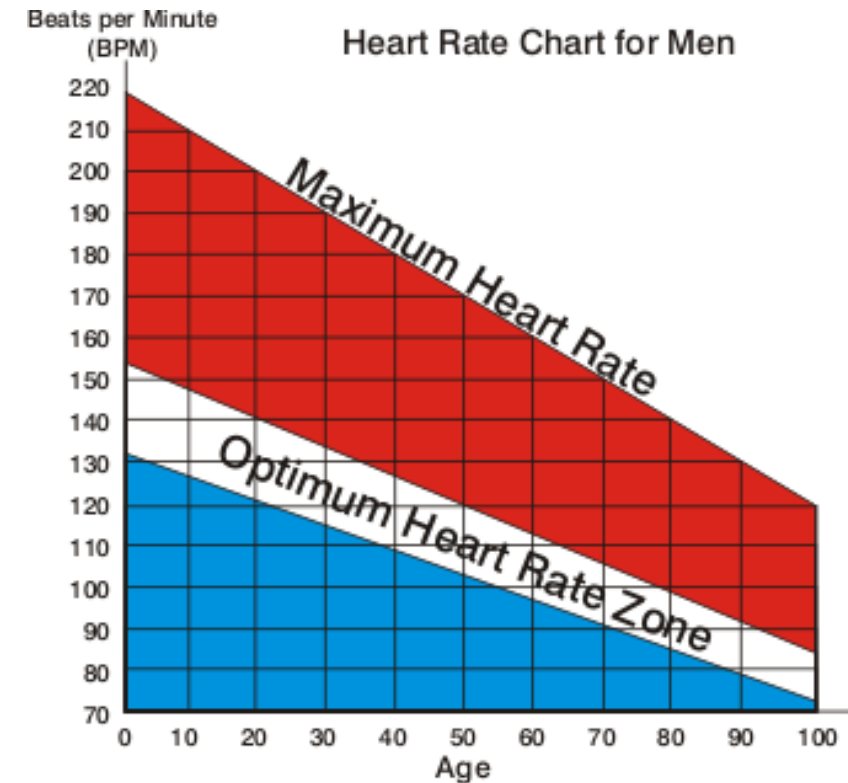
Most effective for overall cardiovascular fitness. Increases your cardio-respiratory capacity: that is, the your ability to transport oxygenated blood to the muscle cells and carbon dioxide away from the cells. Also effective for increasing overall muscle strength.

Anaerobic zone - 80-90%

The point at which the body cannot remove lactic acid as quickly as it is produced is called the lactate threshold or anaerobic threshold. It generally occurs at about 80-88% of the Heart Rate Reserve. Training in this zone helps to increase the lactate threshold, which improves performance. Training in this zone is hard: your muscles are tired, your breathing is heavy.

VO2 max "Red line zone" - 90-100%

You should only train in this zone if you are very fit, and only for very short periods of time. Lactic acid develops quickly as you are operating in oxygen debt to the muscles. The value of training in this zone is you can increase your fast twitch muscle fibers which increase speed.



Aerobic and Anaerobic Fitness

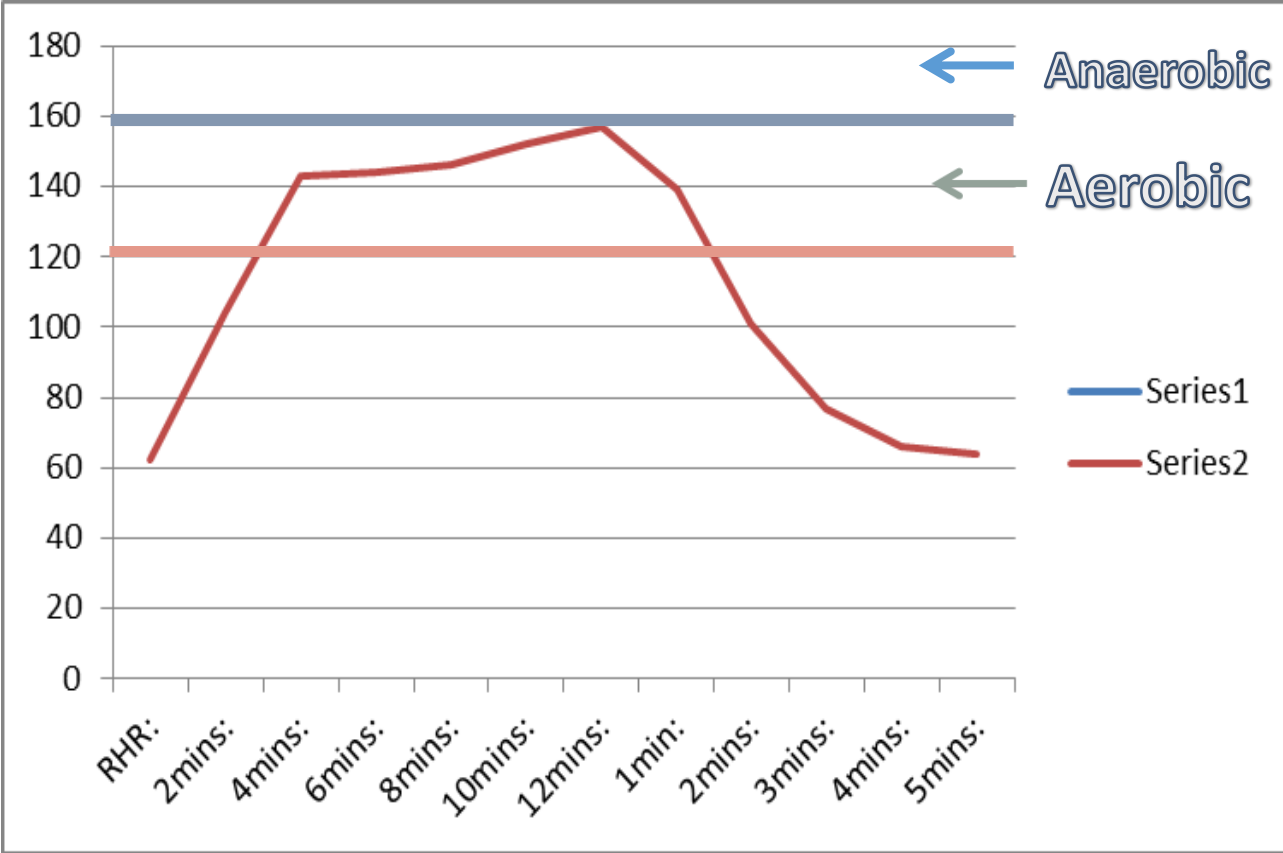
Aerobic

- Aerobic exercise is steady and not too fast, the heart is able to supply enough oxygen to the muscles. Aerobic training improves cardiovascular fitness. This exercise relates more to football because you need the heart to supply your muscles with oxygen so they can work for long periods of time.

Anaerobic

- Anaerobic exercise is performed in short, fast bursts where the heart cannot supply enough oxygen to the muscles. Anaerobic training improves the ability of the muscles to work without enough oxygen when lactic acid is produced. This type of exercise is the worst out of the two for football, because you need to keep adding oxygen to your muscles so they can work for the long period of time. During anaerobic exercise, the heart cannot supply enough oxygen to the muscles.

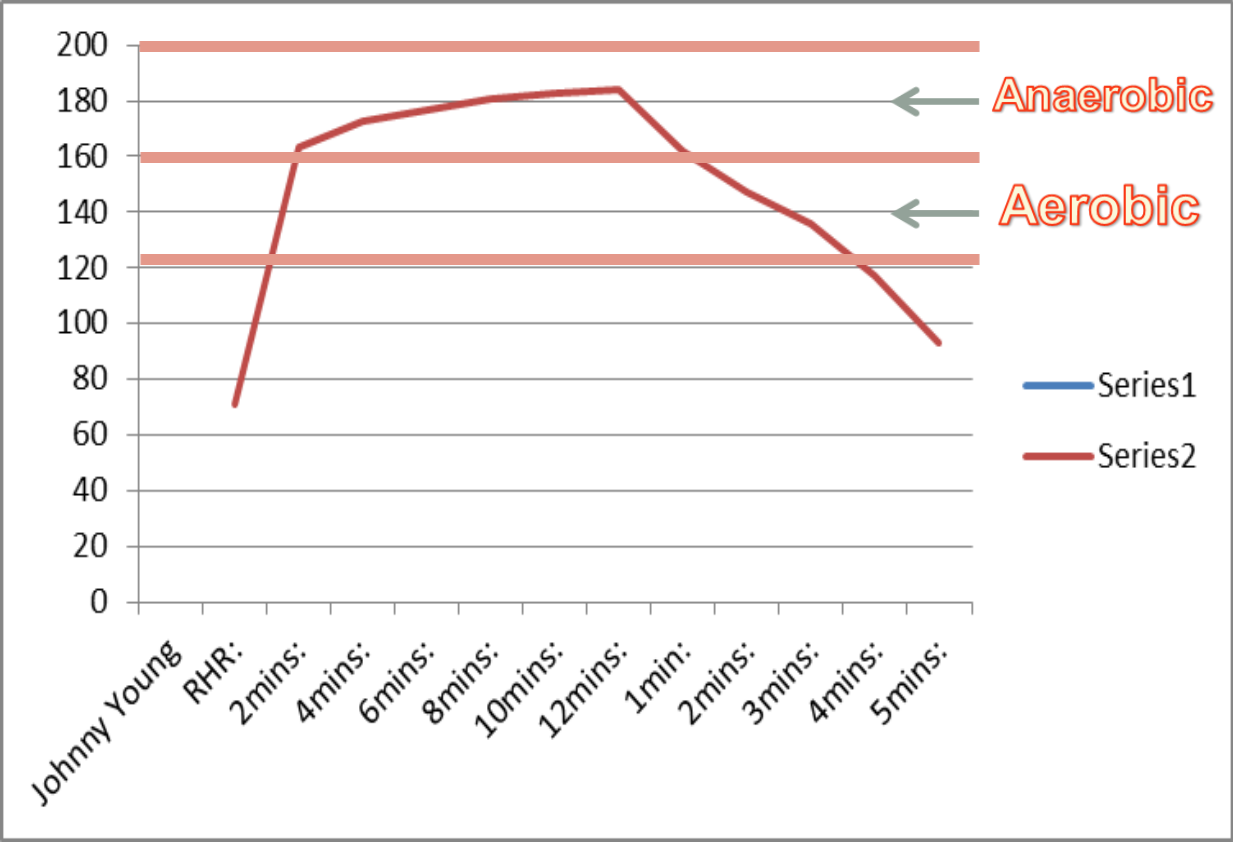
Graphs – Jane



RHR:	62
2mins:	104
4mins:	143
6mins:	144
8mins:	146
10mins:	152
12mins:	157
1min:	139
2mins:	101
3mins:	77
4mins:	66
5mins:	64



Graphs – Pamela



RHR:	71
2mins:	163
4mins:	173
6mins:	177
8mins:	181
10mins:	183
12mins:	184
1min:	162
2mins:	147
3mins:	136
4mins:	117
5mins:	93

When looking at Jane and Pamela's response to exercise, what do you notice? (They are both the same age and are doing the same type of physical activity)

- What training zones are they working in? When are they working in these training zones? What does that mean? Why?
- Describe
- Explain
- Analyse/example

PLENARY
SESSION

Complete your keywords list
accordingly!



Learning Objectives

- All:** To understand what Training thresholds are
- Most:** To be able to calculate Training thresholds
- Some:** To know the difference between aerobic and anaerobic training

3.17 Types of Training



Learning Objectives

All:	To know the different types of training
Most:	To link the types of training to the components of fitness
Some:	To know the advantages and disadvantages for each type of training



On your whiteboards write down as many different ways that you can train for a specific sport



For example... Circuit Training

(Tip: think about your core PE fitness lessons!)



- Circuit Training
- Continuous Training
- Interval/high intensity Training
- Fartlek Training
- Static Stretching
- Weight Training
- Plyometric Training
- High Altitude Training



Using the exercise books – fill in a description of what each type of training is in the boxes available on the next few slides (page 70-77):



CIRCUIT TRAINING

- It can be designed to train either one or a number of components of fitness
- You need to think about space and equipment available
- Need to think about the work to rest ratio
- Allow for specific muscle recovery, thinking about ordering of stations
- 6-8 station circuit
- How much recovery between stations/sets?
- How many sets?
- Link the circuit to the movement demands of the sport
- How can it be linked to the principles of training?

Positives

- You can include simple or complex skills
- Can be varied depending on age/fitness level
- Easy to monitor and alter – progressive overload

Negatives

- You need appropriate space
- May need specialist equipment
- Difficult to know the appropriate work to rest ratio initially



CONTINUOUS TRAINING

- Sustained activity without rest
- Eg, running, rowing, cycling, swimming
- Used to improve cardiovascular endurance
- Often referred to as **steady state exercise**
- Works the aerobic energy system – 60-80% of maximal HR
- Improves your ability without fatiguing as rapidly. Why?
- Should happen for at least 20 minutes
- Should be sport specific
- Should be frequent, around 3 times a week

Positives

- You do not need a lot of equipment
- Improves aerobic fitness
- It can be done in a lot of places
- It is simple (movements are easy)

Negatives

- It can be boring
- Can cause injury because of receptive movements
- Time consuming
- Doesn't always meet the demands of the sport



FARTLEK TRAINING



STATIC STRETCHING



WEIGHT TRAINING

- Includes free weights and resistance machines
- Can suit individuals' needs because you can work individual muscles or groups
- A tennis player would work on increasing power in arm muscles, whereas a marathon runner may use weights on their lower body to increase muscular endurance

Safety

- A correct technique should be used
- A spotted should be used for free weights
- Children should not use weights as it may damage bones

One repetition – one lift of a weight

One set – the completion of a number of reps

One rep max – the maximum weight you can safely lift

Strength/power training – heavy weights and low reps

Muscular endurance – lighter weights with high number of reps

Positives

- Can be easily adapted for fitness aims
- Relevant to all sports
- Straight forward to carry out
- Strength gains can occur

Negatives

- Heavy weights can increase blood pressure
- Injury can occur is weights are too heavy or wrong technique is used
- To achieve an accurate one rep max motivation is needed



PLYOMETRIC TRAINING

- A type of training to increase power = strength x speed
- It takes the form of bounding, hopping and jumping
- E.g. clap press ups, jumping off and onto boxes
- As an athlete lands their quadriceps lengthen (eccentric contraction) and this stored energy can be released with another stronger jump straight away (concentric contraction)

+

- Good for athletes that require power, e.g., for basketball and triple jump

-

- A lot of stress is placed on muscles and joints that can cause injury

- Any training (and practice) method must take account of the following:
 - the training purpose(s), training thresholds/ training targets/training zones (see calculating intensities below)
 - rest/recovery.



HIGH ALTITUDE TRAINING

How it is carried out:

- Used by elite athletes – endurance athletes that work aerobically – virtually no benefit for anaerobic athletes.
 - Athletes normally travel to different parts of the world eg, Mo Farah trained in Ethiopia before Rio
 - It trains the aerobic energy system and improves cardiovascular endurance
- Happens at altitudes above 2000m high
 - There is not as much oxygen in the air and the body finds it harder to carry oxygen to the working muscles
 - The body then makes more red blood cells to carry more oxygen
- Due to the lack of oxygen in the air altitude training is hard
 - The body produces more red blood cells to carry the available oxygen
 - The body will have more red blood cells at the end of training
 - When returning to sea level they will have more red blood cells and the air has more oxygen
 - This will help the performer aerobic endurance activities

Negatives to high altitude training

- It can be very hard to complete train due to the lack of oxygen and therefore fitness can decrease
- Some athletes suffer from altitude sickness
- The benefits get lost quickly when returning to sea level – only 10-14 days





Using a sport of your choice on the worksheets provided...

Using the specific type of training, write down the components of fitness which are used for that type of training.

Then use an example from your sport which demonstrates that type of training and the components of fitness mentioned

3.17 Types of Training

<u>Circuit Training</u>
Components of fitness trained:
Specific to your chosen sport:

<u>Continuous Training</u>
Components of fitness trained:
Specific to your chosen sport:

<u>Interval/high intensity Training</u>
Components of fitness trained:
Specific to your chosen sport:

MATCH IT UP GAME



Using the cards given out – can you match up the advantages and disadvantages to the specific Types of Training?

PLENARY
SESSION



Get the advantages and disadvantages for each Type of Training written down!!!

Learning Objectives

- All:** To know the different types of training
- Most:** To link types of training to the components of fitness
- Some:** To know the advantages and disadvantages for each type of training

3.18 Preventing Injury



Learning Objectives

- | | |
|--------------|---|
| All: | To know the 9 rules to avoid injury |
| Most: | To give a description of the 9 rules to avoid injury |
| Some: | To create a guide for a specific sports performer on how to prevent injury |



WHITEBOARD RUSH

In 2 teams, one at a time, you will write on the whiteboard a way to prevent injury!
The team with the most suggestions in the time limit wins!

RULE 1



Rule: **The training type and intensity should match the training purpose**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 2



Rule: **Over training should be avoided**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 3



Rule: **appropriate clothing and footwear should be worn to protect and support**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 4



Rule: **stretches should not be overstretched or bounced**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 5



Rule: **Taping/bracing should be used when necessary**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 6



Rule: **Spotters should be used when weight training with heavy weights**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 7



Rule: **Hydration should be maintained**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 8



Rule: **Appropriate rest should be given between sessions for recovery**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

RULE 9



Rule: **A warm up and cool down needs to completed**

Description:

Most: To give a description of the 9 rules to avoid injury

All: To know the 9 rules to avoid injury

PLENARY
SESSION



Complete the worksheet provided!



Learning Objectives

- All:** To know the 9 rules to avoid injury
- Most:** To give a description of the 9 rules to avoid injury
- Some:** To create a plan for a specific sports performer on how to prevent injury

3.19 Training Seasons



Pre-season **(preparation)**

- Aims to improve general and aerobic fitness
- Long runs (aerobic fitness), specific training e.g., agility for tennis
- This may include working on general fitness as well as sport specific fitness

Competition **(peak/playing season)**

- Aim to maintain fitness levels
- They will be at peak fitness
- May work on specific skills during this time

Post season **(transition)**

- To rest and recover
- Continue with light aerobic training so fitness levels don't drop too much

Learning Objectives

- | | |
|--------------|--|
| All: | To know the 3 different training seasons |
| Most: | To understand what each training season entails |
| Some: | To research an elite athletes training season programme |



Using the 'Training seasons' cards – can you divide them into 3 different categories/seasons?



Pre-season/preparation

Performers focus on:

- general aerobic fitness, through continuous training, interval training and/or Fartlek training
- general strength and muscular endurance, through weight training
- training the components of fitness that are essential to success in their chosen sport or physical activity
- practising the skills and techniques that will prepare them for success in the competitive season ahead.

► **Figure 3.34:** Jamaal Lascelles takes part in strength and conditioning training during a Newcastle United pre-season training session



Competitive/peak/playing season

Performers concentrate on maintaining their fitness levels throughout their competitive season, when they are playing in matches or competing every week. They must avoid training too much, however, as this can

cause fatigue, which would decrease their performance. Instead, they should work on optimising their skills and, in team sports, practising set plays to improve team performance.

KEYWORDS





Post-season/closed season/transition

Performers rest and recuperate; only taking part in light aerobic training to maintain a level of general fitness.

At the end of the closed season, performers should be fully rested and ready for pre-season training.

KEYWORDS



PLENARY
SESSION



Can you identify
the pre-season,
playing season
and post season
training plans for
these 2 sport
training
programmes?

3.19 Training Seasons

Which Season is this?

You're going to want to build on the endurance and strength that you've been working on by adding muscular power, speed and agility. In this period, you're making a concentrated effort to engage in activities more netball-like. This means that you're wanting to increase the intensity and lower the duration of your workouts. For instance, if you're running, try to complete your course in less minutes each time you run. Aerobic exercises are the best option here as the swift movements and high-intensity are similar to those on the court.

Which Season is this?

You should be focusing on getting your body used to low intensity workouts over longer periods of time rather than the intense focused workouts of the netball court. This will give your body a chance to recover from the strains on muscles and joints and is the most important time for focusing on those injuries. Finding a social sports team to join will keep you exercising regularly. Include swimming in your weekly schedule to improve upper body and core strength and consider yoga to aid flexibility.

Which Season is this?

You should be attending a training session once a week to maintain your general fitness levels. You will also be competing in regular matches which will add to your general fitness – do not overdo it however as you do not want to cause the body to fatigue!

3.19 Training Seasons

Which Season is this?

Active rest and mobility are important aspects to recovery and injury prevention. The upper and lower body mobility / recovery routines outlined in the recovery section on your training days should be performed a minimum of 4x per week. This is why on your sample training schedule it is outlined on your training days but also attached to your active rest days.

Which Season is this?

Our main objective is to maintain everything that you earned in the off-season and progress on any area that we can while keeping you healthy, injury free and full of energy for your games. This means keeping up your strength, size, power output, aerobic / anaerobic capacity and agility all within the same system.

Which Season is this?

Focus on maintaining muscular strength and endurance, while your practices provide a conditioning component. Workouts should be shorter and feature multi-joint movements that target large muscle groups to get a bigger bang for your buck with each exercise. Perform the exercises with lighter weight for fewer sets and more reps, so they will be challenging, but won't fatigue your muscles too much.

The hockey-training program below switches up the sets and reps each week so your muscles don't get too comfortable with the workout and continue making gains. Follow the set and rep schedule below with all exercises unless otherwise specified. Perform grouped exercises in superset fashion.

3.19 Training Seasons

Some: To research an elite athletes training season programme

Learning Objectives

- All:** To know the 3 different training seasons
- Most:** To understand what each training season entails
- Some:** To research elite athletes training season programme

3.20 Warming up and cooling down



Learning Objectives

All:	To know the importance of a warm up and cool down
Most:	To know the different stages of a warm up and cool down
Some:	To create a session plan with an effective and appropriate warm up and cool down



Using the task card you have been given you have 5 minutes to answer it

Your key phrase is:



The Exercise Session

3.20 Warming up and cooling down

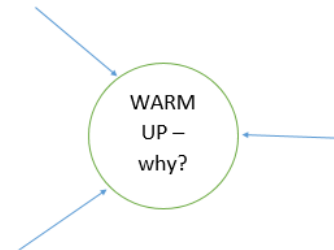
All: To know the importance of a warm up and cool down



As a class we will go through pages 80 – 81 whilst filling in the worksheets about warming up and cooling down

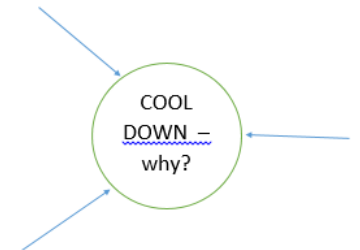


3.20 Warming up and cooling down



4 stages of a warm up

3.20 Warming up and cooling down



2 stages of a cool down

3.20 Warming up and cooling down

All: To know the importance of a warm up and cool down

Most: To know the different stages of a warm up and cool down



Task : Create an exercise session for one of the below sports (15 minutes)

Swap your session with a partner – in a different coloured pen add anything you think is required to your partners session and evaluate it



**PLENARY
SESSION**



Using the task card you have been given you have 5 minutes to answer it

Your key phrase is:

The Exercise Session



Swap your whiteboard and task card with a partner – complete the task your partner has underneath their original response in a different coloured pen

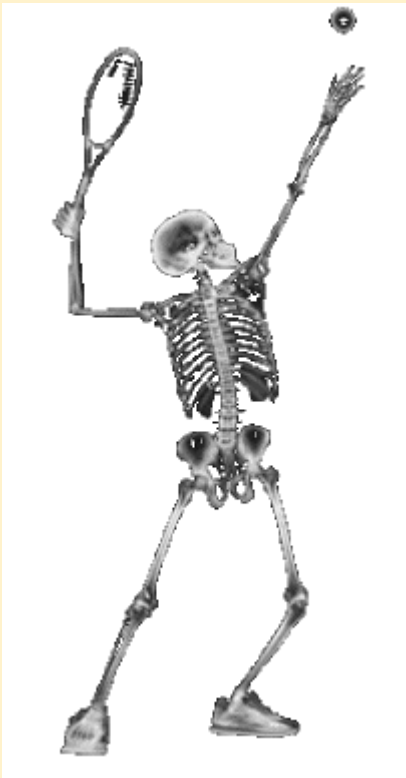
Learning Objectives

- All:** To know the importance of a warm up and cool down
- Most:** To know the different stages of a warm up and cool down
- Some:** To create a lesson plan with an effective and appropriate warm up and cool down

Chapter 1: Applied Anatomy and Physiology

- 1.1: The structure and functions of the Skeleton
- 1.2: The structure and function of the Muscular System
- 1.3: The structure and function of the Cardio-respiratory System
- 1.4: Aerobic and Anaerobic Exercise
- 1.5: The effects of exercise

1.1 The structure and functions of the skeleton – part 1



Learning Objectives

All:	To know the structure of the skeletal system
Most:	To understand the functions of the skeletal system
Some:	To understand the link between the skeletal and muscular systems

1.1 The structure and functions of the skeleton



In partners, write down
as many bones as you
know – 2 minutes

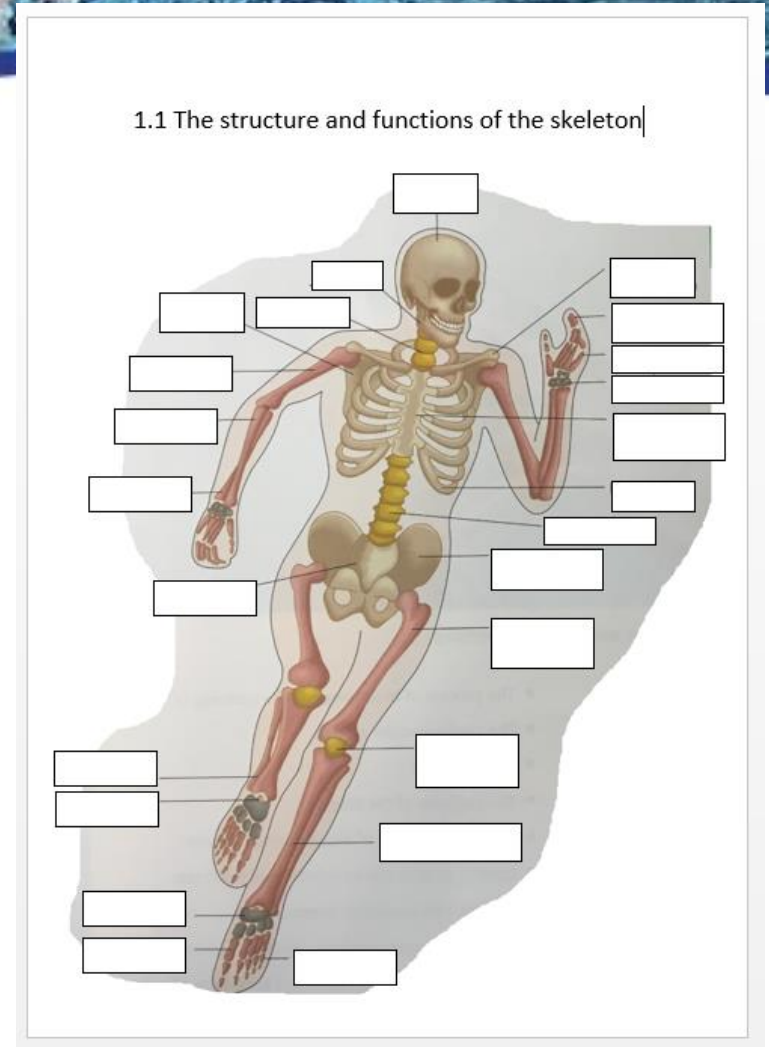




Watch the YouTube video and try to fill in the gaps on the skeleton worksheet (in pencil!!)

We will then go through the correct answers as a class (page 6)

<https://www.youtube.com/watch?v=uuWbqwQfLxQ>



Types of Bones

Flat Bones – are often quite large and usually protect vital organs

Long bones – enable gross (large) movements

Short bones – enable finer, controlled movements

Irregular bones – Specifically shaped to protect



On the bottom of your skeleton sheet create a 'key'

The skeleton is shaded in 4 different colours – these colours represent the 4 types of bones.... Which is which??

**Name the
bone! and
which type
of bone is
this?**



**Name the
bone! and
which type
of bone is
this?**



**Name the
bone! and
which type
of bone is
this?**



**Name the
bone! and
which type
of bone is
this?**





Articulating bones – bones that meet at a joint to enable movement

Joint	Articulating Bones
Shoulder	2 Scapula, humerus
Elbow	3 Humerus, radius, ulna
Hip	2 Pelvis and femur
Knee	3 Femur, tibia, patella
Ankle	3 tibia, fibula, talus

Functions of the Skeletal System

Support

- Bones are solid and rigid
- Keep us upright and gives structure
 - Keeps muscles and organs in place

Protection

- Protects organs
 - Eg, brain in cranium
 - Especially important in contact activities, eg, rugby

Movement

- Provides anchor points for muscles to pull against each other
 - Eg, long bones in arms

Shape and Structure

- Skeleton gives our shape and height
 - Taller people have long leg bones and bigger vertebrae

Blood Cell Production

- Inner marrow of long bones and ribs produces red and white blood cells.
 - Red BC help to carry oxygen
 - White BC help fight infections

Storage of Minerals

- Stores calcium, phosphorous
 - Can be released into the blood.

Musculoskeletal System

The skeletal system and muscular system are known together as the musculoskeletal system – they work together to allow movement, which occurs at the joints. One system cannot work without the other!



Some: To understand the link between the skeletal and muscular systems

PLENARY
SESSION

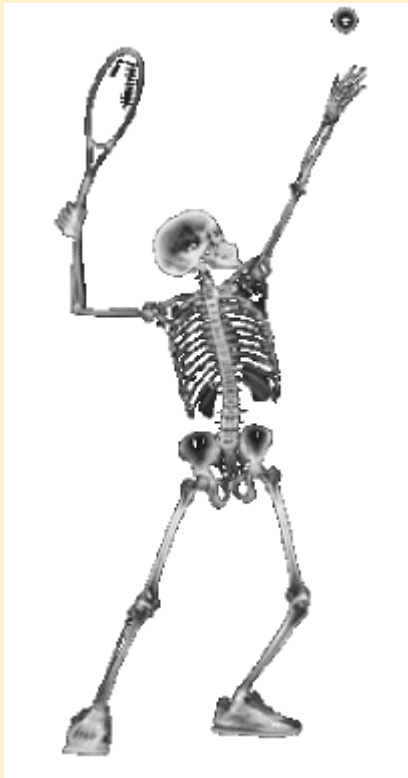
With a partner (use 1 of you as the model) using the post it notes can you correctly identify and locate the main bones of the body?



Learning Objectives

- All:** To know the structure of the skeletal system
- Most:** To understand the functions of the skeletal system
- Some:** To understand the link between the skeletal and muscular systems

1.1 The structure and functions of the skeleton - part 2



Learning Objectives

- | | |
|--------------|---|
| All: | To know the structure of synovial joints |
| Most: | To know the different types of synovial joints |
| Some: | To know where the different types of synovial joints are found in the skeleton |



What is the highest value word you can make from the scrabble card?

The word **MUST** be to do with the Skeletal System

SCRABBLE

Using the 'topic' on the board see if you can make 8 key words linked to the topic with the aim of getting the highest score in the class once you total up all 8 of your words!

Good Luck

A ₁	B ₃	C ₃	D ₂		
E ₁	F ₄	G ₂	H ₄	I ₁	J ₈
K ₅	L ₁	M ₃	N ₁	O ₁	P ₃
Q ₁₀	R ₁	S ₁	T ₁	U ₁	V ₄
W ₄	X ₈	Y ₄	Z ₁₀		

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Scrabble Challenge:

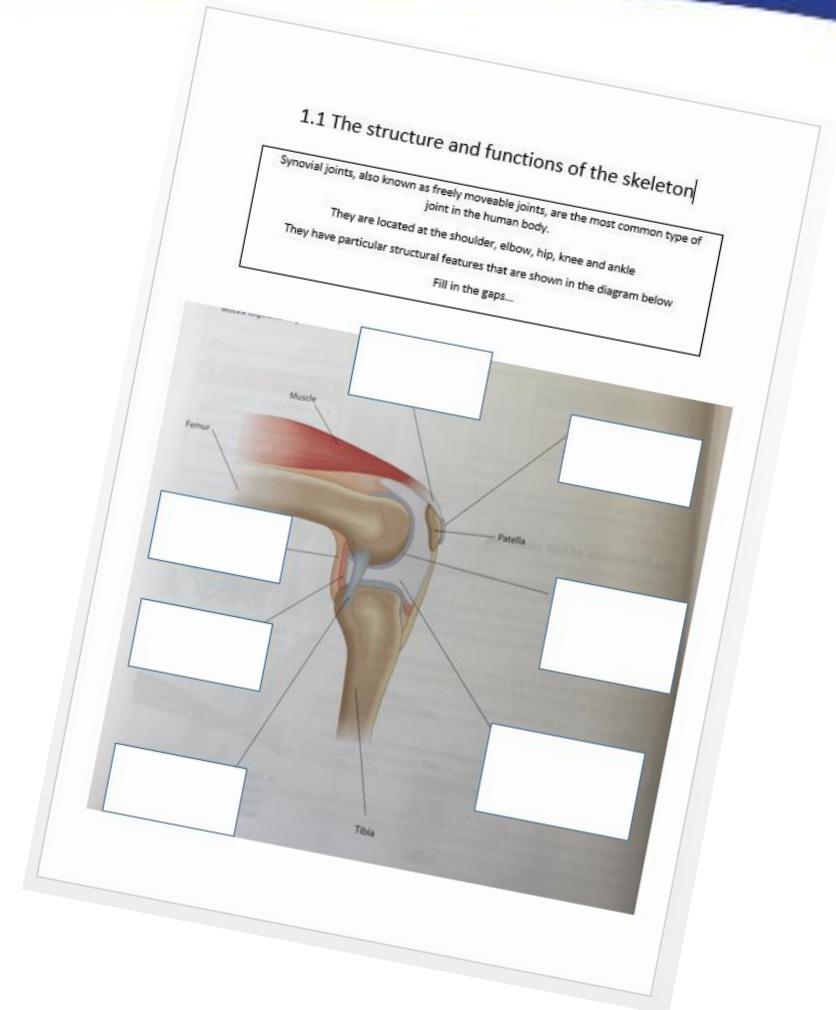
Key Word:	Score:
1.....	<input type="text"/>
2.....	<input type="text"/>
3.....	<input type="text"/>
4.....	<input type="text"/>
5.....	<input type="text"/>
6.....	<input type="text"/>
7.....	<input type="text"/>
8.....	<input type="text"/>

Use this space to work out your score:

T O T A L



Using page 8, fill in the gaps on your Synovial Joint Structure worksheet





Types of Synovial Joint

Ball and Socket Joint

- Can move away from the body
- Can move back towards the body
 - Can rotate
- Most moveable joint in the body

Hinge Joint

- Can move only in one direction
- Can move back toward and away from each other
 - Like a hinge on a door

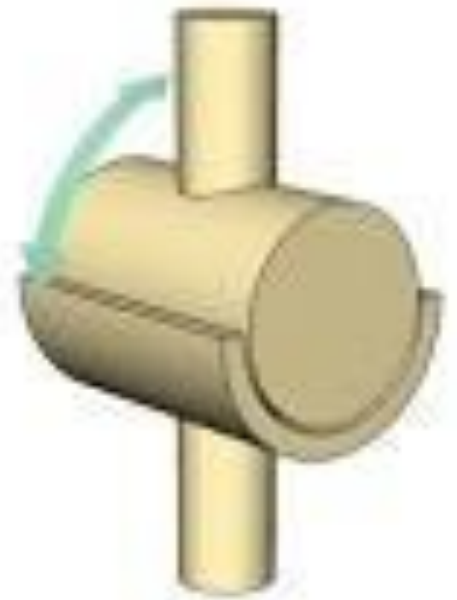
Ball and Socket Joint

- Has the greatest range of motion
- Can move forward and backwards, side to side and rotate around axis
- The excess range of movement increases the likelihood of dislocation



Hinge Joint

- Knee joint – formed between 2 bones, femur and tibia. The patella lies at the front of the knee and is not part of the joint.
- Meniscus – rubbery cartilage between the femur and tibia – acts as a shock absorber for running and jumping
- 2 ligaments in the knee to hold bones in the right place – anterior and posterior cruciate ligaments



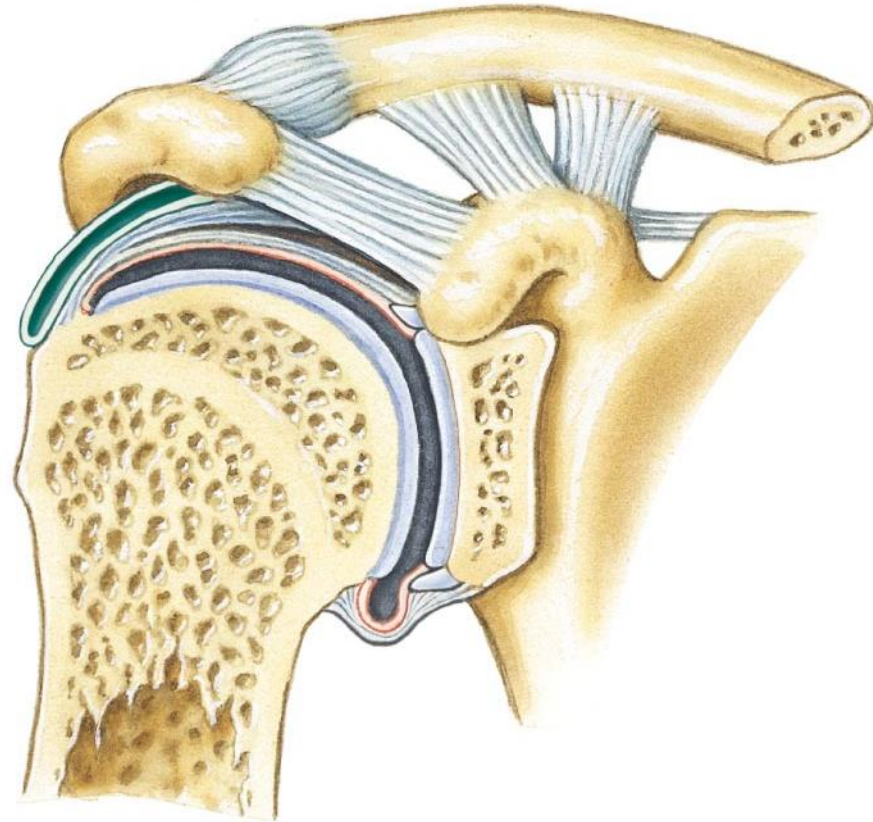
**Name the
joint! and
which type
of joint is
this?**



**Name the
joint! and
which type
of joint is
this?**



**Name the
joint! and
which type
of joint is
this?**



**Name the
joint! and
which type
of joint is
this?**



**Name the
joint! and
which type
of joint is
this?**



- Ligaments surrounds joints to help maintain stability – it allow movement but resists dislocation of the bones.
- Synovial fluid – a viscous fluid in joints to reduce friction against cartilage
- Synovial membrane – helps maintain the synovial fluid
- A joint capsule is a piece of tissue that surrounds a synovial joint, helps hold the synovial fluid and joint in place

PLENARY
SESSION



What is the highest
value word you can
make from the
scrabble card?

The word MUST
NOW be to do with
the Joints

SCRABBLE

Using the 'topic' on the board see if you can make 8 key words linked to the topic with the aim of getting the highest score in the class once you total up all 8 of your words!

Good Luck

A ₁	B ₃	C ₃	D ₂		
E ₁	F ₄	G ₂	H ₄	I ₁	J ₈
K ₅	L ₁	M ₃	N ₁	O ₁	P ₃
Q ₁₀	R ₁	S ₁	T ₁	U ₁	V ₄
W ₄	X ₈	Y ₄	Z ₁₀		

Scrabble Challenge:

Key Word: _____ Score: _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

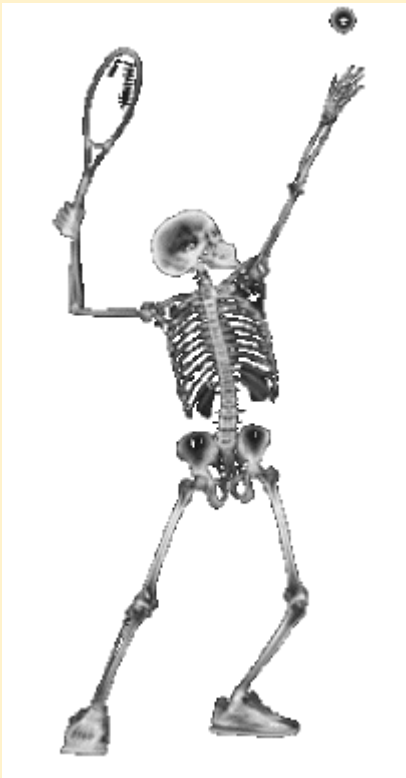
Use this space to work out your score:

T O T A L

Learning Objectives

- All:** To know the structure of synovial joints
- Most:** To know the different types of synovial joints
- Some:** To know the different types of synovial joints are found in the skeleton

1.1 The structure and functions of the skeleton – part 3



Learning Objectives

- | | |
|--------------|--|
| All: | To identify the different types of movement |
| Most: | To explain the different types of movement |
| Some: | To give a sport example for each type of movement |



BONE BINGO

Cranium	Clavicle	Scapula	Radius	Ulna	Vertebrae	Sacrum	Fibula
Talus	Tarsals	Metatarsals	Phalanges	Tibia	Patella	Femur	Pelvis
Ribs	Sternum	Carpals	Metacarpals	Long Bones	Short Bones	Flat Bones	Irregular Bones
Articulating Bones	Support	Protection	Movement	Shape & Structure	Blood cell production	Storage of minerals	Synovial joints
Ball and Socket	Hinge	Humerus	Flexion	Extension	Plantar Flexion	Dorsiflexion	Rotation
Adduction	Abduction	Shoulder	Elbow	Hip	Knee	Ankle	Musculoskeletal

1.1 The structure and functions of the skeleton

All: To identify the different types of movement

A photograph of a swimmer in a pool, wearing a blue swim cap and goggles, with water splashing around their head.

7 Types of Joint Movement

Flexion

Extension

Plantar Flexion

Dorsiflexion

Rotation

Adduction

Abduction

KEYWORDS

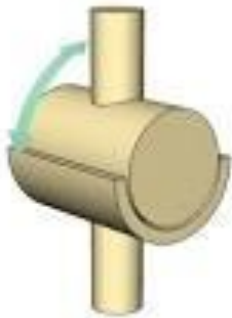


FLEXION



Movement where angles
between bones reduces

Hinge Joint



KEYWORDS

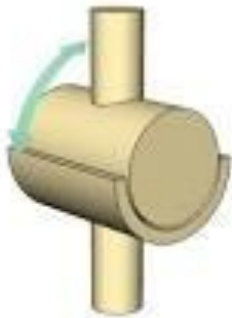


EXTENSION



Movement where the angle between bones increases

Hinge Joint



KEYWORDS



ABDUCTION →

Movement where limbs
are moved away from the
body

Ball and Socket Joint



KEYWORDS



ADDUCTION →

Movement where limbs are moved back towards the body

Ball and Socket Joint



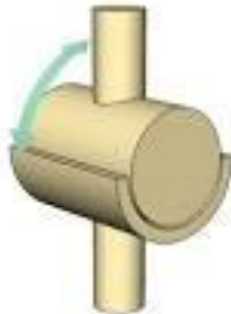
KEYWORDS



PLANTAR FLEXION



Hinge Joint



Movement at the ankle
where the toes are pointed
towards the ground

KEYWORDS



ROTATION



Turning a limb along its long axis

Ball and Socket Joint



KEYWORDS

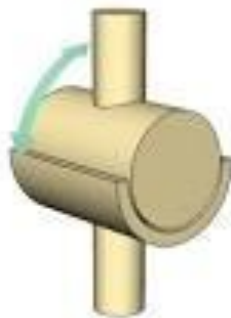


DORSI- FLEXION

Hinge Joint



Movement at the ankle
where the toes are pulled
up towards the knee





Complete the worksheet to
find sport examples of the
joint movement types

CHALLENGE: Can you think of
times in your sport where
these movements take place?



**PLENARY
SESSION**

In pairs, can you get your partner to perform a movement/position by using only the correct terminology from today's lesson

E.g. I would like you to cause flexion of the knees and then extension of the knees

This will result in the performer to complete a jumping action

CHALLENGE : CAN YOU GET YOUR PARTNER TO PERFORM A WHOLE SKILL RATHER THAN PART OF A SKILL I.E. TRIPLE JUMP!?

Learning Objectives

- All:** To identify the different types of movement
- Most:** To give two different types of movement
- Some:** To give an example for each type of movement



1.2 The structure and functions of the muscular system



Learning Objectives

All:	To identify the main muscles of the body
Most:	To know which and how muscles cause joint movement
Some:	To understand the two different types of muscle contractions



Stating one bone per post it note, can you try and fill your whole table with post it notes and correctly named bones with a partner?

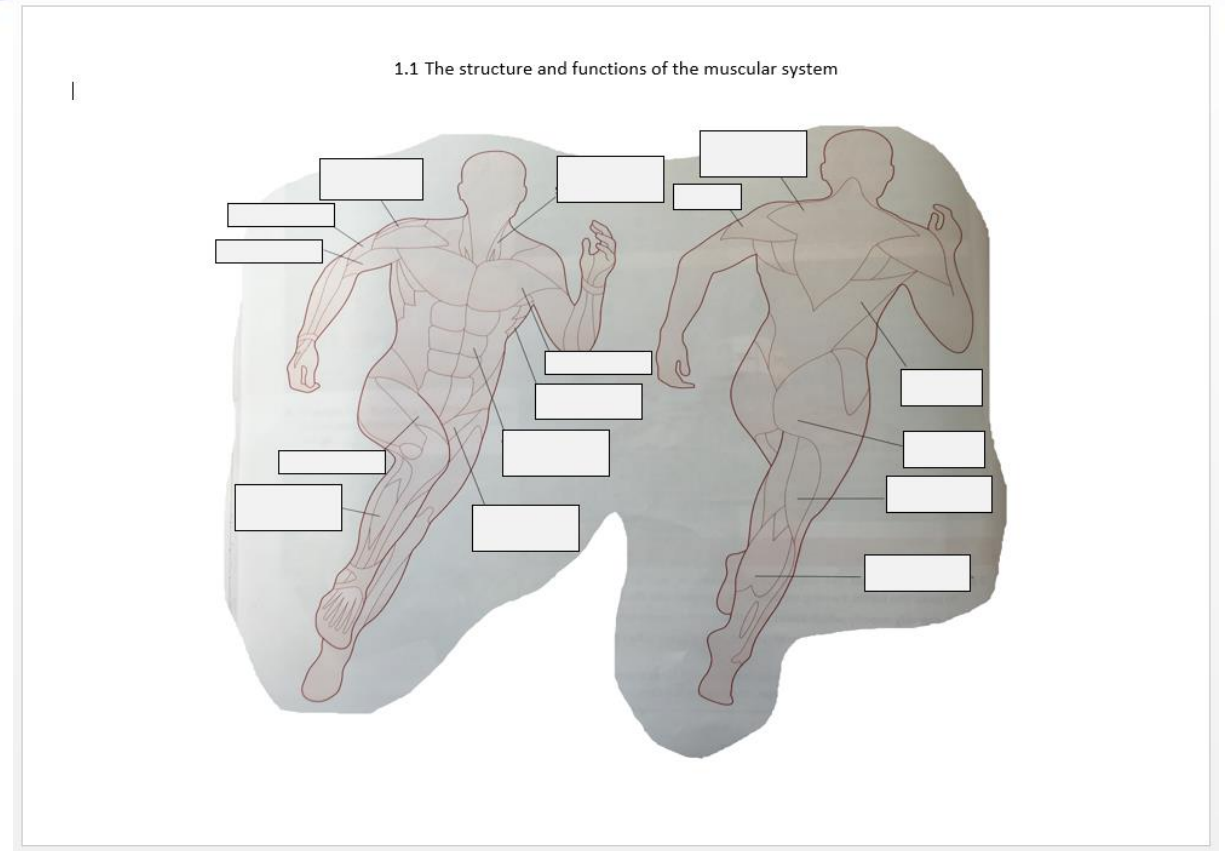




Watch the YouTube video and try to fill in the gaps on the skeleton worksheet (in pencil!!!)

We will then go through the correct answers as a class (page 12)

<https://www.youtube.com/watch?v=s-uXNgpcakU>



1.2 The structure and function of the muscular system

All: To identify the main muscles of the body

Bones!



The major muscle groups that operate at the joints

Joint	
Shoulder	*****
Elbow	**
Hip	**
Knee	**
Ankle	**

The knee

- Synovial fluid – Is a fluid inside the joint that keeps it lubricated
- Bursae – sacs of fluid that reduction friction in a joint
- Tendons – connective tissue that attach muscles bones
- Ligaments – Tissues that connect bone to bone
- Capsule - is an envelope surrounding a synovial **joint**
- Meniscus – Cartilage that acts as a shock absorber between the tibia and femur
- Cruciate ligaments – attach the tibia and femur in the knee joint



- Recap on the bones in the body – in the same groups as last time can you name more bones as last time?
- Write them down in your books first

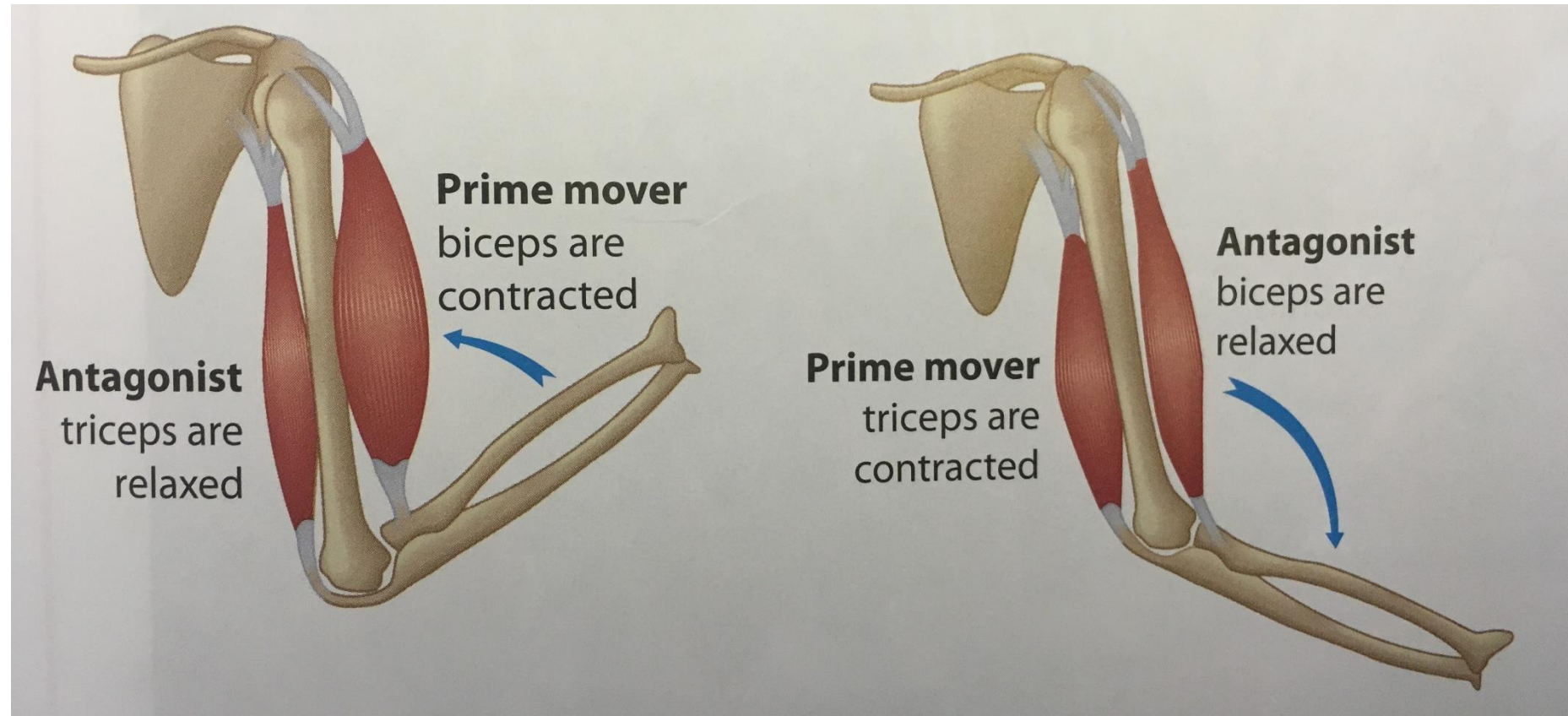
Muscles can only **pull**, not push. They are therefore arranged in **pairs** on either side of joints.

One muscle contracts and pulls while the other relaxes, and vice versa.

The muscle that contracts is the **prime mover/agonist**

The muscle that relaxes is called the **antagonist**

This is why we say that muscles work in **ANTAGONISTIC PAIRS**





Can you think of muscles that make up obvious antagonistic pairs?
What joint movement do these antagonistic pairs create?

EXAMPLE:

The biceps and triceps act at the elbow to create flexion and extension. During a bicep curl the bicep is the agonist and the tricep is the antagonist.



- During a penalty kick in football
- During the downwards phase of a squat
- During the upwards phase of a squat
- When a gymnast points their toes

Think about the
joint movement



Muscles Contract in two different ways:

ISOTONIC CONTRACTION

- Where the muscle changes length as it contracts causing movement

THERE ARE TWO TYPES OF **ISOTONIC** CONTRACTION!!

Concentric

- The muscle shortens during contraction

Eccentric

- The muscle lengthens during contraction

ISOMETRIC CONTRACTION

- Muscular contractions where the muscle stays the same length

THERE IS ONLY ONE
TYPE OF **ISOMETRIC**
CONTRACTION!!!

CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION?
ISOMETRIC CONTRACTION?

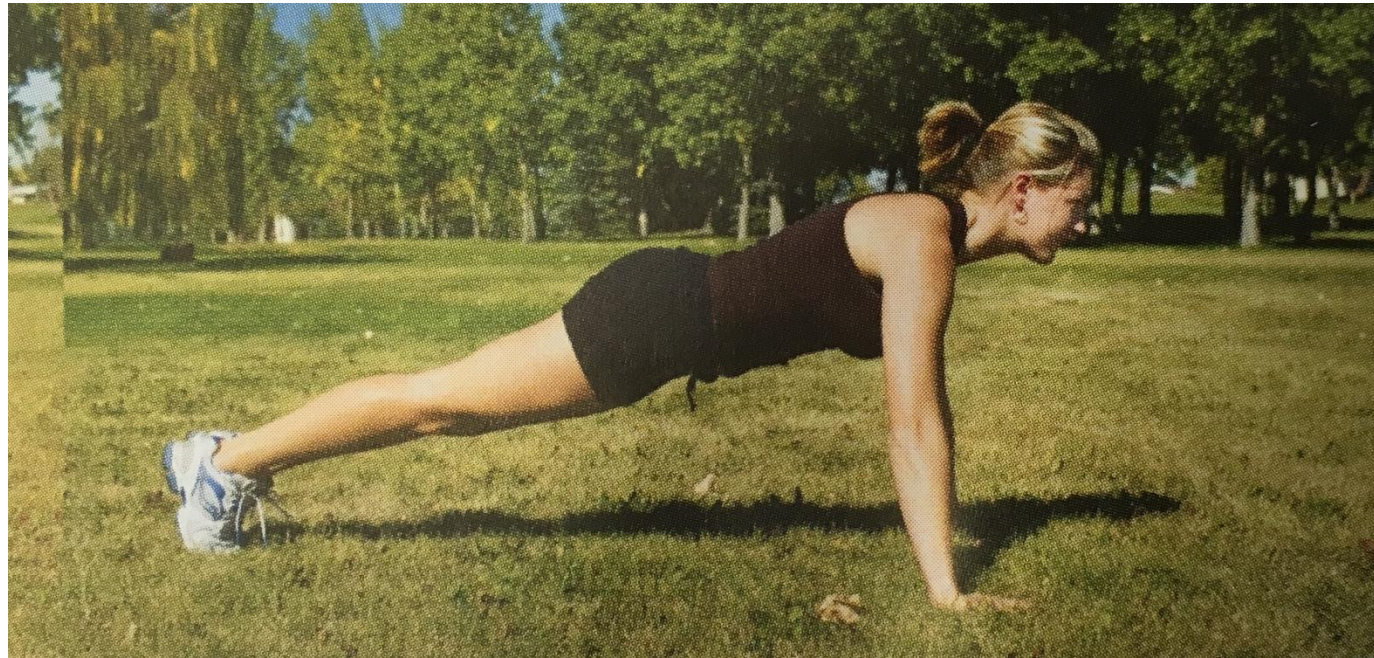


1.2 The structure and function of the muscular system

Some: To understand the two different types of muscle contractions

CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION?
ISOMETRIC CONTRACTION?

Front
support?

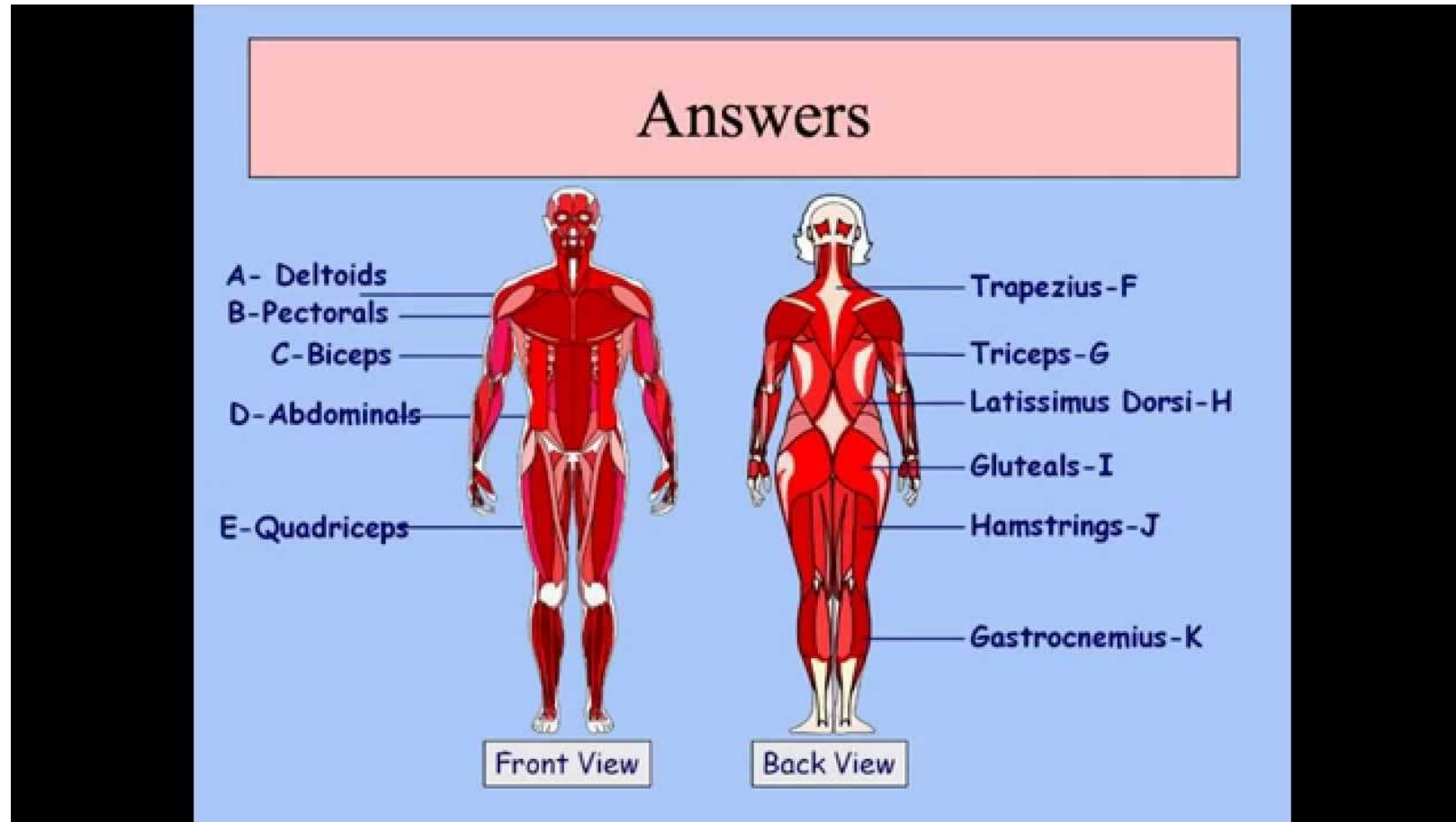


CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION?
ISOMETRIC CONTRACTION?

The
downwards
phase of a
press up?



Muscles + spellings



PLENARY
SESSION



Muscles on sticky notes

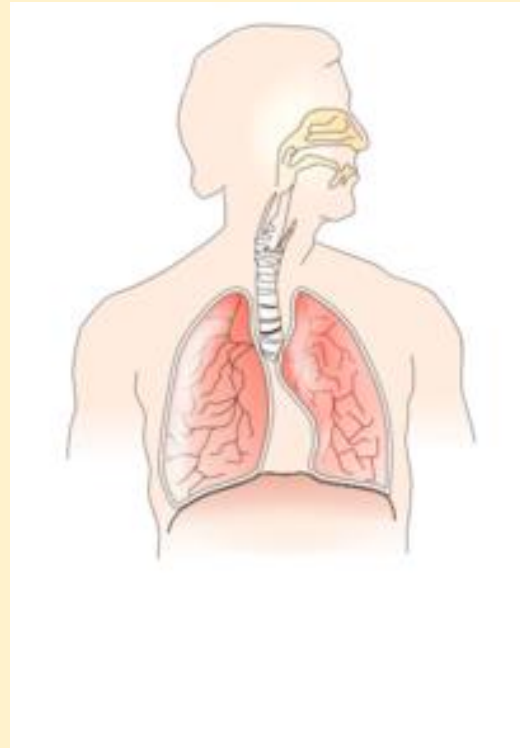
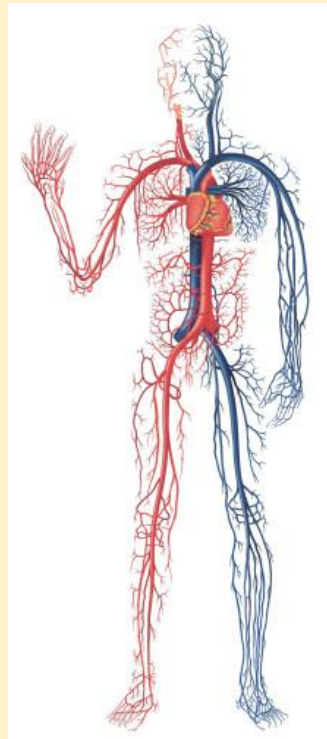
1.2 The structure and function of the muscular system

All: To identify the main muscles of the body

Learning Objectives

- All:** To identify the main muscles of the body
- Most:** To know which muscles cause joint movement
- Some:** To understand the two different types of muscle contraction

1.3 The structure and function of the cardio-respiratory system (part 1)



Learning Objectives

- All:** To understand what the cardio-respiratory system is
- Most:** To know the structure of the respiratory system
- Some:** To know the pathway air takes through the respiratory system

Relationship between the respiratory system and the cardiovascular system

https://www.youtube.com/watch?v=oE8tGkP5_tc

1.3 The structure and function of the cardio-respiratory system

The 5 W's



Lesson focus = The respiratory system



Create a question that you would like to know about the lesson focus using

Who, What, Why, Where and When?

https://www.youtube.com/watch?v=oE8tGkP5_tc

The cardio-respiratory system is made up of the circulatory system (Blood vessels , heart and blood) and the respiratory system (Airways and lungs).

Its main function is to enable the body to Breathe, pumping blood and Oxygen around the body.

During physical activity, the system works Harder to supply blood and oxygen to the muscles .

Oxygen
Blood
Heart
Breathe
Oxygen
Airways
Blood vessels
Blood
Harder
Muscles
Lungs

EXTENSION

In detail what demand will exercise have on each of the systems? Link it to a chosen sport

All: To understand what the cardio-respiratory system is

Upper Respiratory Tract

Nasal cavity

Nostrils

Oral cavity

Pharynx

Larynx

Lower Respiratory Tract

Trachea (Windpipe)

Right primary bronchus

Left primary bronchus

Alveoli

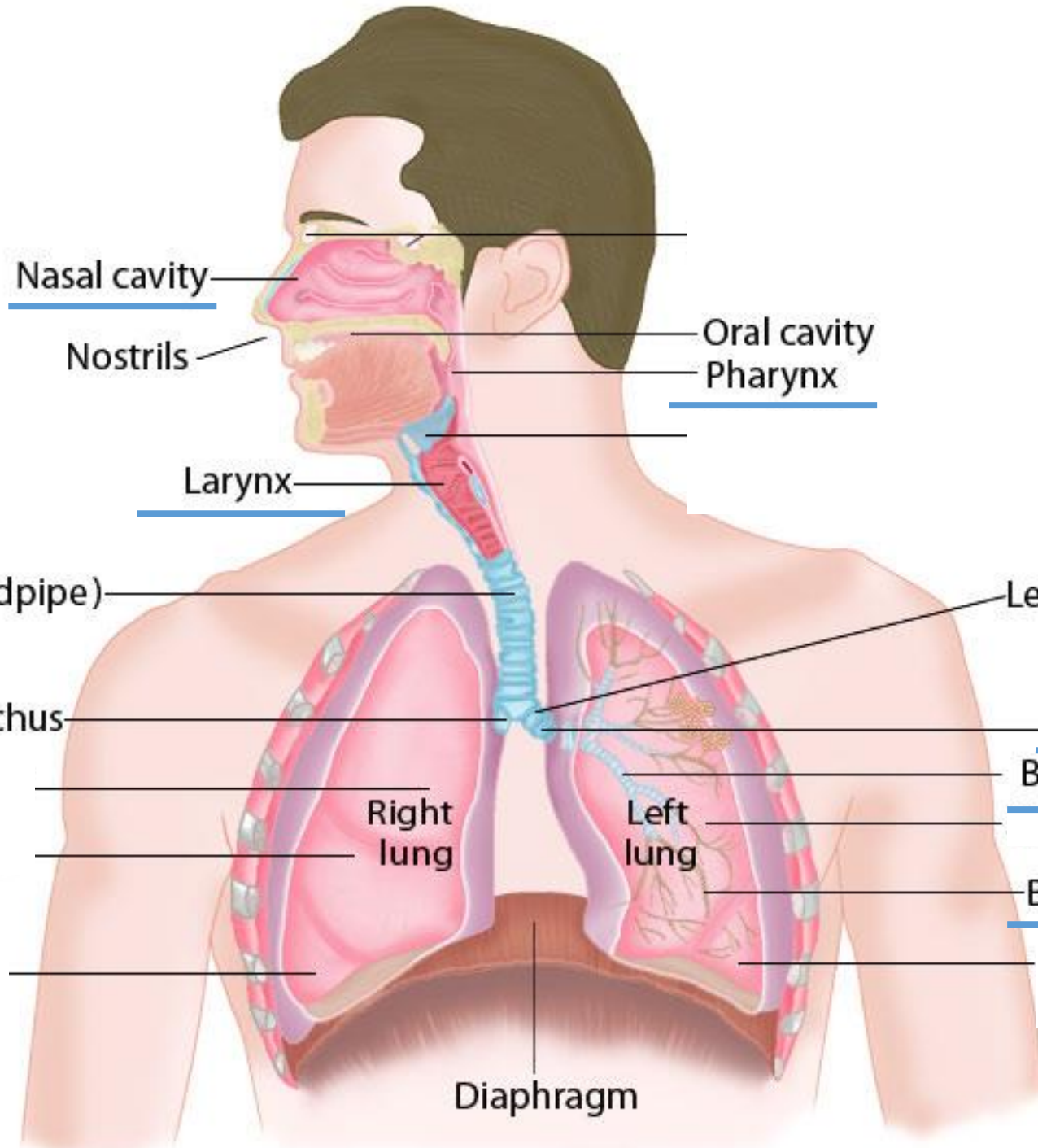
Bronchi

Right lung

Left lung

Bronchioles

Diaphragm



Task :



Using the clues/definition of each separate structure of the respiratory system – can you correctly locate where each one is?

EXTENSION:

Explain the function of the respiratory system? Why is it important in a chosen sport?



Using the information from the lesson and worksheet, can you create a story telling us the pathway air takes through the respiratory system?

This either needs to be in the form of a paragraph or a very neat/detailed flow diagram, adding as much detail as possible!

Story Time – The Journey of Air

Mouth	My
Trachea	Tiny
Bronchus	Brother
Lungs	Likes
Bronchioles	Being
Alveoli	Annoying



Time to test each other!!

Come up with some questions to do with the theory we have covered today

- Different types of questions (long/medium/short answer)
- Different difficulty of questions (easy/medium/hard)
- **MAKE SURE YOU KNOW THE ANSWERS TO THESE QUESTIONS!!**
- At the end of the lesson we are going to ask each other as many as possible

PLENARY
SESSION



Remember this?

Can you now
answer the
questions you
created based on
your learning from
the lesson?

The 5 W's

Lesson focus = The respiratory
system

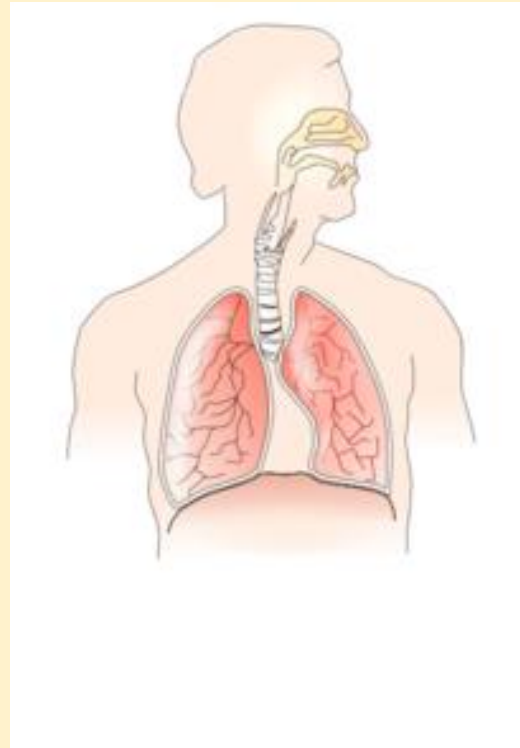
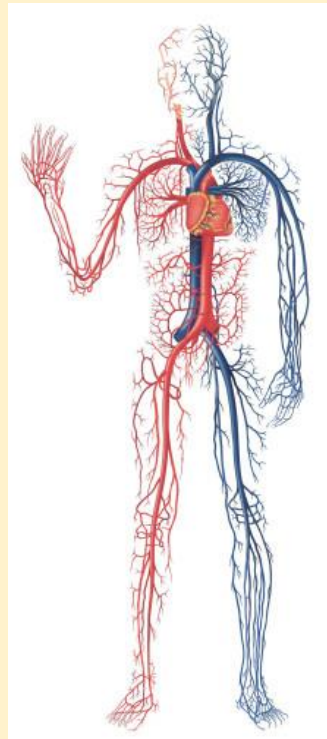
Create a question that you would
like to know about the lesson focus
using

**Who, What, Why, Where and
When?**

Learning Objectives


- All:** To understand how the cardio-respiratory system is
- Most:** To know the structure of the respiratory system
- Some:** To know how air takes through the respiratory system

1.3 The structure and function of the cardio-respiratory system (part 2)



Learning Objectives

- All:** To know what Gaseous Exchange is
- Most:** To know the keywords/definitions of the components which make up Gaseous Exchange
- Some:** To explain the process of Gaseous Exchange

A swimmer in a pool, wearing a blue swim cap and goggles, is shown from the chest up, splashing water.

If this is the answer, what is the question?

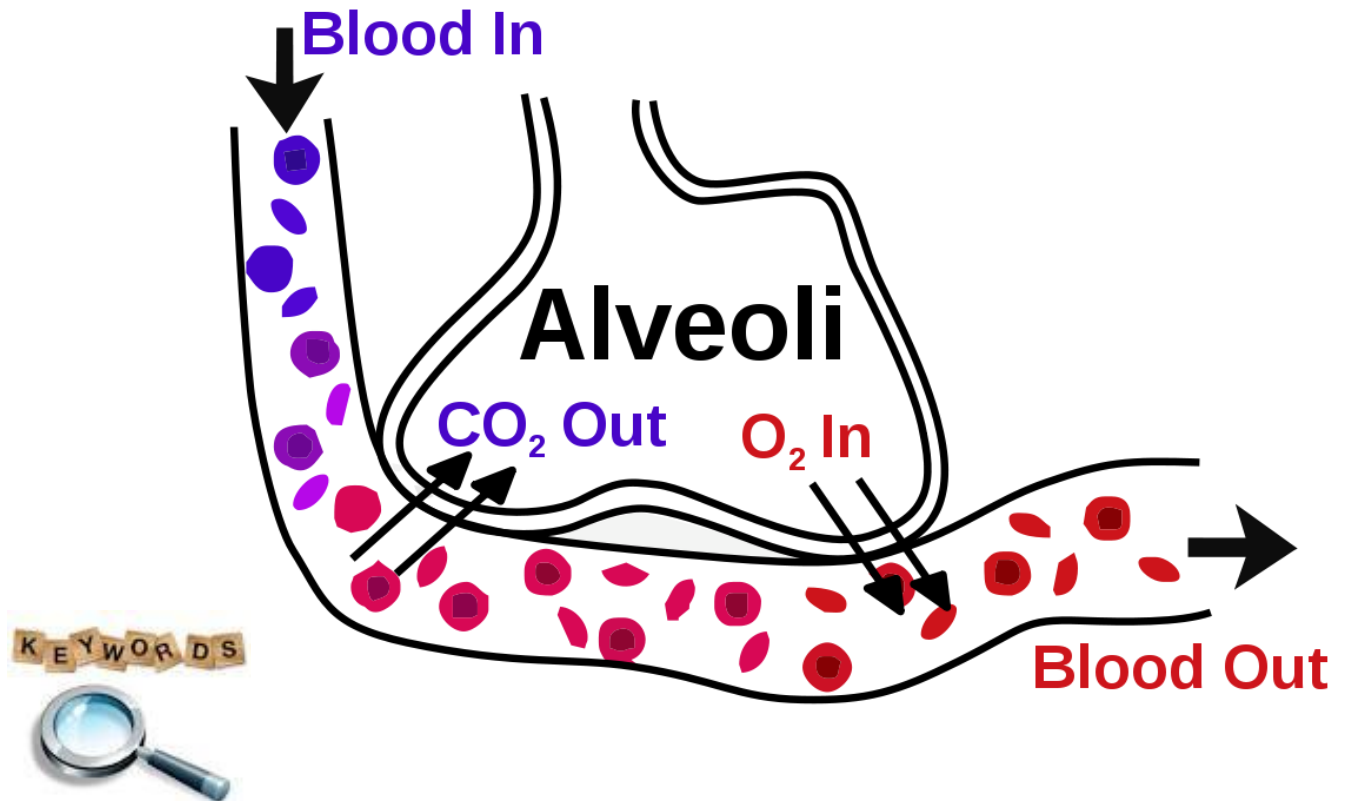


The process where oxygen from the air in the alveoli moves into the blood in the capillaries, while carbon dioxide moves from the blood in the capillaries into the air in the alveoli

Gaseous Exchange

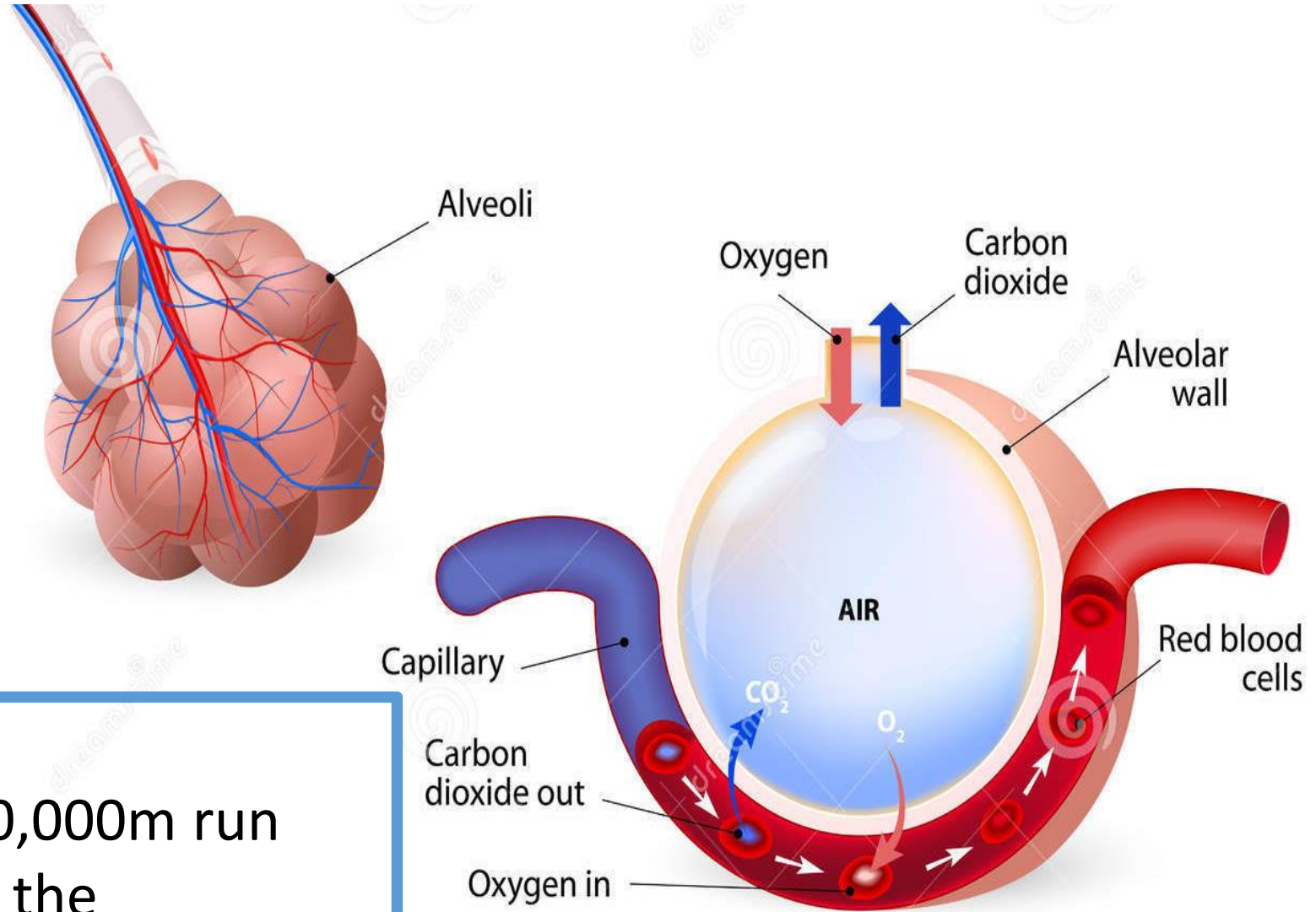
=

The process where oxygen from the air in the alveoli moves into the blood in the capillaries, while carbon dioxide moves from the blood in the capillaries into the air in the alveoli



Gaseous exchange

- Diffusion – gases move from a high to low concentration
- Capillaries are all around the alveoli
- It is a passive process (we don't have to think about doing it)



Apply your knowledge

Mo Farah is competing in a 10,000m run what effect does this have on the concentration gradient between the alveoli and capillaries? Explain why.

The 4 factors that help diffusion (adaptations of alveoli)

- Alveoli are small but there are lots of them and therefore have a large **surface area** – lots of gaseous exchange can happen at once!
- There is a short distance between the alveoli and capillaries – **short diffusion pathway**
- The surface of the alveoli and capillaries have **thin walls** that are only 1 cell thick and moist that helps diffusion.
- Rich supply of blood around the alveoli – **lots of capillaries**

Gas	% of inhaled air	% of exhaled air
Oxygen	21	16
Carbon dioxide	0.04	4
Nitrogen	79	79

http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/transport_systems/blood/revision/1/

- Haemoglobin – the red pigment in red blood cells
- Oxyhaemoglobin – forms when oxygen combines with haemoglobin



Alveoli

Capillaries



Haemoglobin

Oxyhaemoglobin

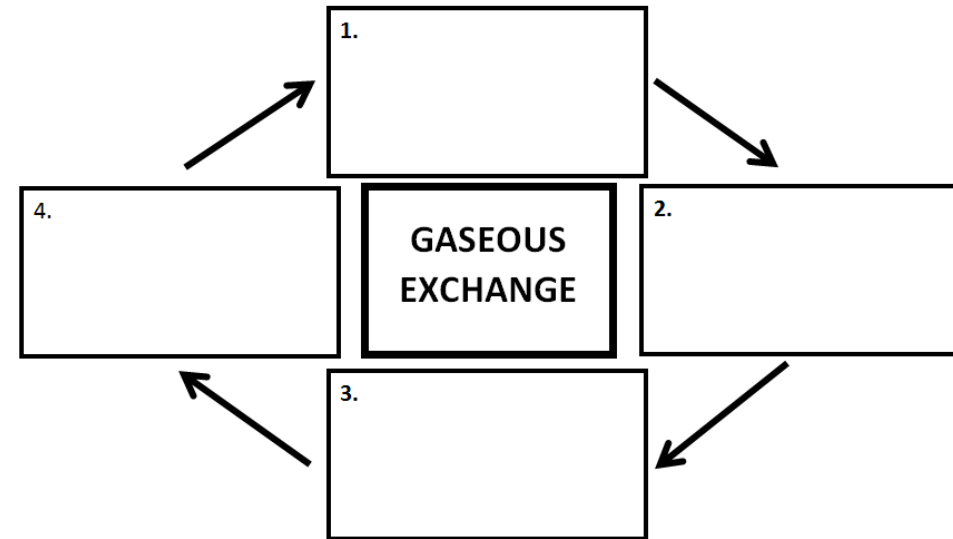
Diffusion pathway



Using the 'Gaseous Exchange Worksheet' and page 16 in the text book, fill in the gaps with the process of gaseous exchange

Extension: Make notes from page 16.

1.3 The structure and function of the cardio-respiratory system

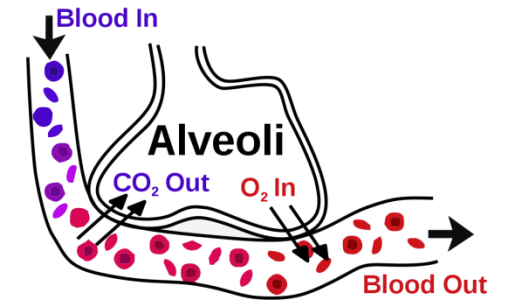


Some: To explain the process of Gaseous Exchange

PLENARY
SESSION

1. What are the main two gases being exchanged between the lungs and the circulatory system?

Flip card >



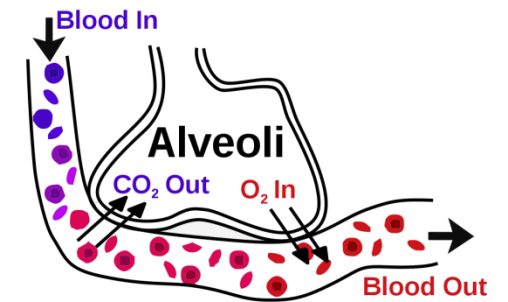
Most: To know the keywords/definitions of the components which make up Gaseous Exchange

1.3 The structure and function of the cardio-respiratory system

PLENARY
SESSION

2. Explain diffusion

Flip Card ➤



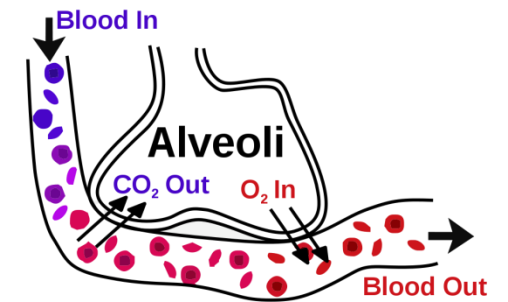
Most: To know the keywords/definitions of the components which make up Gaseous Exchange

1.3 The structure and function of the cardio-respiratory system

PLENARY
SESSION

3. Which feature do both alveoli and capillaries share which aids gas exchange?

Flip Card ➤

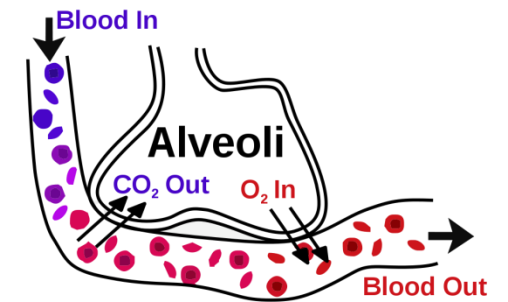


Most: To know the keywords/definitions of the components which make up Gaseous Exchange

PLENARY
SESSION

4. Why does carbon dioxide pass out of the blood supply when it reaches the alveoli?

Flip Card >

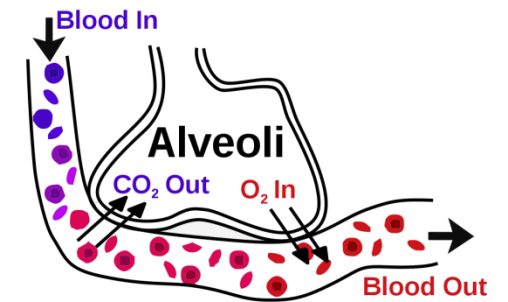


**Some: To explain the process of
Gaseous Exchange**

PLENARY
SESSION

5. How much oxygen is in the air we breathe in and the air we breathe out?

Flip Card >

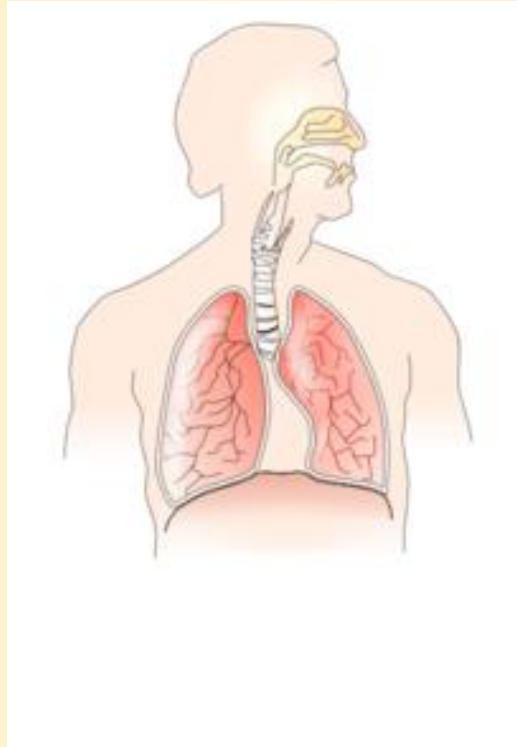
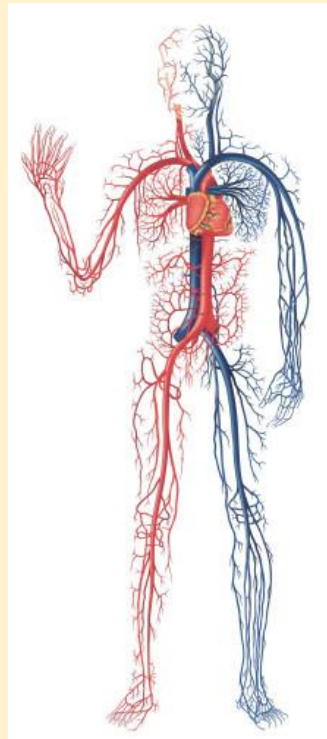


**Some: To explain the process of
Gaseous Exchange**

Learning Objectives

- All:** To know what Gaseous Exchange is
- Most:** To know the key words/definitions of the components which make up Gaseous Exchange
- Some:** To explain the process of Gaseous Exchange

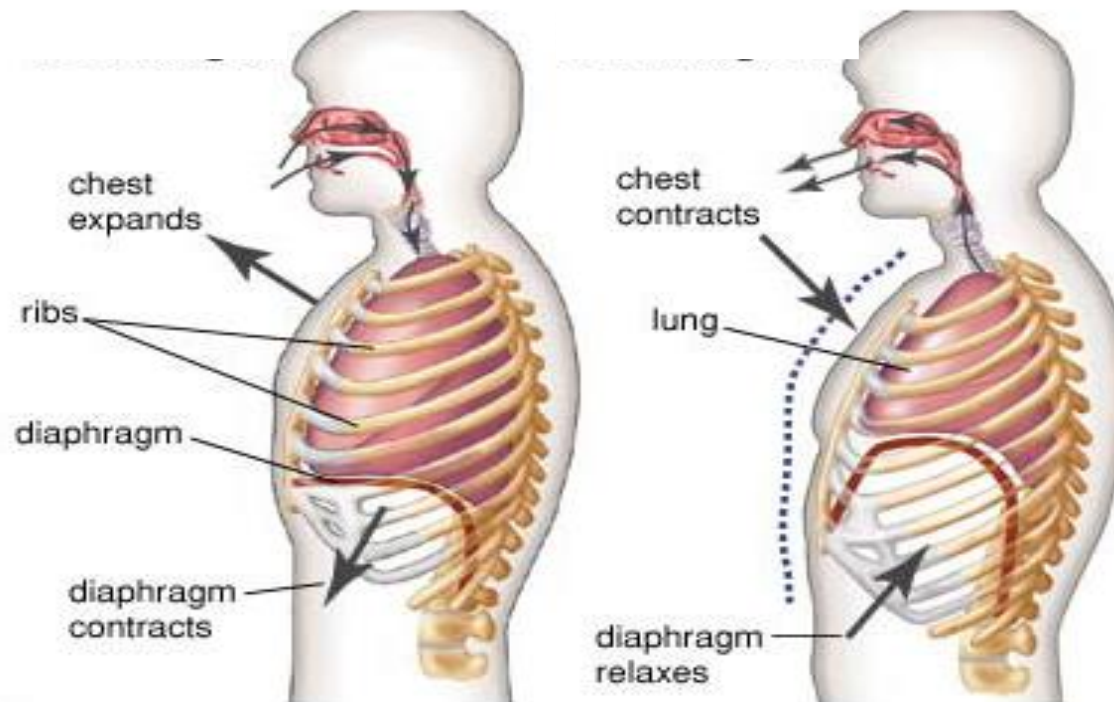
1.3 The structure and function of the cardio-respiratory system (part 3)



Learning Objectives

- | | |
|--------------|--|
| All: | To know the definitions of inspiration and expiration |
| Most: | To understand the mechanics of breathing |
| Some: | To understand the spirometer trace |

What does this picture represent?



1.3 The structure and function of the cardio-respiratory system

**All: To know the definitions of
inspiration and expiration**

KEYWORDS



Jumbles

Can you unjumble the sentences?

Inhalation/Inspiration - Breathing the in of process

Exhalation/Expiration - Process out the breathing of



Make
notes
from
page 12

Write notes here:



Spirometer Trace Bingo!



You will be given one definition to write in on your bingo cards next to whichever key word it relates to

You then need to walk around the room to find out the other definitions on your bingo card

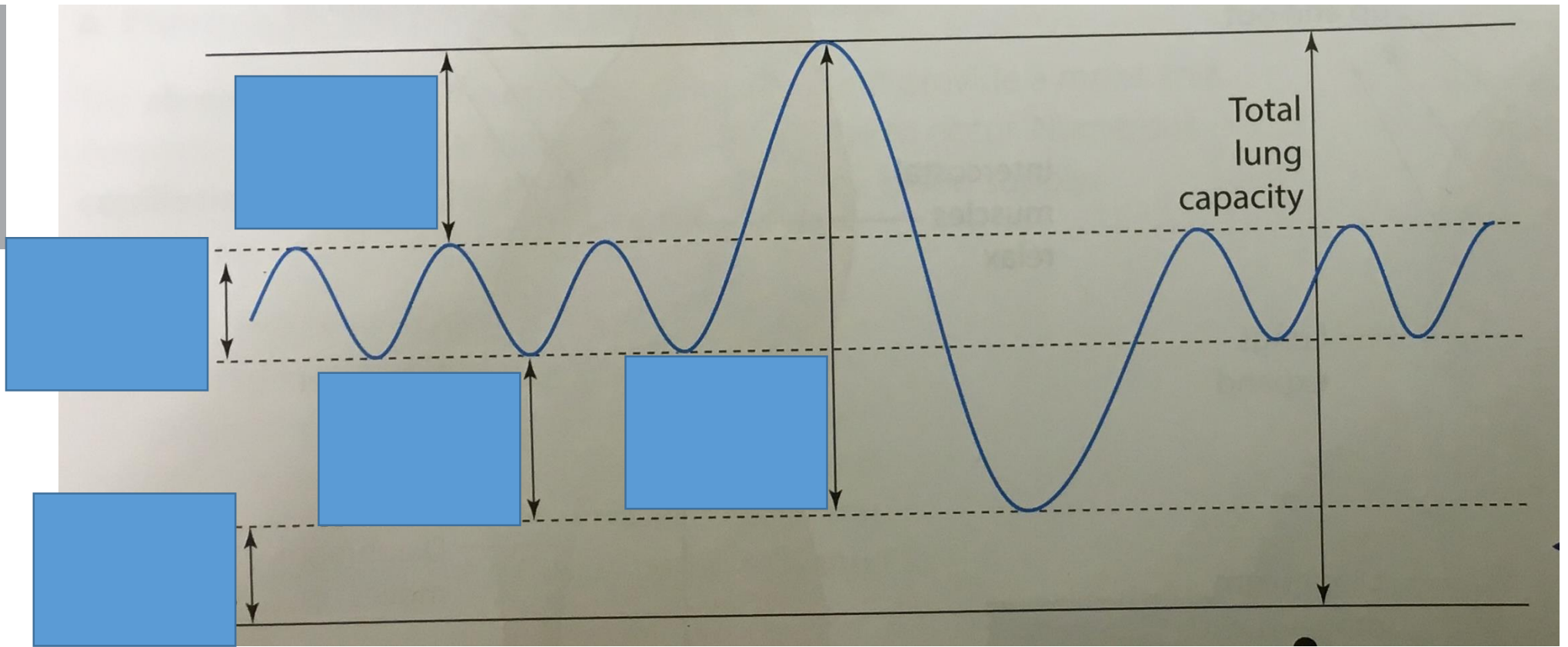


Once you have them all written in – call BINGO!

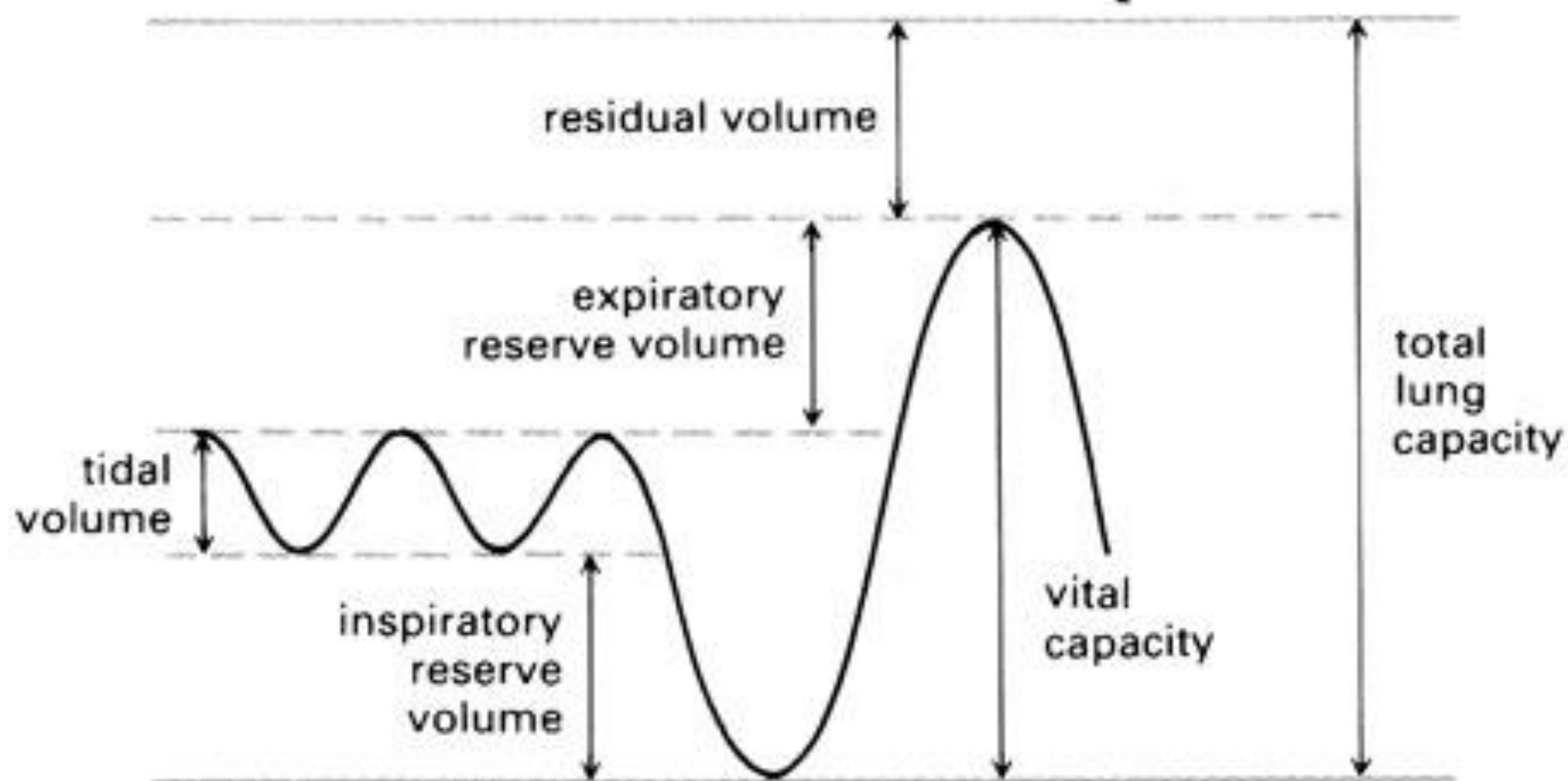


PLENARY
SESSION

Fill in the
blanks
using
your
keywords
from the
lesson!



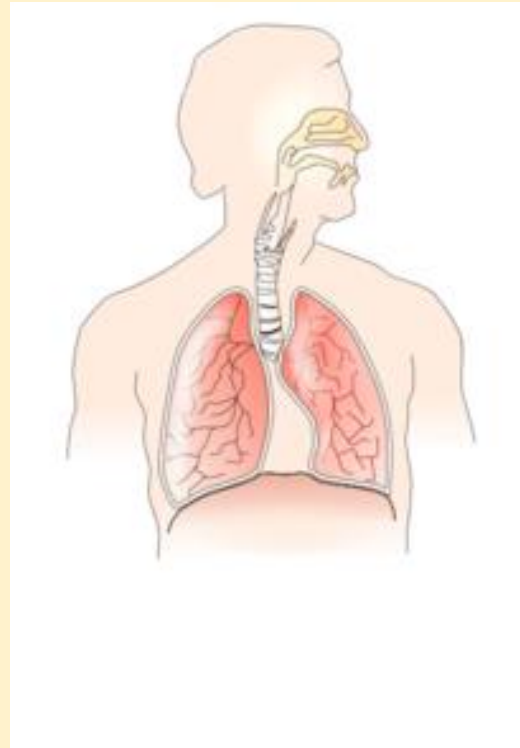
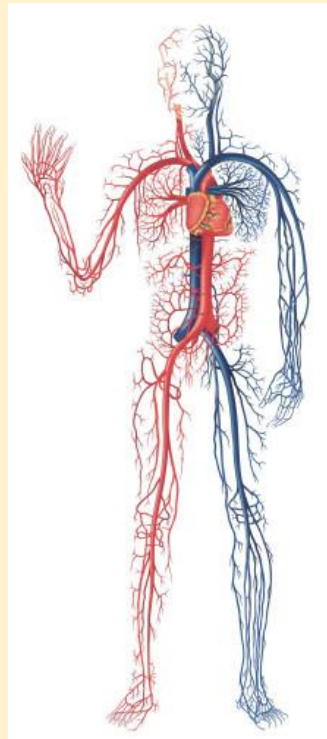
Some: To understand the
spirometer trace



Learning Objectives

- All:** To know the descriptions of inspiration and expiration
- Most:** To understand the mechanics of breathing
- Some:** To understand the spirometer trace

1.3 The structure and function of the cardio-respiratory system (part 4)



Learning Objectives

- All:** To identify the structures of the heart
- Most:** To understand the terms deoxygenated blood and oxygenated blood
- Some:** To understand the pathway blood takes



Give me 10 key words that relate to.....



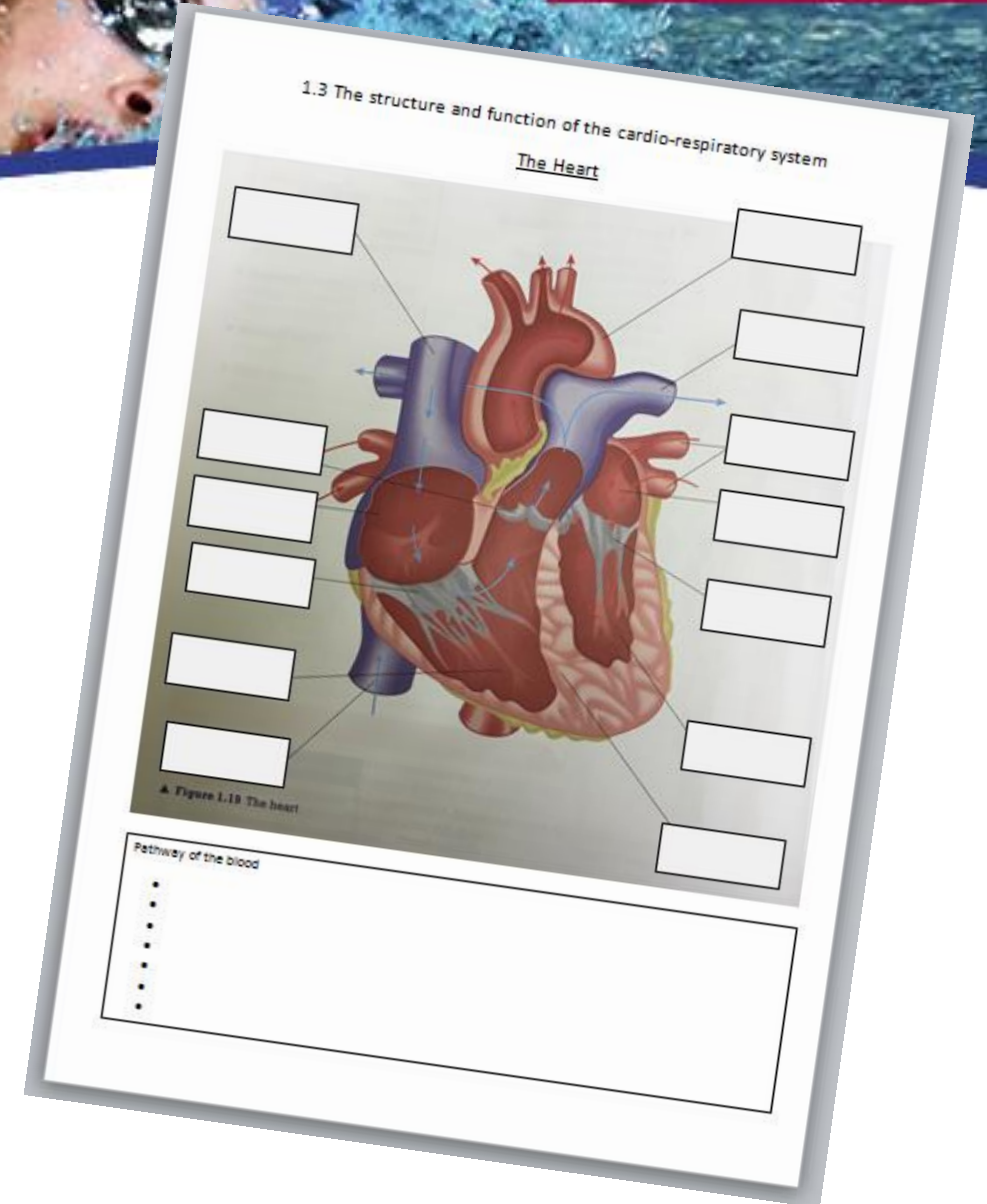
THE HEART



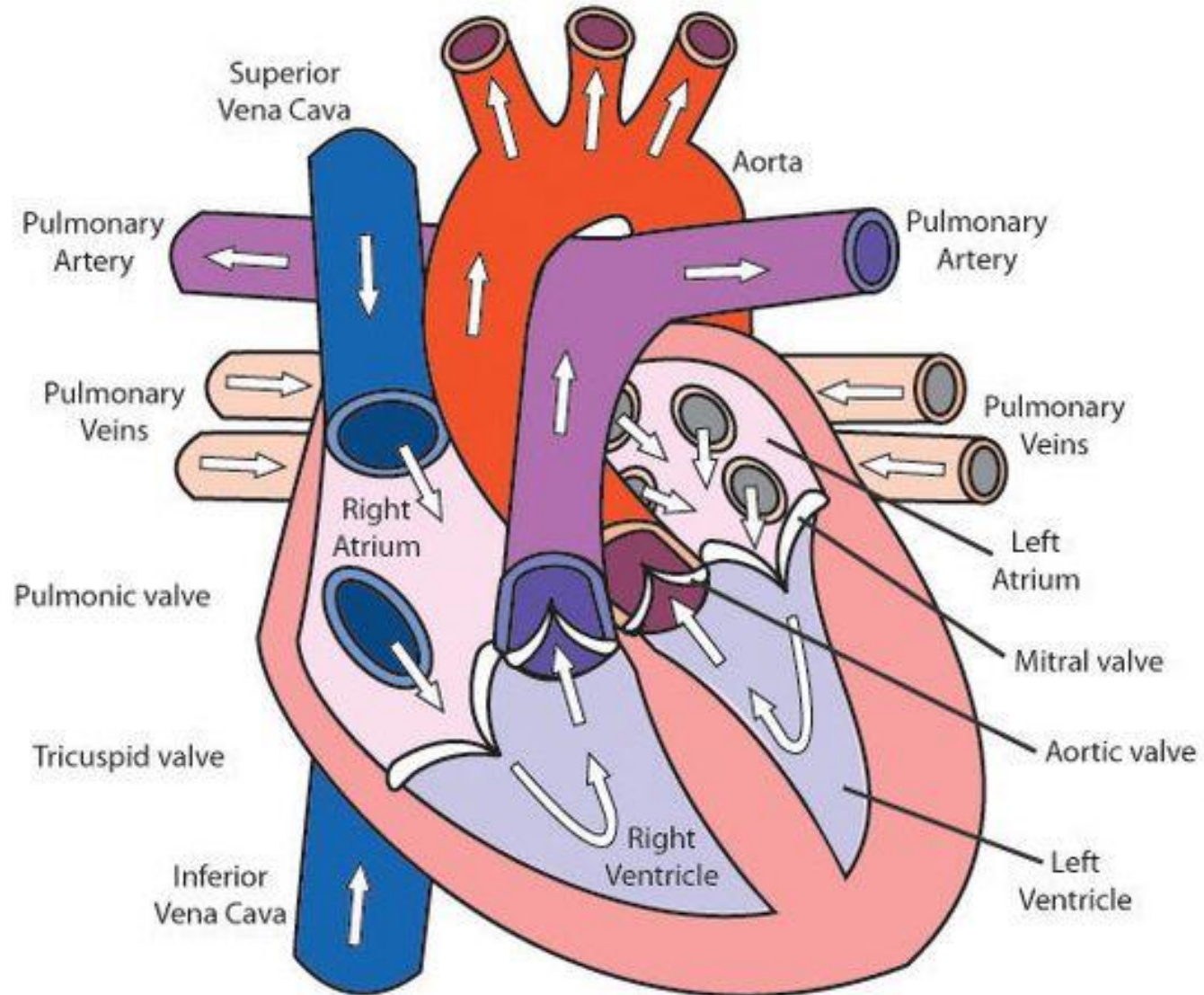
Watch the YouTube video and try to fill in the gaps on the heart worksheet (in pencil!!)

We will then go through the correct answers as a class

<https://www.youtube.com/watch?v=p-wilmN80XE>



The Heart



KEYWORDS

Table Text



You will be divided into 8 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto your computer in the time limit given

You will then rotate round your computers to add more detail.

Key Terms

Vasodilation + vasoconstriction

Oxygenated Blood

Deoxygenated Blood

Heart rate

Arteries

Veins

Capillaries

**Most: To understand the terms
deoxygenated blood and
oxygenated blood**

Oxygenated Blood

KEYWORDS



This is blood that has been through the lungs and O₂ has attached to the haemoglobin creating oxyhaemoglobin and oxygenated blood that the working muscles need.

Most: To understand the terms
deoxygenated blood and
oxygenated blood

Deoxygenated Blood

KEYWORDS



This is bloody that has been used by the muscles and has no O₂ left in it. It has lots of CO₂ present after gaseous exchange has taken place.

<http://www.bbc.co.uk/education/guides/z4tfr82/revision>

Most: To understand the terms
deoxygenated blood and
oxygenated blood

Heart Rate

Heart rate is the speed of the heartbeat measured by the number of contractions of the heart per minute (bpm). The heart rate can vary according to the body's physical needs, including the need to absorb oxygen and excrete carbon dioxide. It is usually equal or close to the pulse measured at any peripheral point. Activities that can provoke change include physical exercise, sleep, anxiety, stress, illness, and ingestion of drugs.

The normal resting adult human heart rate range from 60–100 bpm, the lower the Rest Heart rate normally means the better cardiovascular fitness the person has.

Arteries and Veins

The arteries carry blood AWAY from the heart while veins return blood to it. With both, their structure is related to their function.

Arteries

Blood in the arteries is under high pressure generated by the heart. The arteries have:

thick outer walls

thick layers of muscle and elastic fibres.

Veins

The blood in veins is under lower pressure than the blood in arteries. The veins have:

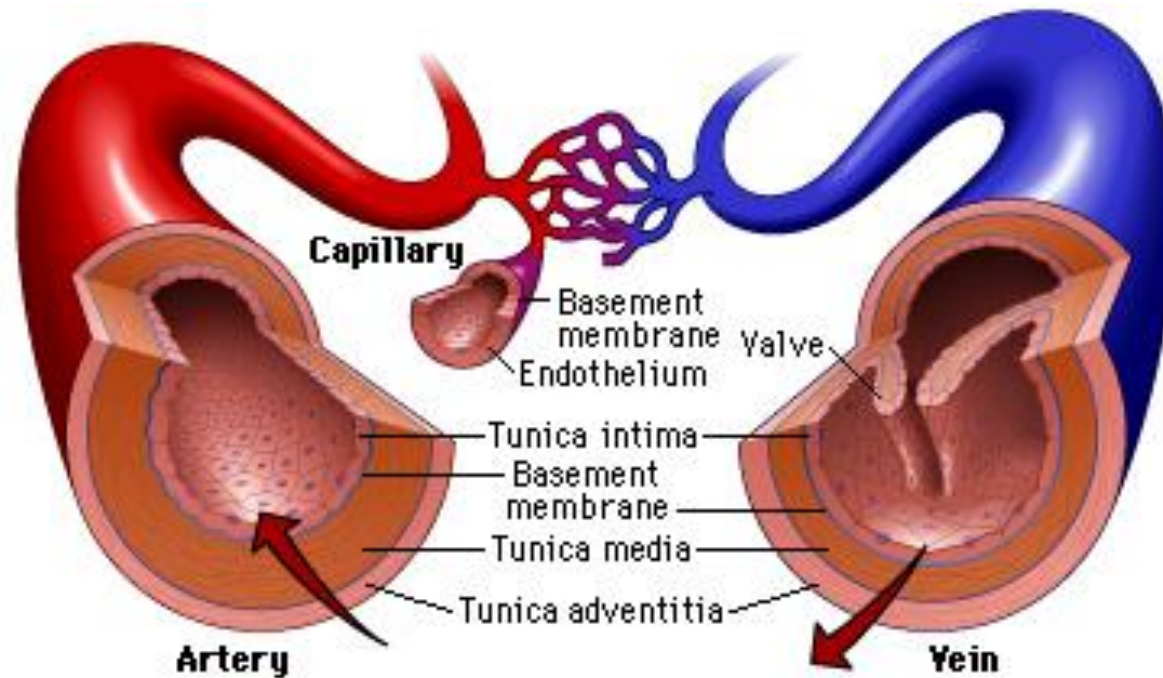
thin walls

thin layers of muscle and elastic fibres.

Unlike arteries, veins have **one-way** valves in them to keep the blood moving in the correct direction.

Veins and Arteries

KEYWORDS



Most: To understand the terms
deoxygenated blood and
oxygenated blood

Capillaries

KEYWORDS



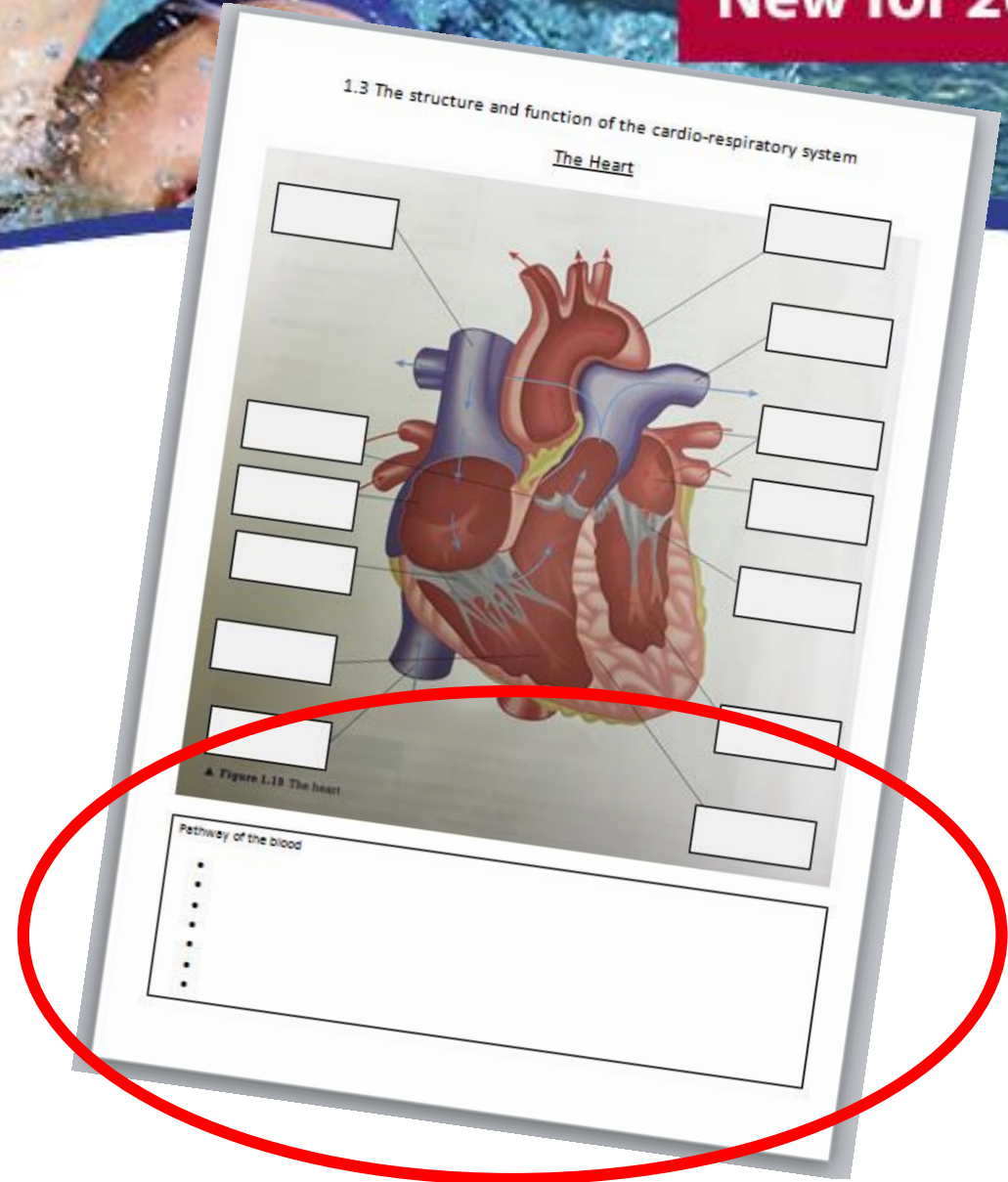
The function of capillaries is to allow food and oxygen *to* diffuse to cells while waste is diffused *from* cells. Capillaries have thin walls - only one cell thick - that allow them to effectively perform their function.

Most: To understand the terms
deoxygenated blood and
oxygenated blood

- Vasoconstriction = reducing the diameter of the small arteries to reduce blood flow to tissues.
- Vasodilation = increasing the diameter of the small arteries to increase the blood flow to the tissues – this happens during exercise to allow more blood to the working muscles.

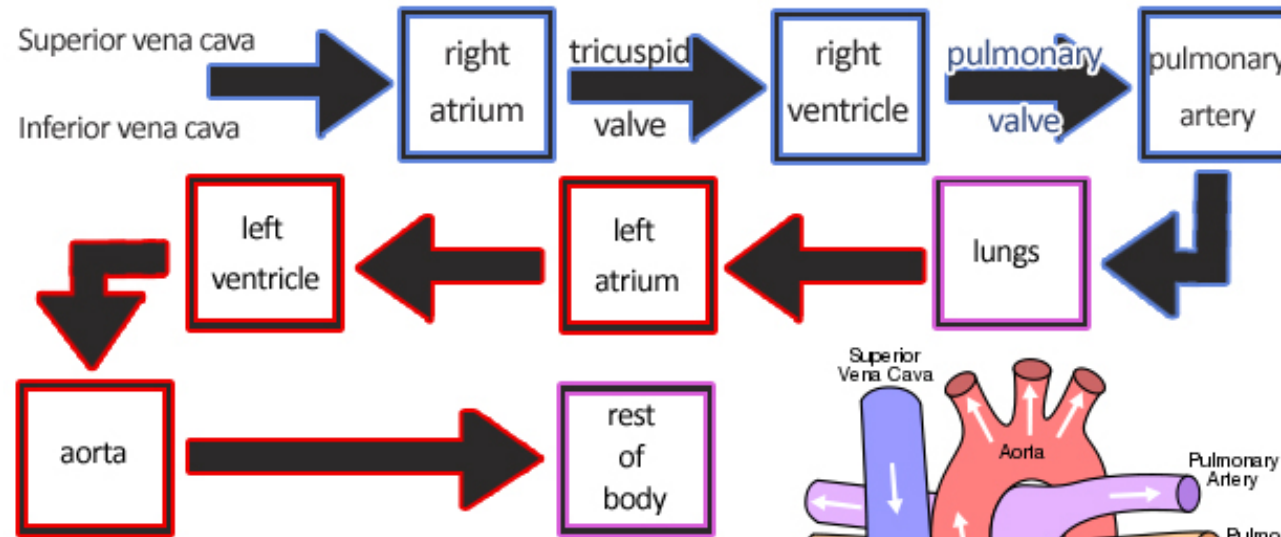


Using the arrows on
your worksheet to
help you and page 21
in the text book,
silently write down in
order the pathway
that blood takes
through the heart

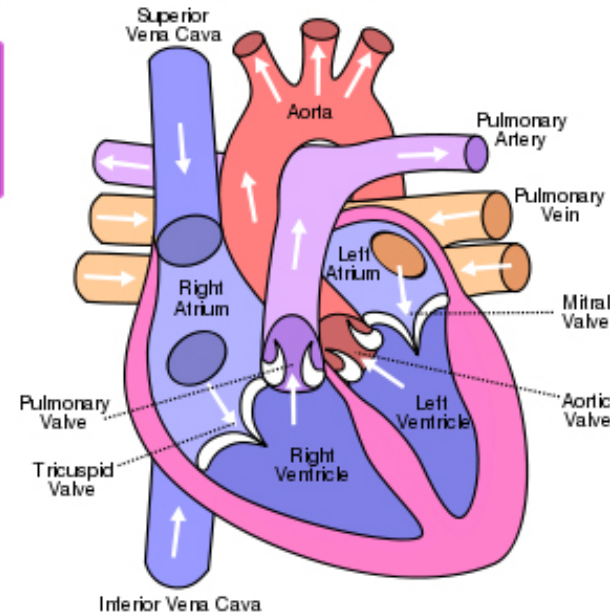


Some: To understand the pathway
blood takes

<http://cephalicvein.com/2016/09/path-of-blood-through-the-heart/>



Circulation of Blood Through the Heart:





**PLENARY
SESSION**

Now that you have learnt about the heart in more detail – would change any of your original 10 key words about the heart?

Give me 10 key words that relate to.....

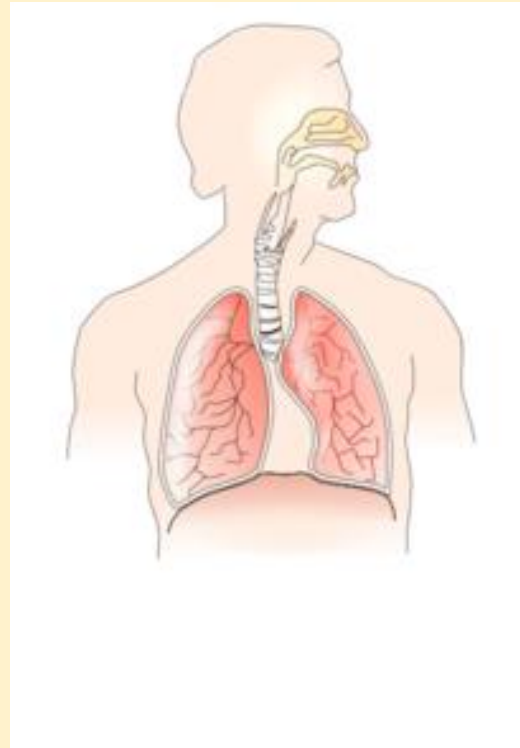
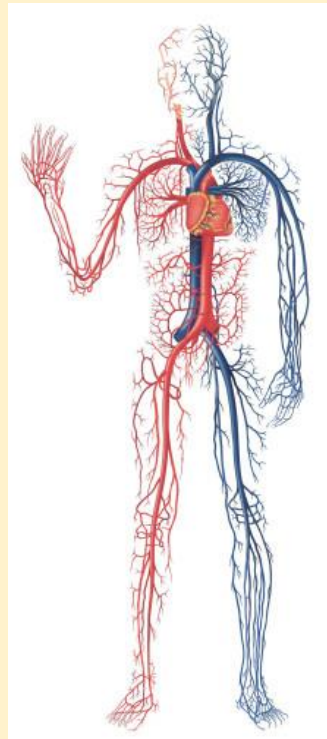


THE HEART

Learning Objectives

- All:** To identify the structures of the heart
- Most:** To understand the terms deoxygenated blood and oxygenated blood
- Some:** To understand the pathway blood takes

1.3 The structure and function of the cardio-respiratory system (part 5)



Learning Objectives

- All:** To define cardiac output (Q), stroke volume (SV) and heart rate (HR)
- Most:** To understand the relationship between Q, SV and HR
- Some:** To understand the effect of exercise on Q, SV and HR



How does our heart respond to different intensities of physical activity?



1.3 The structure and function of the cardio-respiratory system

All: To define cardiac output (Q),
stroke volume (SV) and heart rate (HR)

KEYWORDS



Heart Rate (HR)

Number of times your heart ventricles beat in one minute

Average resting heart rate is 70-72 bpm

Maximal heart rate = $220 - \text{age}$

Low resting heart rate = high level of aerobic endurance fitness

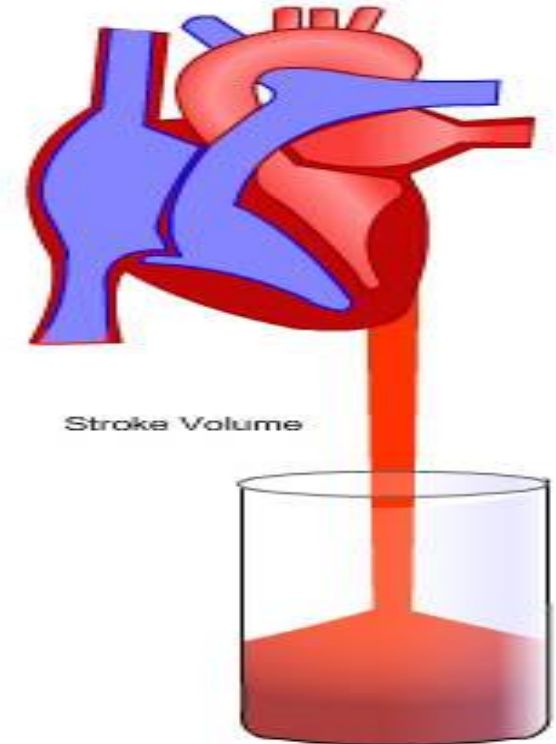
RHR below 60 = bradycardia (slow HR = increase in stroke volume due to hypertrophy)

KEYWORDS



Stroke volume (SV)

The volume of blood pumped out of the heart by each ventricle during one contraction



- Tidal Volume = is the lung volume representing the normal volume of air displaced between normal inhalation and exhalation when extra effort is not applied. In a healthy, young human adult, tidal volume is approximately 500 mL per inspiration
- Residual Volume = is the amount of air that remains in a person's lungs after fully exhaling. Doctors use tests to measure a person's residual air volume to help check how well the lungs are functioning

Cardiac output (Q)

KEYWORDS



- The volume of blood ejected by the heart in one minute

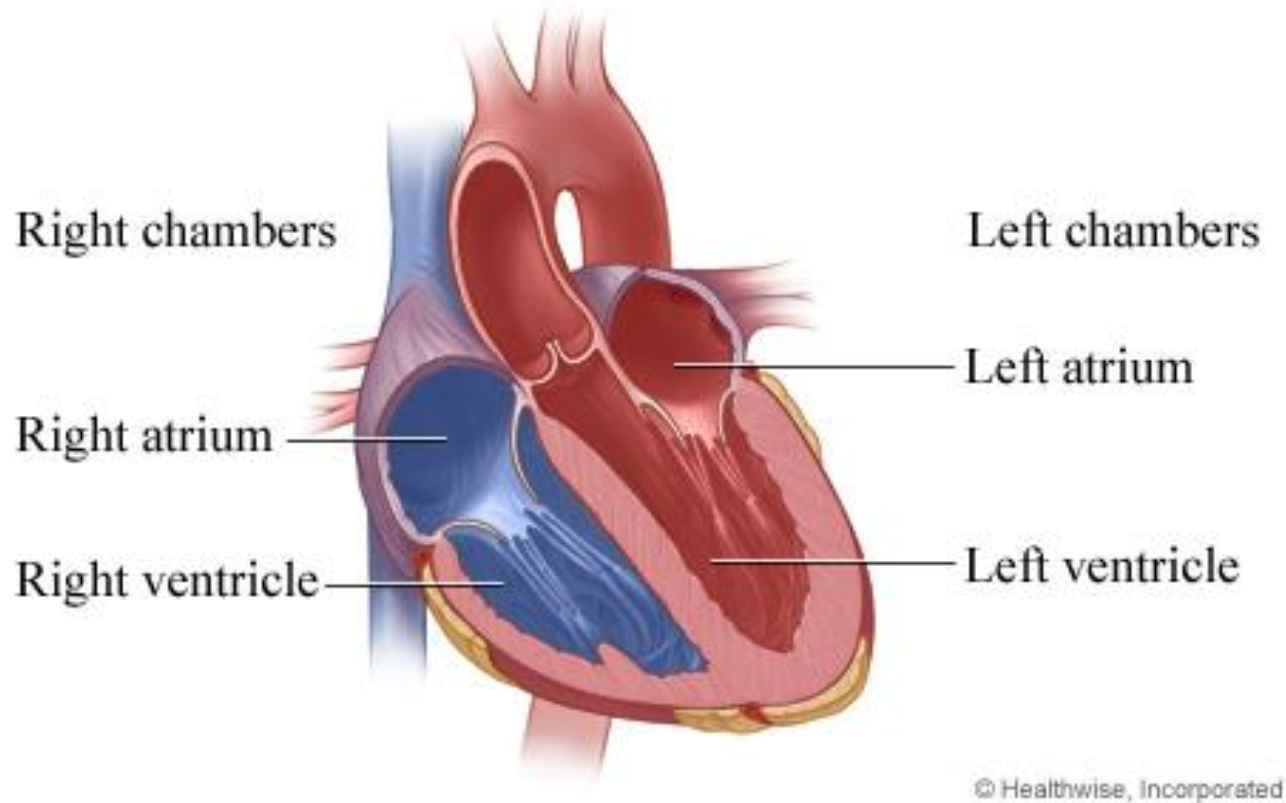
How do SV, HR and Q link together??

$$Q = SV \times HR$$

$$(\text{L/min}) = (\text{ml per beat}) \times (\text{beats per min})$$

Most: To understand the relationship
between Q, SV and HR

Chambers of the heart



The heart has four chambers: two atria and two ventricles. The right atrium receives oxygen-poor blood from the body and pumps it to the right ventricle. The right ventricle pumps the oxygen-poor blood to the lungs. The left atrium receives oxygen-rich blood from the lungs and pumps it to the left ventricle.

When the chambers of the heart relax and fill with blood, is called **DIASTOLE** and when the heart contracts and ejects blood away from the heart is called **SYSTOLE**. One cycle of diastole and systole is known as the **Cardiac Cycle**.

The two readings are taken when blood pressure is measured – **Diastolic and systolic** blood pressure.



Find the fib!

Write down 3 statements about what we have just learnt – 2 of which are true, 1 which is a fib!

Be prepared to share with the class



As you exercise, your cardiac output increases. Your heart works harder to deliver oxygen to your muscles, and carry away carbon dioxide more quickly!

Draw out the graph in the space below, on page 23 from the text book to show the effect of exercise on heart rate

1.3 The structure and function of the cardio-respiratory system

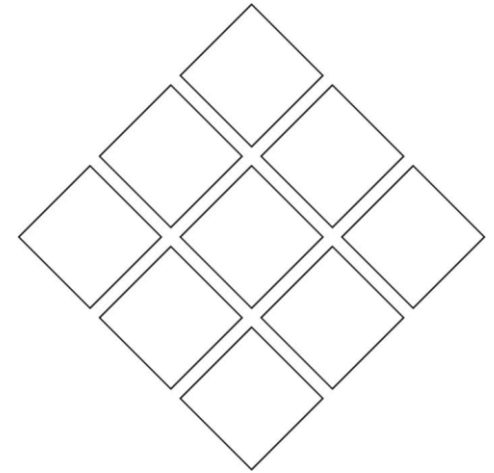
Some: To understand the effect of exercise on Q, SV and HR

PLENARY
SESSION

Diamond 9

In small groups using the information from the lesson I would like you to order the information on the diamond

The top of the diamond being most important, the bottom being not so!



Learning Objectives

- All:** To define cardiac output (Q), stroke volume (SV) and heart rate
- Most:** To understand the relationship between Q, SV and HR
- Some:** To understand the effect of exercise on Q, SV and HR

1.4 Aerobic and Anaerobic Exercise



Learning Objectives

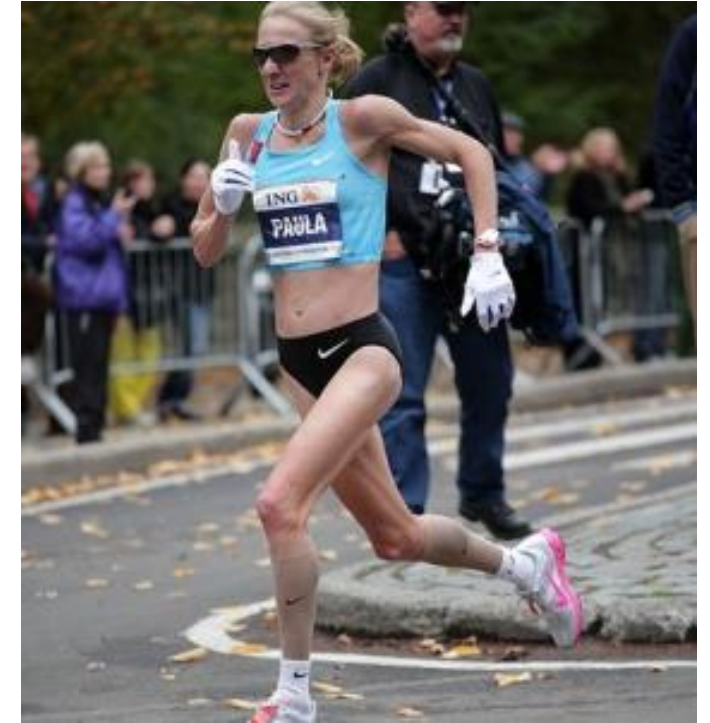
- | | |
|--------------|---|
| All: | Understand the terms aerobic and anaerobic |
| Most: | Understand the effects of aerobic and anaerobic exercise |
| Some: | To know the methods of recovery |



Mo Farah – 1500m - marathon

Aerobic exercise

- **WITH** the presence of oxygen
- Exercise over a long period of time – steady exercise – the heart can supply all the working muscles with oxygen
- Energy comes from **carbohydrates** – its converted into glucose and oxygen
- When energy is used it produces the **by-products** carbon dioxide (exhaled from lungs) and water (sweat)



Paula Radcliffe – marathon running

Glucose + Oxygen → Energy + Carbon dioxide + Water

- During aerobic exercise – lots of energy can be produced with not many harmful by-products
- **LOW-MODERATE intensity**

Any other sporting examples?



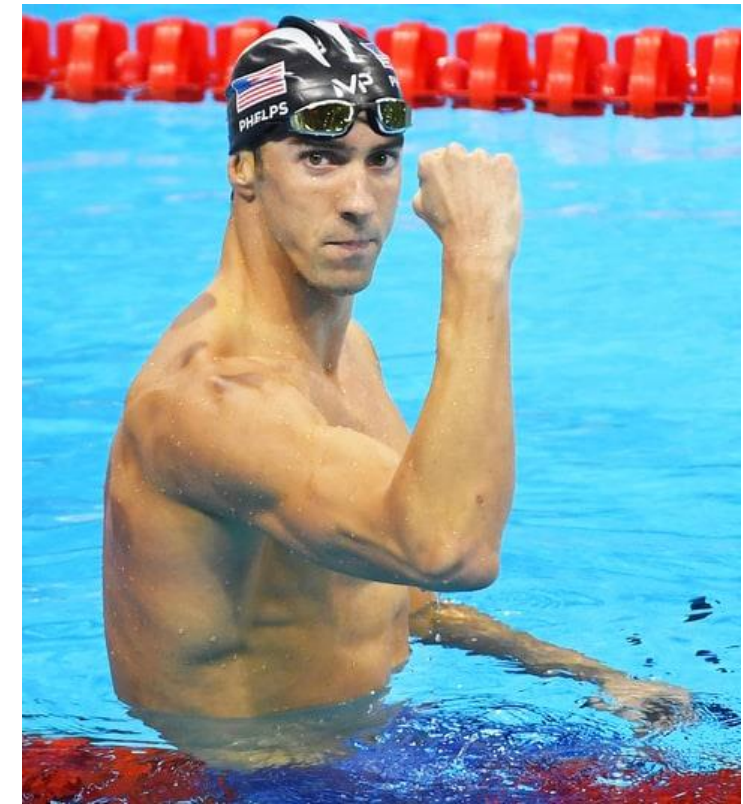
Usain Bolt – 100m,
200m, 4 x 100m

Anaerobic exercise

- In the **ABSENCE** of enough oxygen
- Short duration and high intensity
- The heart and lungs cannot supply enough blood and therefore oxygen to the working muscles
- Glucose is converted into energy without the presence of oxygen.

Glucose → energy and lactic acid

- Work anaerobically produces the waste product lactic acid.
- Lactic acid builds up in the muscles (become fatigued and cannot keep working efficiently)
- HIGH INTENSITY – Short periods of time – maximum of around 60 seconds.



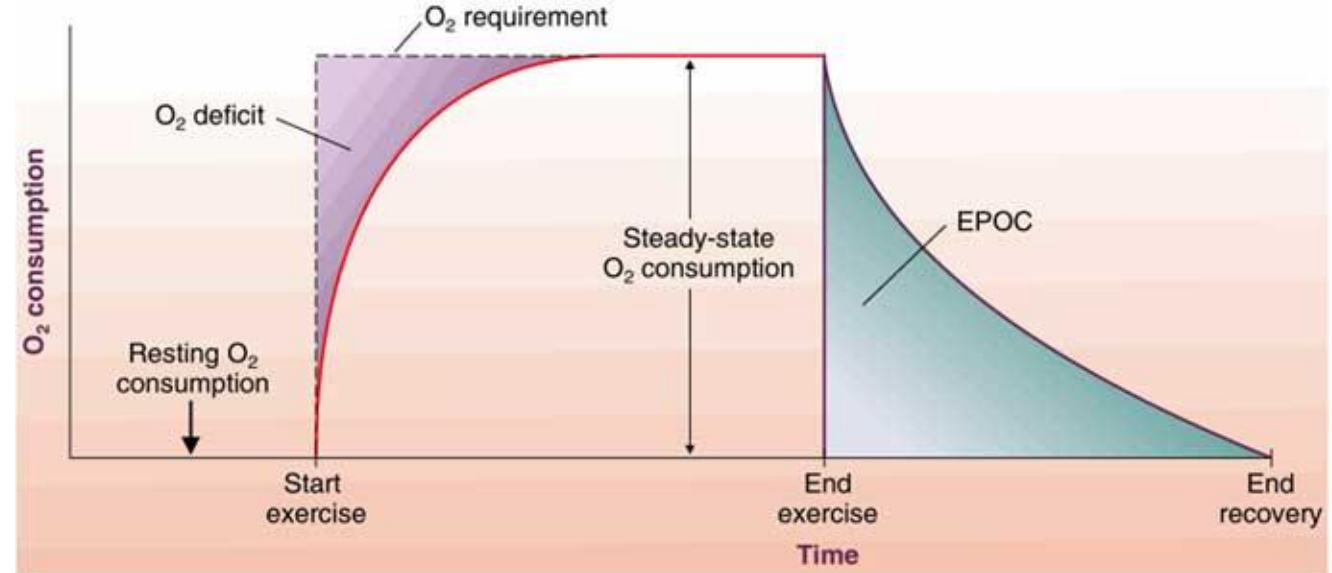
Michael Phelps – 100m, 200m,
4x100m, 4x200m

Any other sporting examples?

Anaerobic exercise

EPOC (Excess Post-exercise Oxygen Consumption)

- The amount of oxygen need to recover after anaerobic exercise
- Shown by an increased and deeper breathing rate
- EPOC :
 - replenishes the body with oxygen
 - Converts lactic acid into glucose, carbon dioxide and water



EPOC is sometimes known as 'oxygen debt'

- Need to maintain an elevated level of breathing after exercise

The recovery process

1. The cool down

2. Manipulation of diet

3. Ice baths or massage

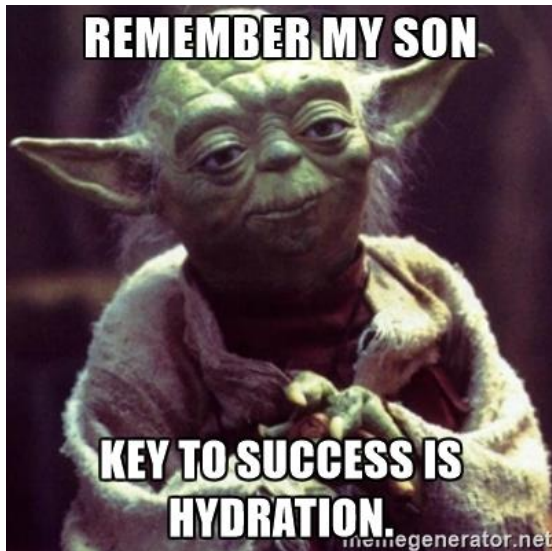
The recovery process

1. Cool down

- Do not suddenly stop at the end of exercise
 - End the session gradually
 - Some light exercise
 - Gentle stretch (of used muscle groups)
- This helps to:
 - maintain elevated heart rate – ensures blood continues to flow to muscles
 - replenishes working muscles with oxygen
 - helps convert lactic acid to glucose, carbon dioxide and water (stops you feeling stiff the next day)



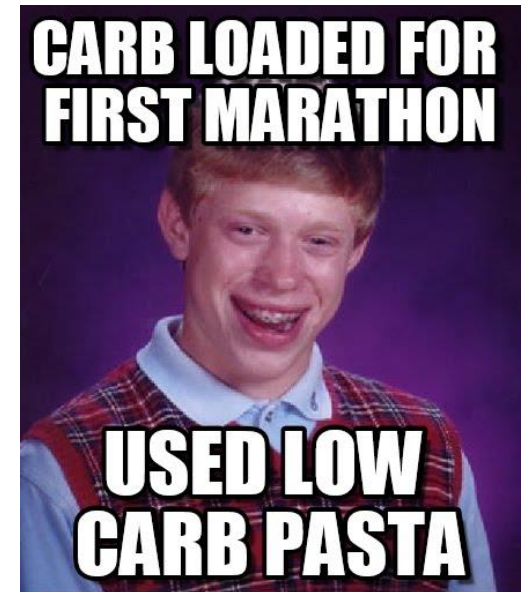
- Essential to rehydrate – helps the body to replace lost fluid
- This depends on:
 - duration
 - intensity
 - air temperature
 - humidity
 - altitude
 - body composition



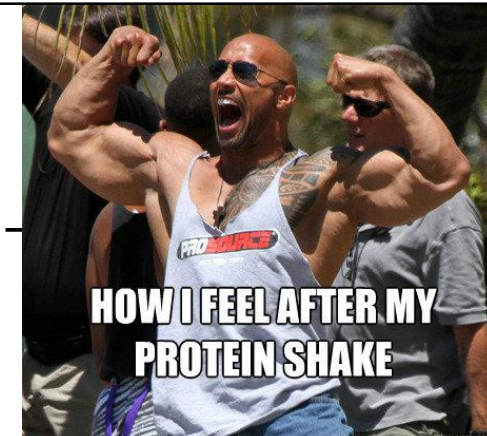
The recovery process

2. Manipulation of diet

- Endurance athletes use carbohydrate loading to:
 - boost performance
 - limit the severity of recovery period
 - increase carbohydrate uptake a few days before an event (maximises amount of glucose in body)



- The timing of protein intake is particularly important for power athletes
- POWER = STRENGTH X SPEED
- Power training creates small tears on the muscle surface – these tears heal and become bigger and stronger – HYPERTROPHY
- Protein provides the nutrients to heal tears quickly



The recovery process

3. Ice baths or massage

- Ice baths and massage – popular with elite athletes
- It helps:
 - prevent DOMS (Delayed Onset of Muscle Soreness)
 - massage increases blood flow to the sore area – speeds up healing process
 - ice baths – helps body flush lactic acid from working muscles
 - the cold causes vasoconstriction– forcing out lactic acid
 - vasodilation of vessels when you get out (and warm) – bring oxygenated blood in

BRACE YOURSELF

**IT'S TIME TO GET IN THE
ICEBATH**



PAIRS



Anaerobic exercise

Intensity

Aerobic Exercise

Sprinter

Long-distance runner

Lactic Acid

Aerobic exercise

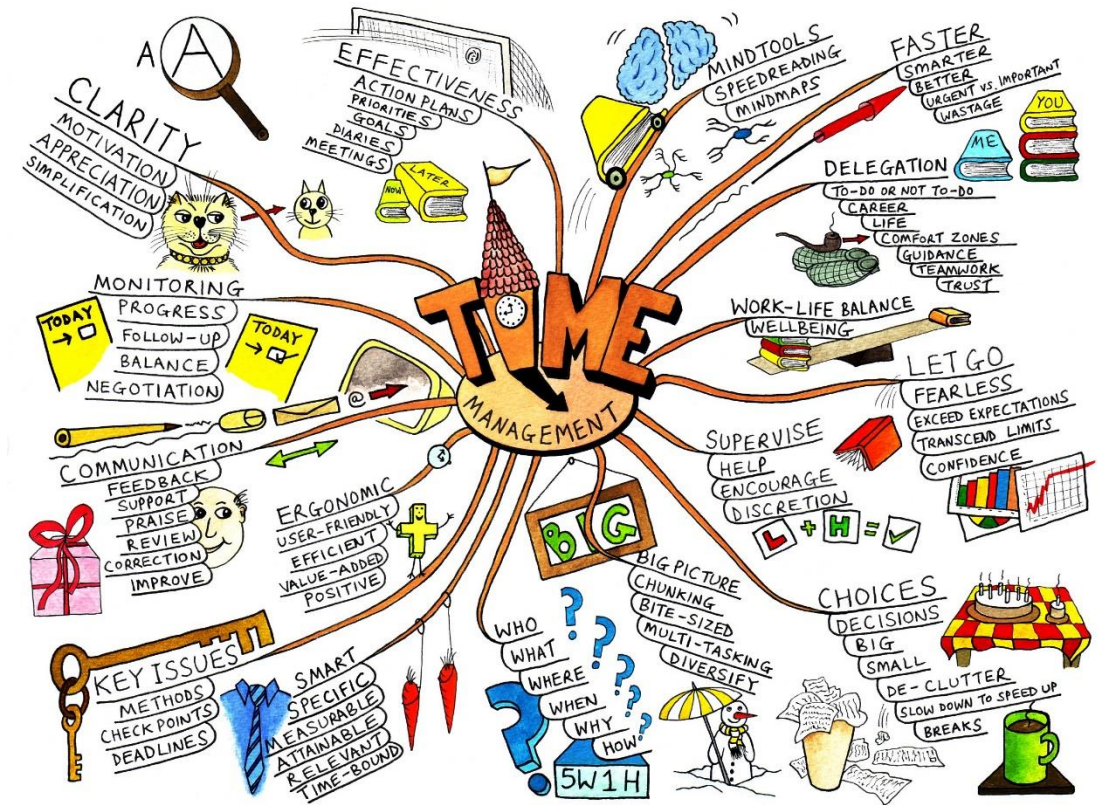
Anaerobic exercise



CONVERSION

Turn the text on pages 24 and 25 into 2 separate mind maps

- 1 mind map on Aerobic Exercise
- 1 mind map on Anaerobic Exercise



All: Understand the terms aerobic and anaerobic

Most: Understand the effects of aerobic and anaerobic exercise

Sporting activity	Intensity (high/medium /low)	Duration	Aerobic or anaerobic



Make a list of 10 different sports or physical activities

- a) Next to each activity, write down whether it is low, medium or high intensity
- b) Next to each activity, make a note of approximately how long each activity lasts
- c) Draw two columns on a page, one labelled aerobic, the other labelled anaerobic. Place each activity into one of the columns. Are there any that could go in both columns?



1.4 Aerobic and anaerobic exercise

All: Understand the terms aerobic and anaerobic
Most: Understand the effects of aerobic and anaerobic exercise

It is important to ensure that the body recovers from vigorous exercise



Using the post it notes
can you list as many
different methods of
recovery as possible?





CONVERSION

Turn the text on page 26 into bullet points for each method of the recovery process:

Cool Down

Manipulation of Diet

Ice baths or Massage

PLENARY
SESSION



Revisit the
pairs activity –
do you still
agree with
your original
answers
having now
learnt the
content?

PAIRS

Anaerobic exercise

Intensity

Aerobic Exercise

Sprinter

Long-distance runner

Lactic Acid

Aerobic exercise

Anaerobic exercise

Learning Objectives

- All:** Understand the terms aerobic and anaerobic
- Most:** Understand the effects of aerobic and anaerobic exercise
- Some:** To know the methods of recovery

1.5 The effects of exercise



Learning Objectives

- All:** To know the 3 different categories of the effects of exercise
- Most:** To know the effects of immediate, short term and long term exercise
- Some:** To know the link between the effects of exercise and the benefits of participating in physical activity



Can you list down as many different effects of exercise as possible – 1 per sticky note

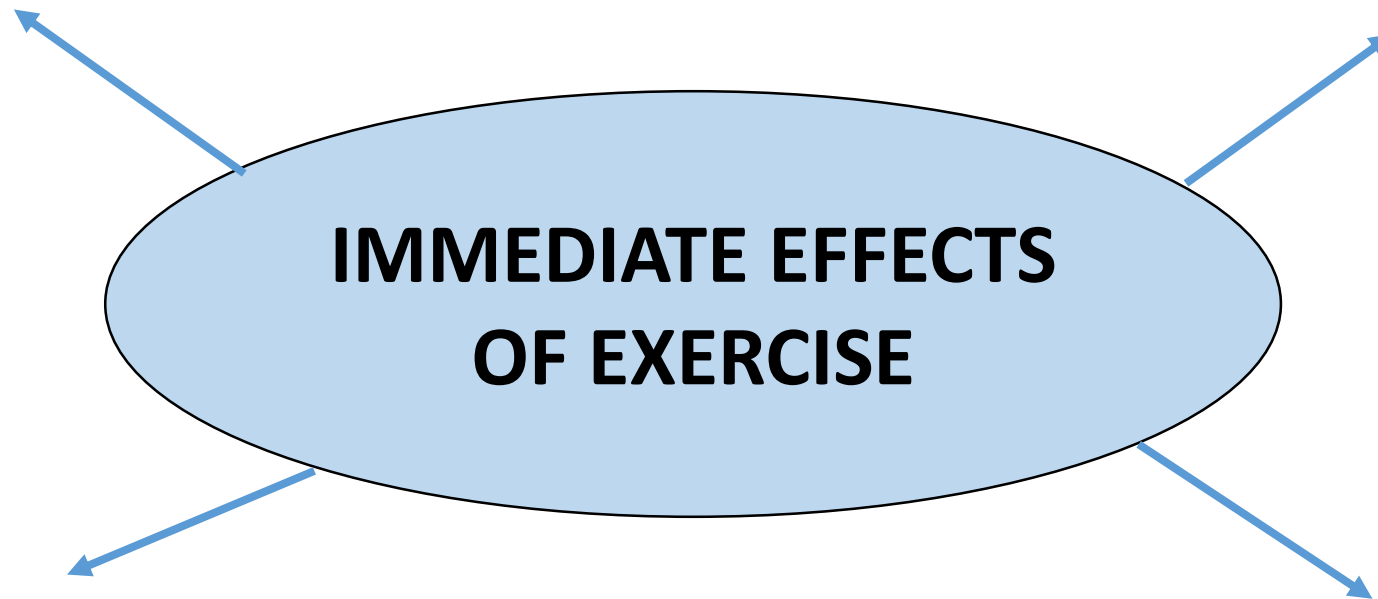
Who can fill their table in the time limit?

Example: You will sweat
Your muscles will ache



Once the time is up can you divide your ideas up into 'immediate effects' 'short term effects' and 'long term effects'?

What answers did you get? (class discussion)

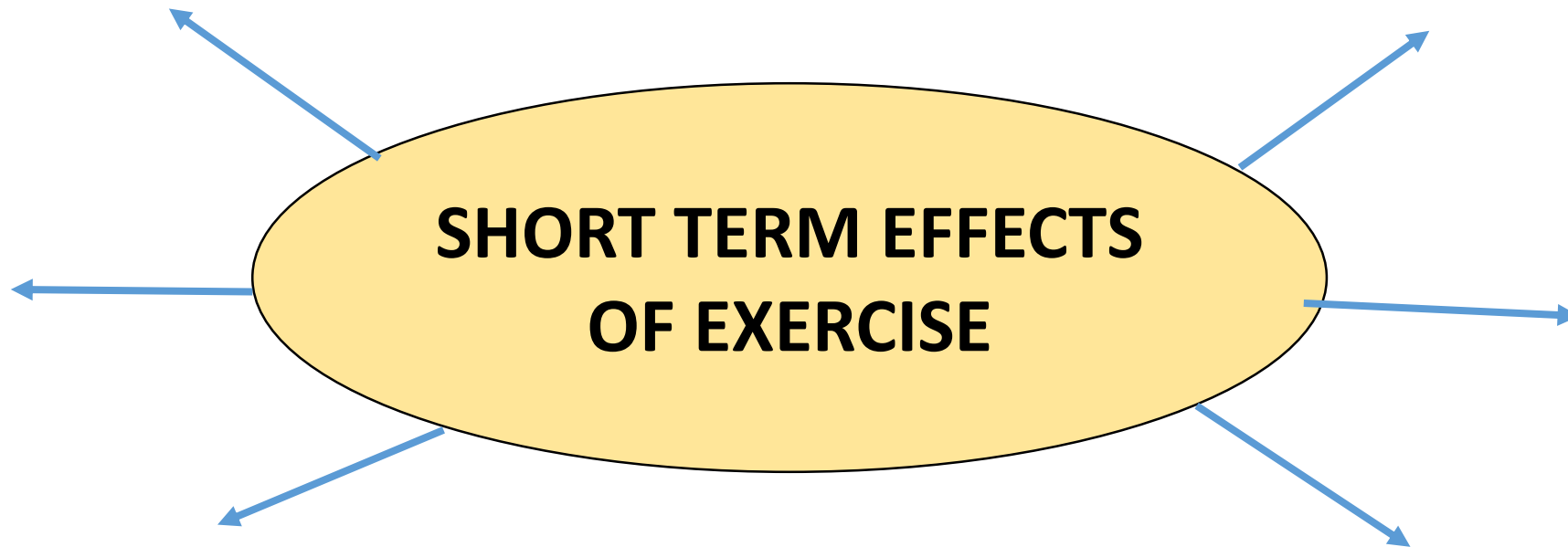


Immediate effects of exercise!

- HR increases – to deliver more O₂ to the working muscles
- Breathe deeper and more frequently to get more O₂ into the body
- Feel hotter as your body temp rises
- Sweat and redden as the body tries to cool down



What answers did you get? (class discussion)

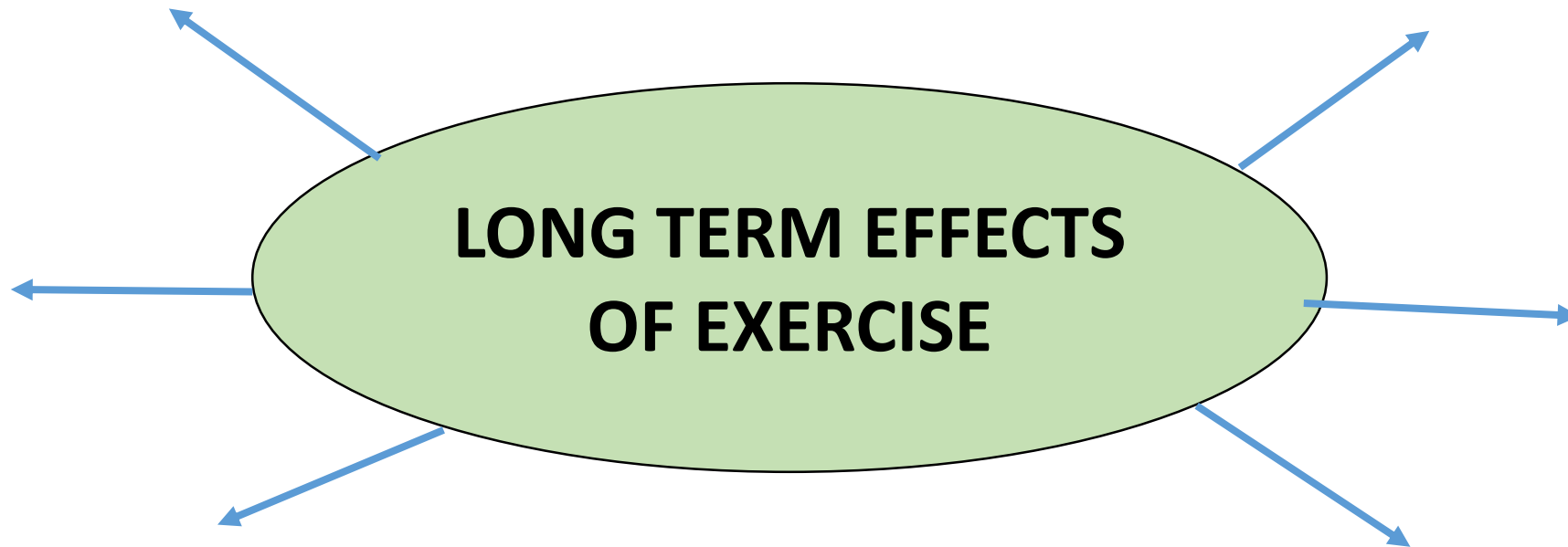


Short term effects of exercise

- Fatigue
- Light headed
- Nauseous (sick)
- Muscles ache
- DOMS
- Muscle cramps



What answers did you get? (class discussion)



Long Term effects of exercise

- Body changes shape for the better as exercise tones the muscles
- Improvements in specific components of fitness
- Cardiovascular endurance improves
- Muscle hypertrophy
- Cardiac hypertrophy – cardiac output increases (gaseous exchange improves)
- Bradycardia – resting HR decreases

PLENARY
SESSION



On your whiteboards answer
the following question:
**What is the link between the
effects of exercise and the
benefits of participating in
physical activity**



Learning Objectives

- All:** To know the 3 different categories of the effects of exercise
- Most:** To know the effects of immediate, short term and long term
- Some:** To know the link between the effects of exercise and the benefits of participating in physical activity

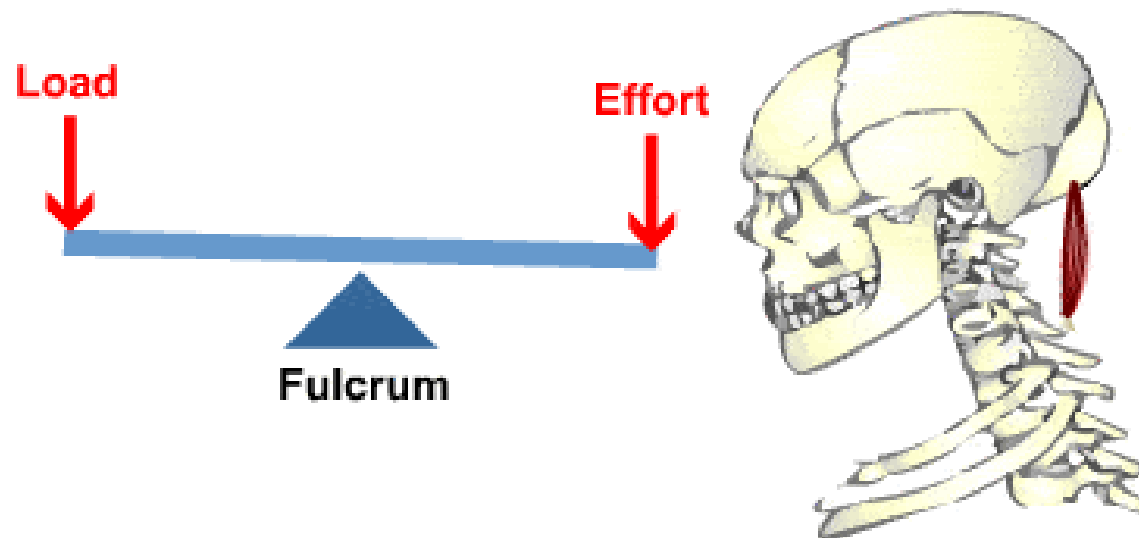
A photograph of a swimmer in a pool, wearing a blue swim cap and goggles, with water splashing around their head. The swimmer is wearing a black and pink swimsuit.

Chapter 2: Movement Analysis

- 2.1 Types of Levers
- 2.2 Basic Movements
- 2.3 Planes of movement and axes of rotation

2.1 Types of Levers

First order levers



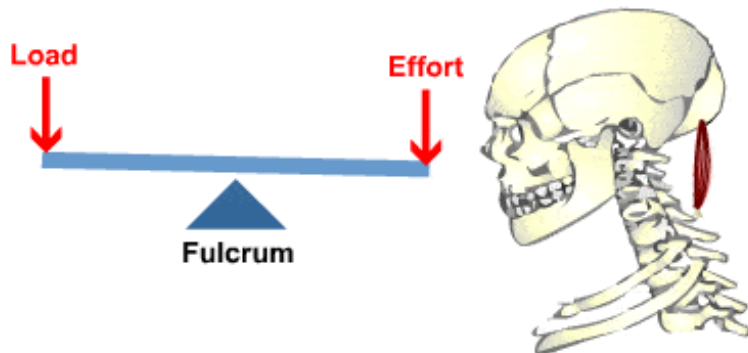
Learning Objectives

- All:** To understand what first class, second class and third class levers are
- Most:** To provide sport examples for each type of lever
- Some:** To understand the term 'mechanical advantage'

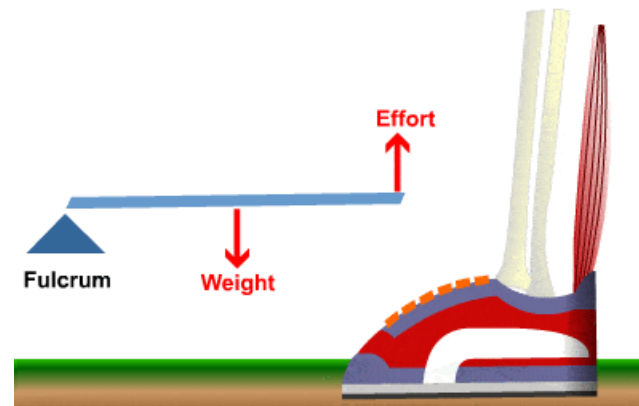


Can you identify what the difference is between these 3 pictures?

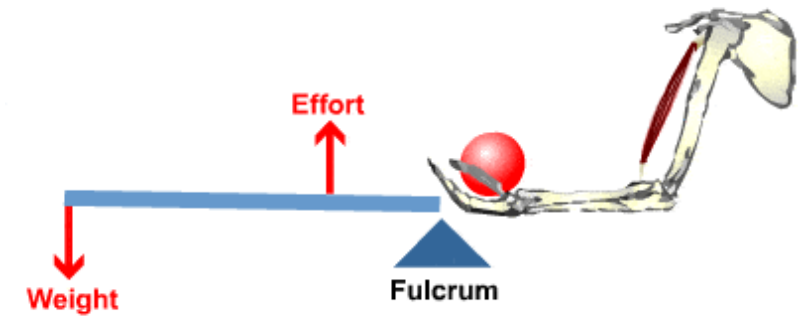
First order levers



Second order levers



Third order levers



2.1 Types of levers

All: To understand what first class, second class and third class levers are

All movement in the body are produced by levers working together

All leavers have...

- Fulcrum: the fixed point at which a lever turns or is supported
 - Load: the weight or 'resistance' that the lever must use
- Effort: the force required to move the load (often the muscle)

All movements made by the body are produced by a series of **levers** working together. Without levers we would not be able to throw or kick a ball, run or jump. A lever is a rigid bar that turns about an axis to create movement.

There are three types of levers – **first class levers**, **second class levers** and **third class levers** – and they all make use of a **fulcrum**, **load** and **effort**.

The fulcrum is the point at which a lever turns or is supported.

The load is the weight or resistance that the lever must move.

The effort is the force required to move the load and, in the human body, the effort comes from the muscles.

KEYWORDS



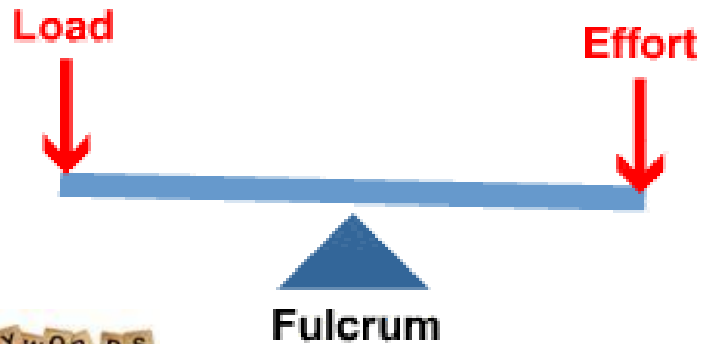
Using page 32 – can you define the terms highlighted in red on your keywords sheet?

2.1 Types of levers

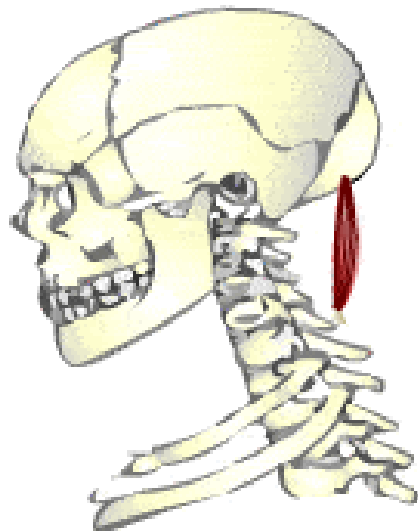
All: To understand what first class, second class and third class levers are

FIRST CLASS LEVERS

First order levers

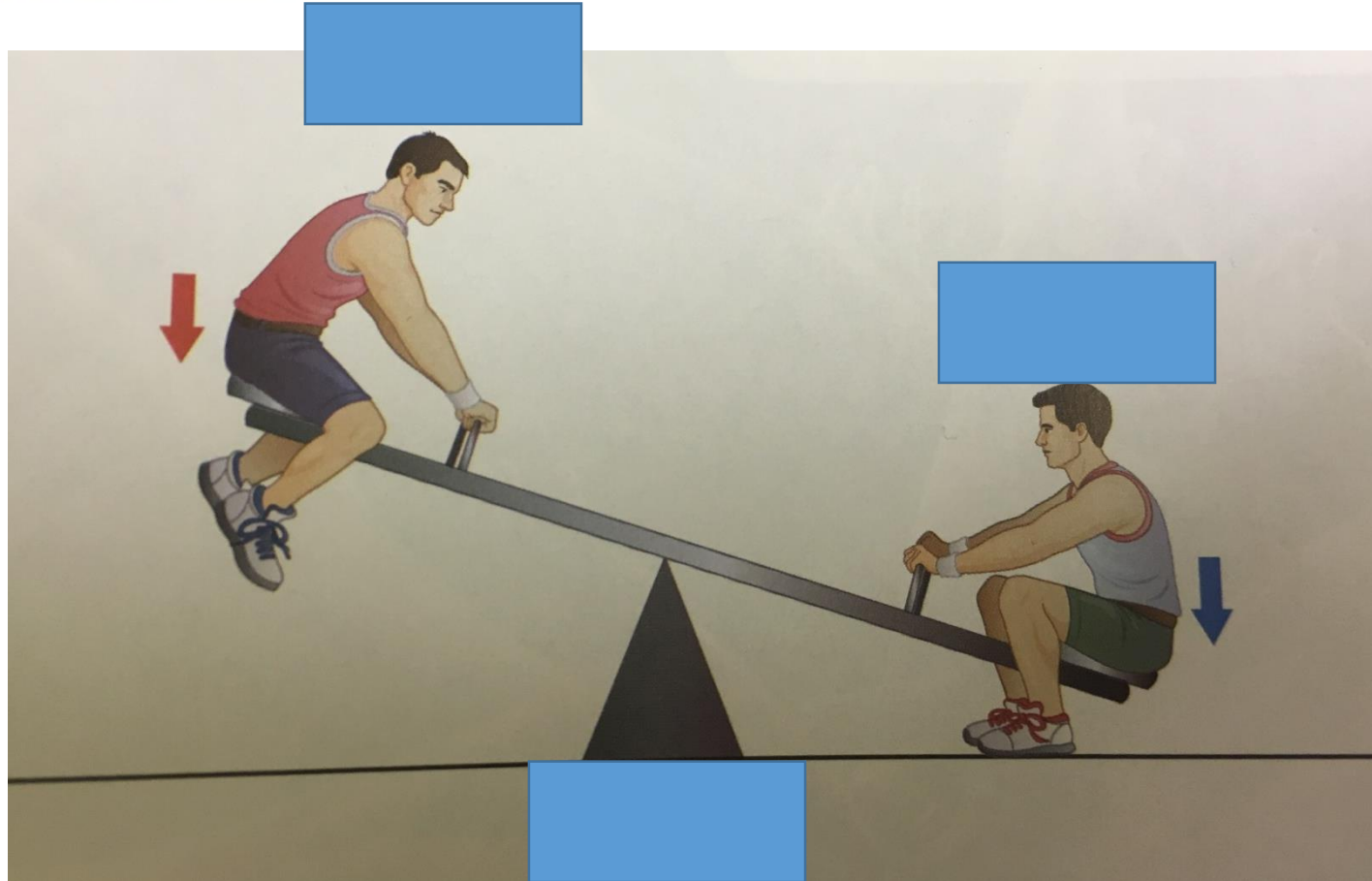


KEYWORDS



First Class levers have the fulcrum midway between the effort and the load. Also the fulcrum is quite close to both the effort and the load.

FIRST CLASS LEVERS



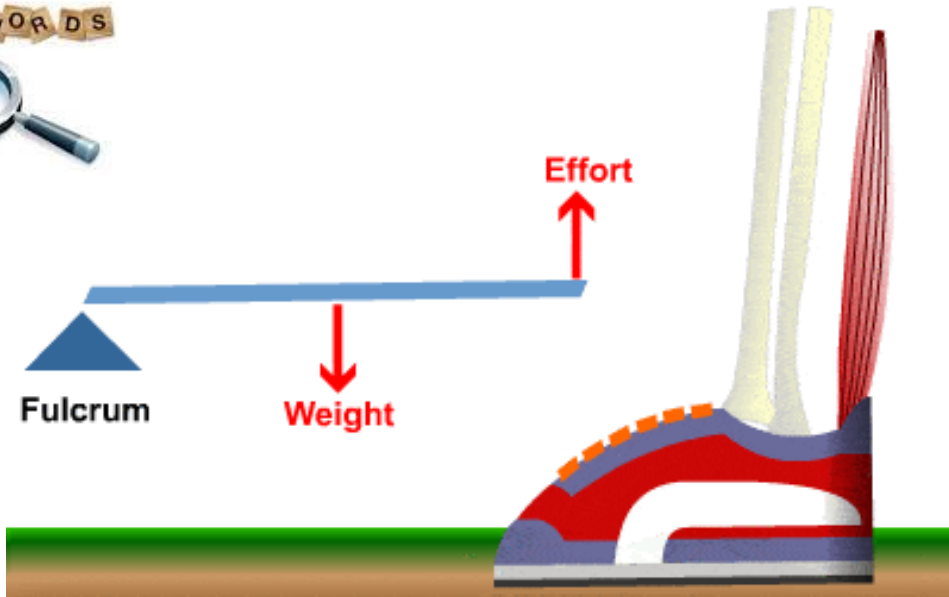
2.1 Types of levers

All: To understand what first class, second class and third class levers are

SECOND CLASS LEVERS

Second order levers

KEYWORDS



Second class levers have the load between the fulcrum and the effort. This means that a large load can be moved with relatively low effort

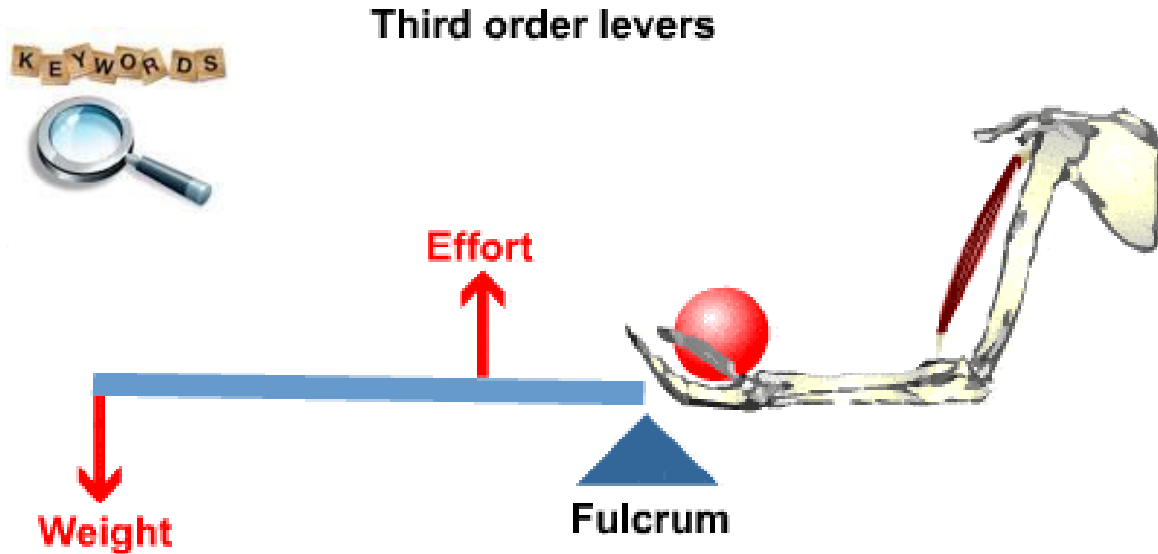
SECOND CLASS LEVERS



2.1 Types of levers

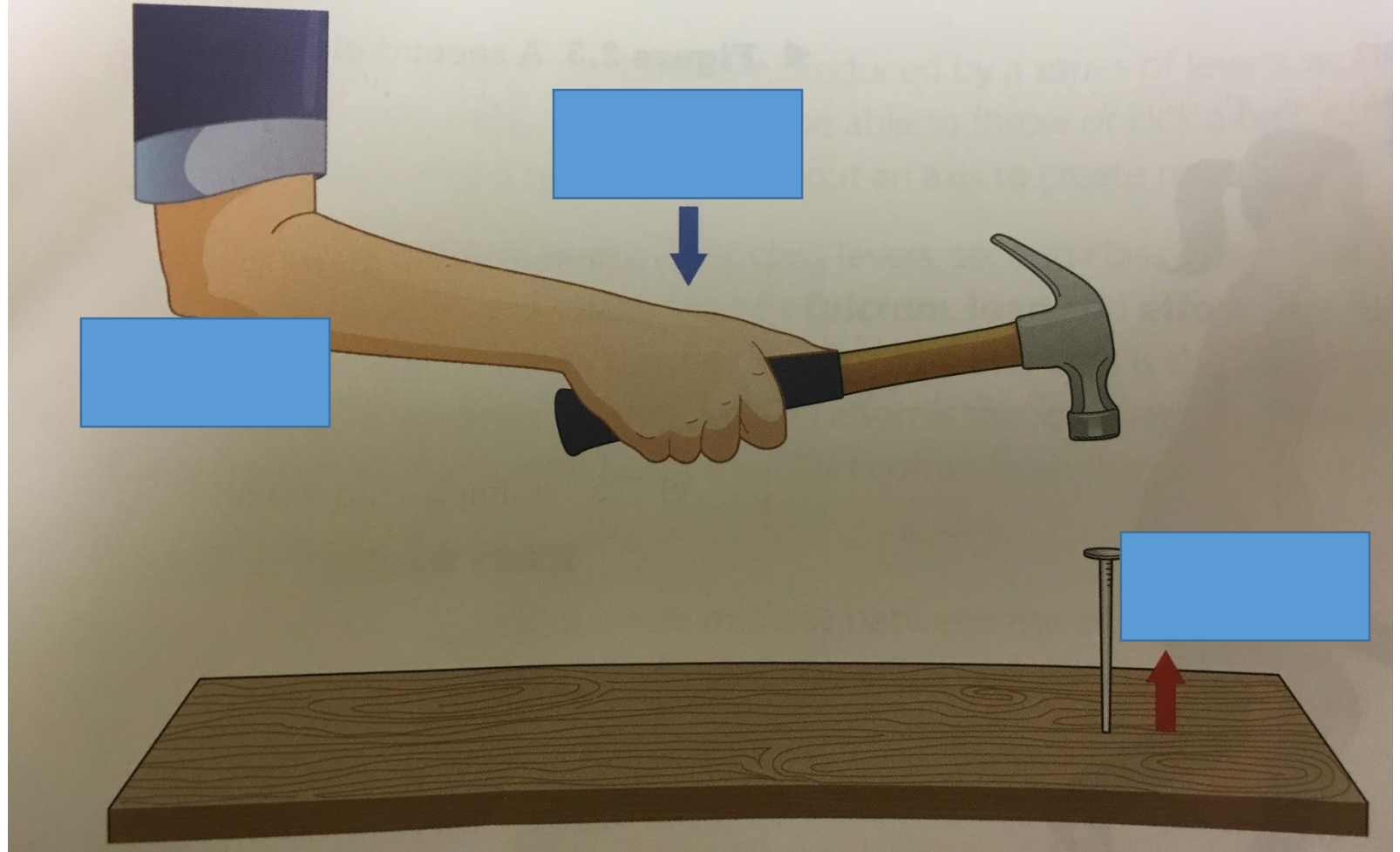
All: To understand what first class, second class and third class levers are

THIRD CLASS LEVERS




Third class levers have the effort placed between the fulcrum and the load. This means they can produce a larger range of movement with relatively low effort

THIRD CLASS LEVERS



2.1 Types of levers

All: To understand what first class, second class and third class levers are

A photograph of a swimmer in a pool, wearing a blue swim cap and goggles, with water splashing around their head.

On the next few slides a series of sport examples will appear.

Can you identify which type of lever they are?

Can you identify where the fulcrum, effort and load is on the picture?

Which type of
lever is this?

3rd

fulcrum

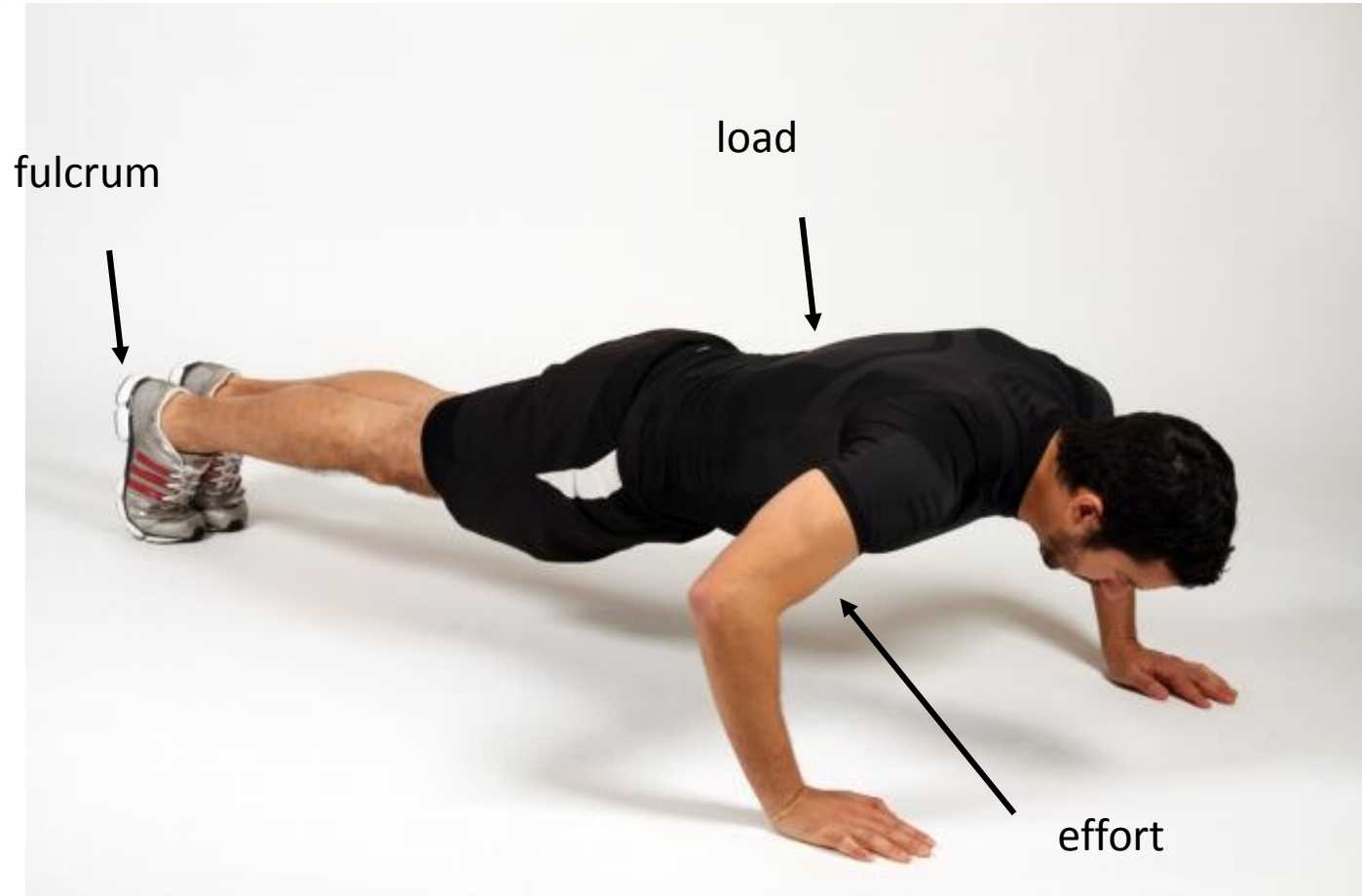
effort

load



Which type of
lever is this?

2nd



Which type of
lever is this?

3rd



Which type of
lever is this?

3rd



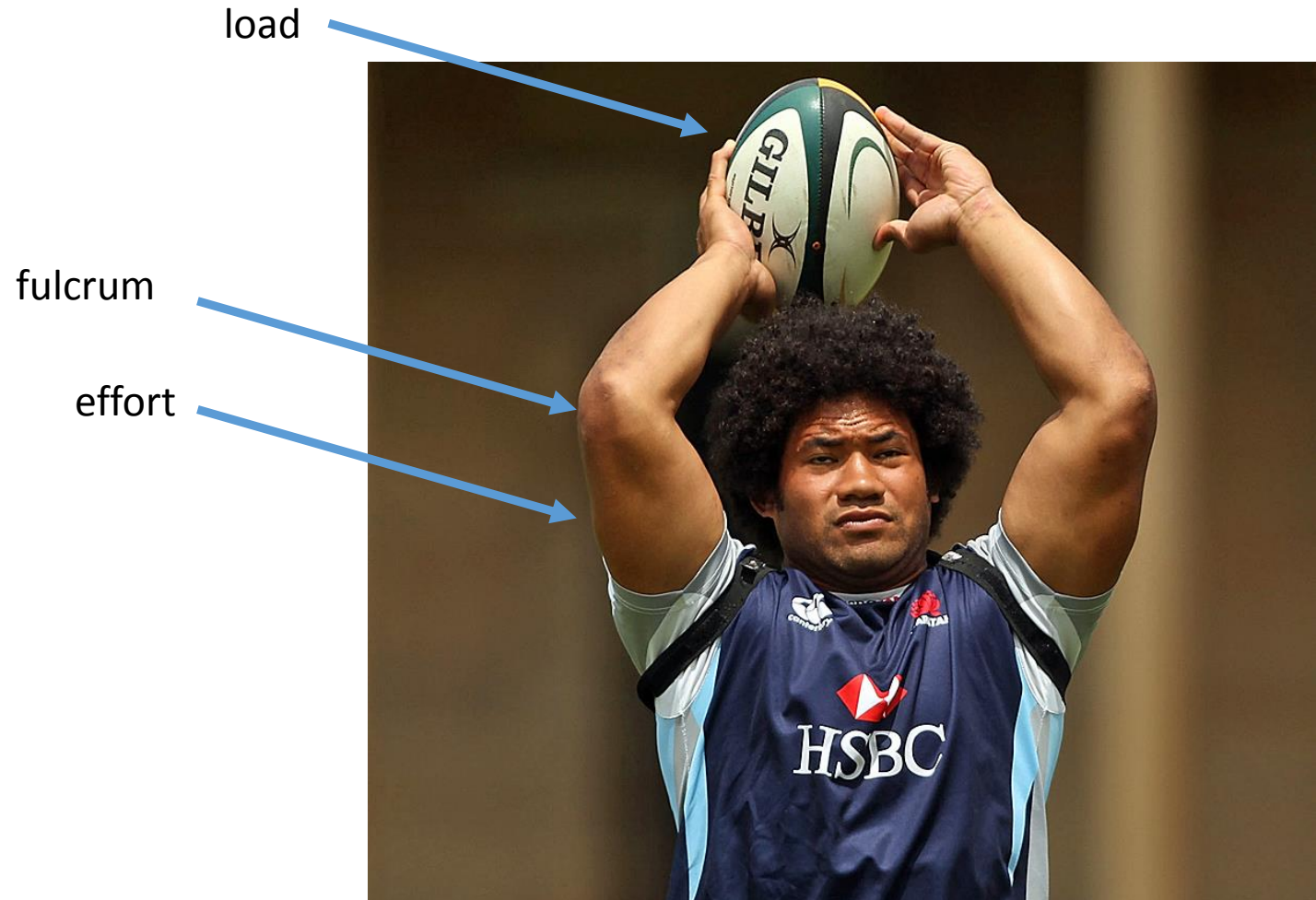
Which type of
lever is this?

2nd



Which type of
lever is this?

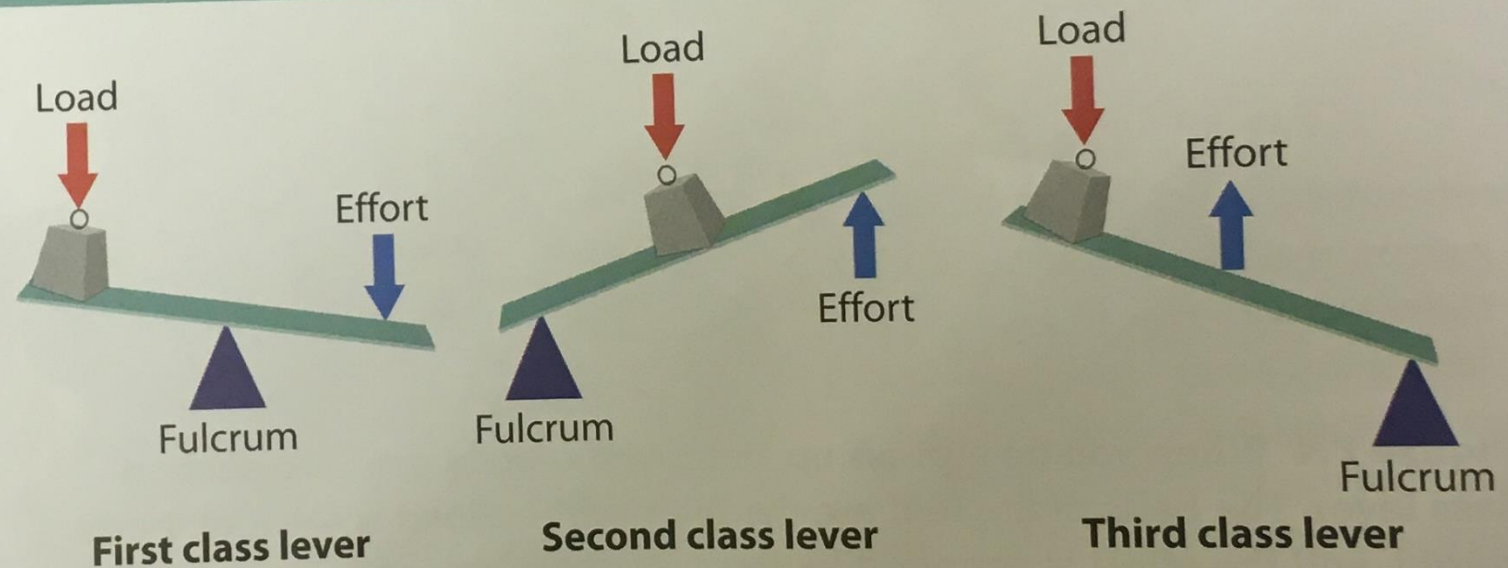
1st



Exam tip

You may be asked to draw a 'linear version' of a lever showing the position of the fulcrum, load and effort. This just means that you have to draw a simple diagram. Study the diagrams opposite and learn how to draw them.

► **Figure 2.7**



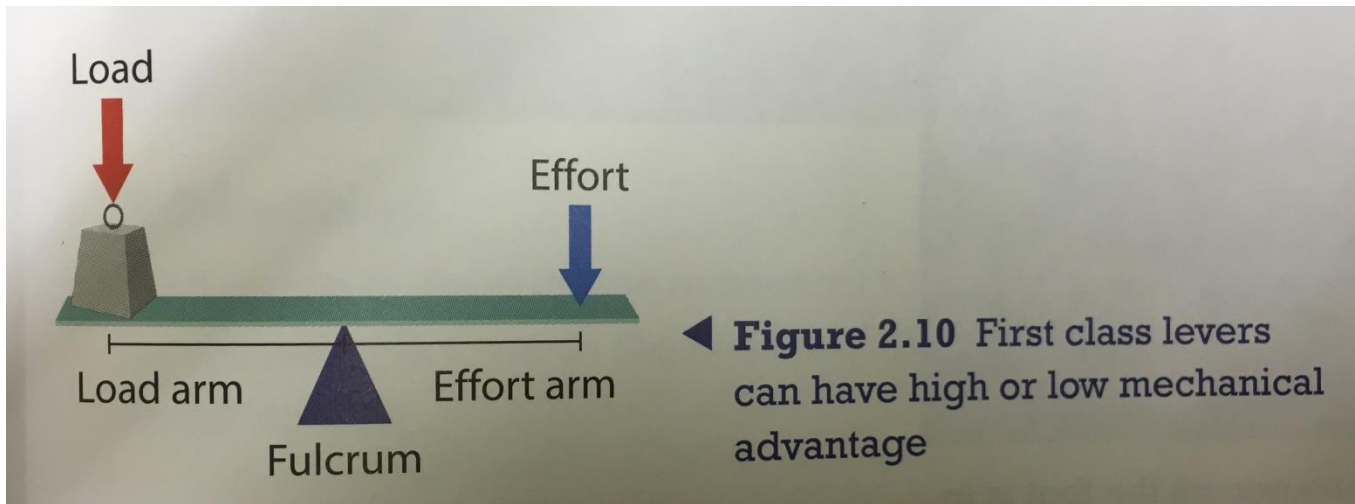
2.1 Types of levers

Most: To provide sport examples for each type of lever

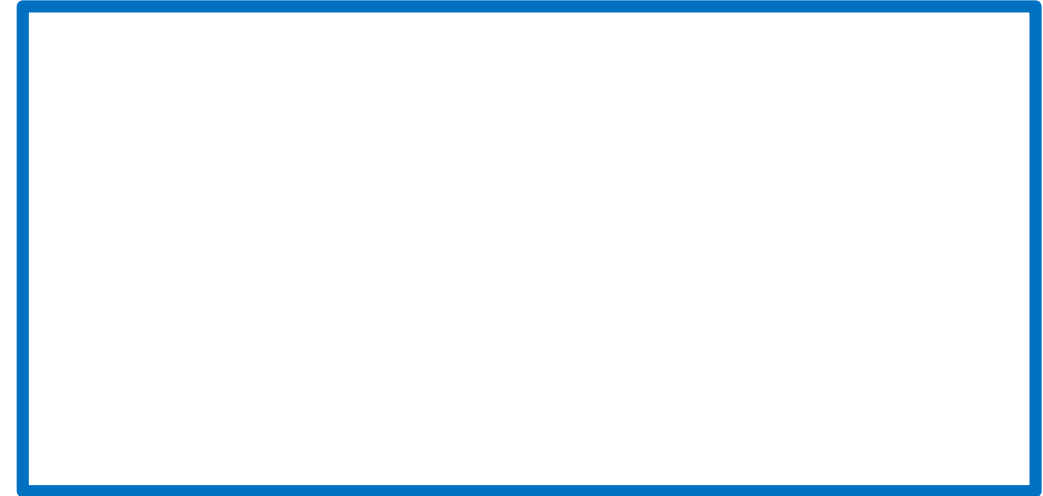
KEYWORDS



Mechanical Advantage – The distance from the load to the fulcrum is known as the load arm, while the distance from the effort to the fulcrum is known as the effort arm.

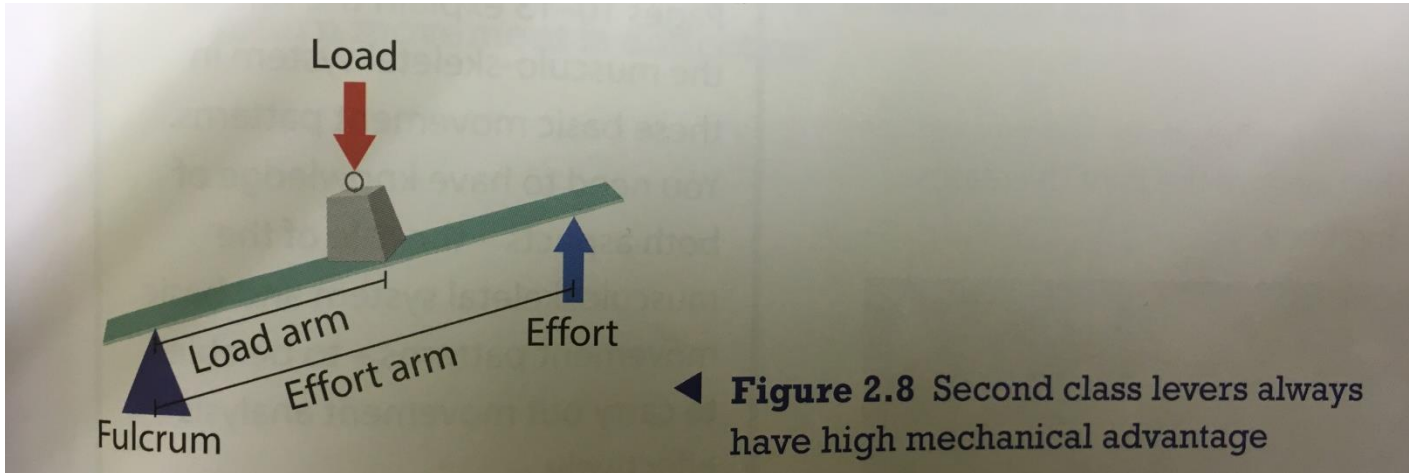


◀ **Figure 2.10** First class levers can have high or low mechanical advantage

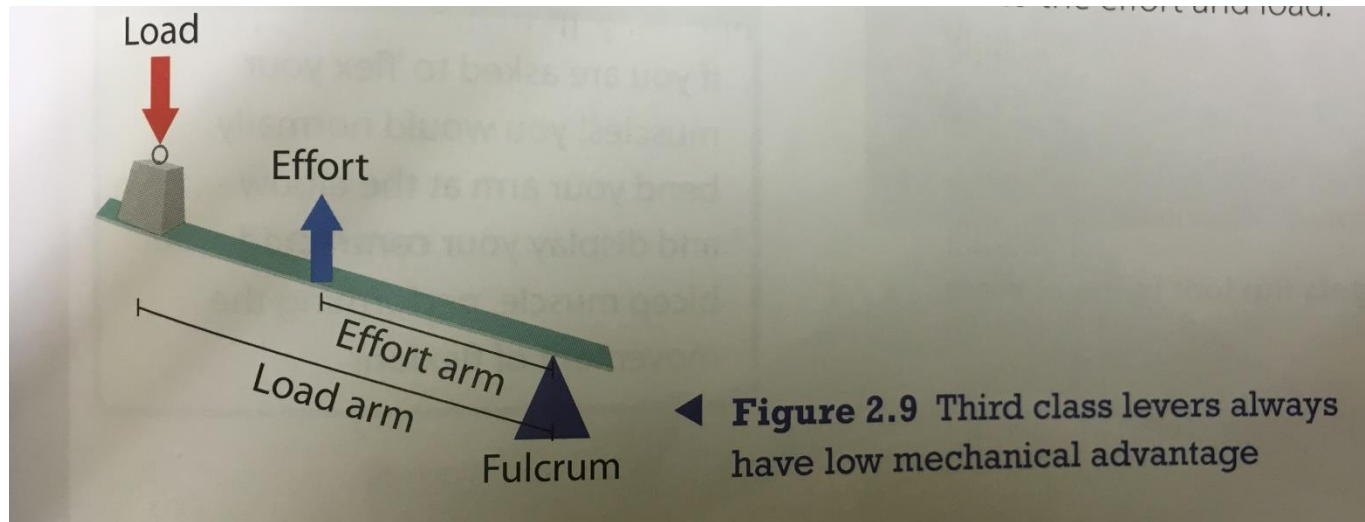




Mechanical Advantage – The distance from the load to the fulcrum is known as the load arm, while the distance from the effort to the fulcrum is known as the effort arm.



Mechanical Advantage – The distance from the load to the fulcrum is known as the load arm, while the distance from the effort to the fulcrum is known as the effort arm.



PLENARY
SESSION



Summarise this photo using key terminology from the lesson:



2.1 Types of levers

Learning Objectives

- All:** To understand what first class, second class and third class levers are
- Most:** To provide sports examples for each type of lever
- Some:** To understand the term 'mechanical advantage'

2.1 Basic Movements



Learning Objectives

- | | |
|--------------|--|
| All: | To identify the 7 basic movements |
| Most: | To define the 7 basic movements |
| Some: | To give sport examples of the 7 basic movements |



Choose 2 picture cards – on your white board answer the following questions about your pictures



How is the movement in the picture occurring?

Can you describe the movement of the body in your picture?



2.2 Basic Movements

All: To identify the 7 basic movements

Basic Movements



Flexion
Extension
Abduction
Adduction
Dorsiflexion
Plantar Flexion
Rotation



Using the text books find the definitions for the 7 basic movements

Under the diagram column sketch a diagram of what that type of movement would look like!

2.1 Basic Movements

Fill in the definitions of each basic movement by using pages 36 – 39 in the text books

Basic Movement	Definition	Diagram
Flexion		
Extension		
Abduction		
Adduction		
Dorsiflexion		
Plantar flexion		
Rotation		



Name the movement and where it's taking place...

This is

of the _____ joint.

2.2 Basic Movements

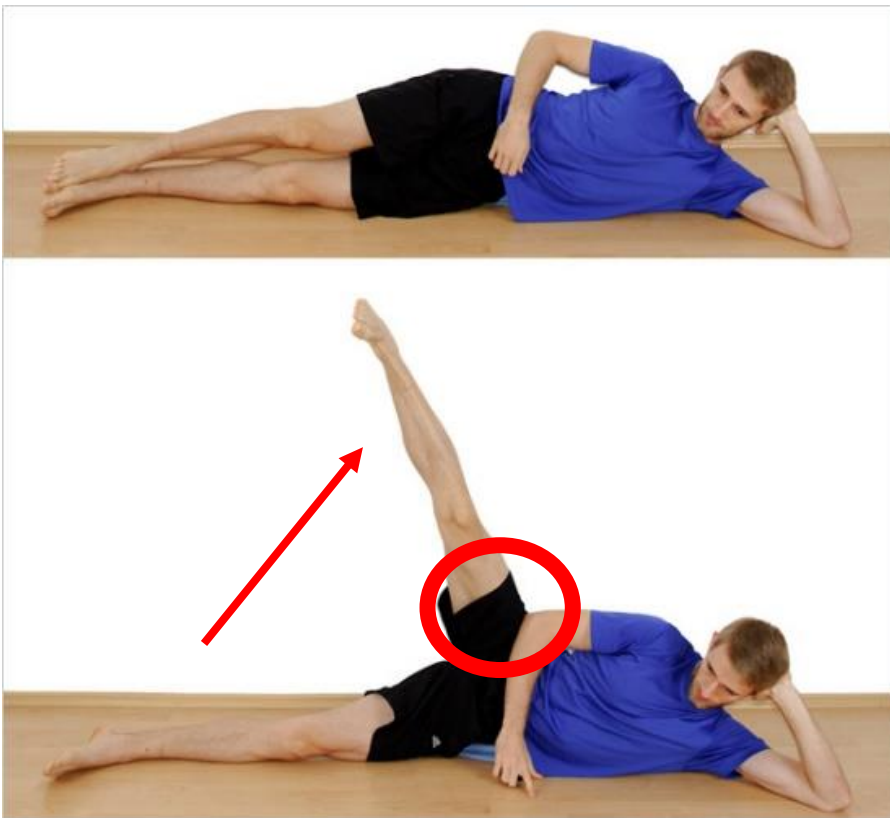
Some: To give sport examples of the 7 basic movements



Name the movement and where it's taking place...

This is

of the _____ joint.



Name the movement and where it's taking place...

This is

of the _____ joint.

2.2 Basic Movements

Some: To give sport examples of the 7 basic movements



Name the movement and where it's taking place...

This is

of the _____ joint.



Name the movement and where it's taking place...

This is

of the _____ joint.



Name the movement and where it's taking place...

This is

_____ of the _____ joint.





Name the movement and where it's taking place...

This is

of the _____ joint.

2.2 Basic Movements

Some: To give sport examples of the 7 basic movements

PLENARY
SESSION



Revisit the starter and answer the questions using the correct terminology that you have learnt this lesson



Choose 2 picture cards – on your white board answer the following questions about your pictures

How is the movement in the picture occurring?

Can you describe the movement of the body in your picture?



2.2 Basic Movements

All: To identify the 7 basic movements

Learning Objectives

- All:** To identify the 7 basic movements
- Most:** To define the 7 basic movements
- Some:** To give short examples of the 7 basic movements

2.3 Planes of movement and axes of rotation



Learning Objectives

- | | |
|--------------|--|
| All: | To identify the different planes and axes |
| Most: | To define the different planes and axes |
| Some: | To provide sport examples for the different planes and axes |

The 5 W's



Lesson focus = Planes of movement and axes of rotation



Create a question that you would like to know about the lesson focus using

Who, What, Why, Where and When?



Planes and axes are technical words to help you describe directions of movement

Think of a plane as a line drawn through the body dividing it into two parts. A movement occurs in a plane. There are three planes referred to in movement analysis: the frontal plane, the transverse plane and the sagittal plane

An axis is an imaginary line around which the body rotates. There are three different axes of rotation in movement analysis: the sagittal axis, the longitudinal axis and the transverse axis.



KEYWORDS



FRONTAL PLANE

Can you define and
draw a diagram to
represent this plane?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



KEYWORDS



TRANSVERSE PLANE

Can you define and
draw a diagram to
represent this plane?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



KEYWORDS



SAGITTAL PLANE

Can you define and
draw a diagram to
represent this plane?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



KEYWORDS



SAGITTAL AXIS

Can you define and draw a diagram to represent this axis?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



KEYWORDS



LONGITUDINAL AXIS

Can you define and draw a diagram to represent this axis?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



KEYWORDS



TRANSVERSE AXIS

Can you define and draw a diagram to represent this axis?

2.3 Planes of movement and axes of rotation

All:	To identify the different planes and axes
Most:	To define the different planes and axes



<https://www.youtube.com/watch?v=iP7fpHuVaiA>

Link the planes of movement and axes of rotation to the basic movements....

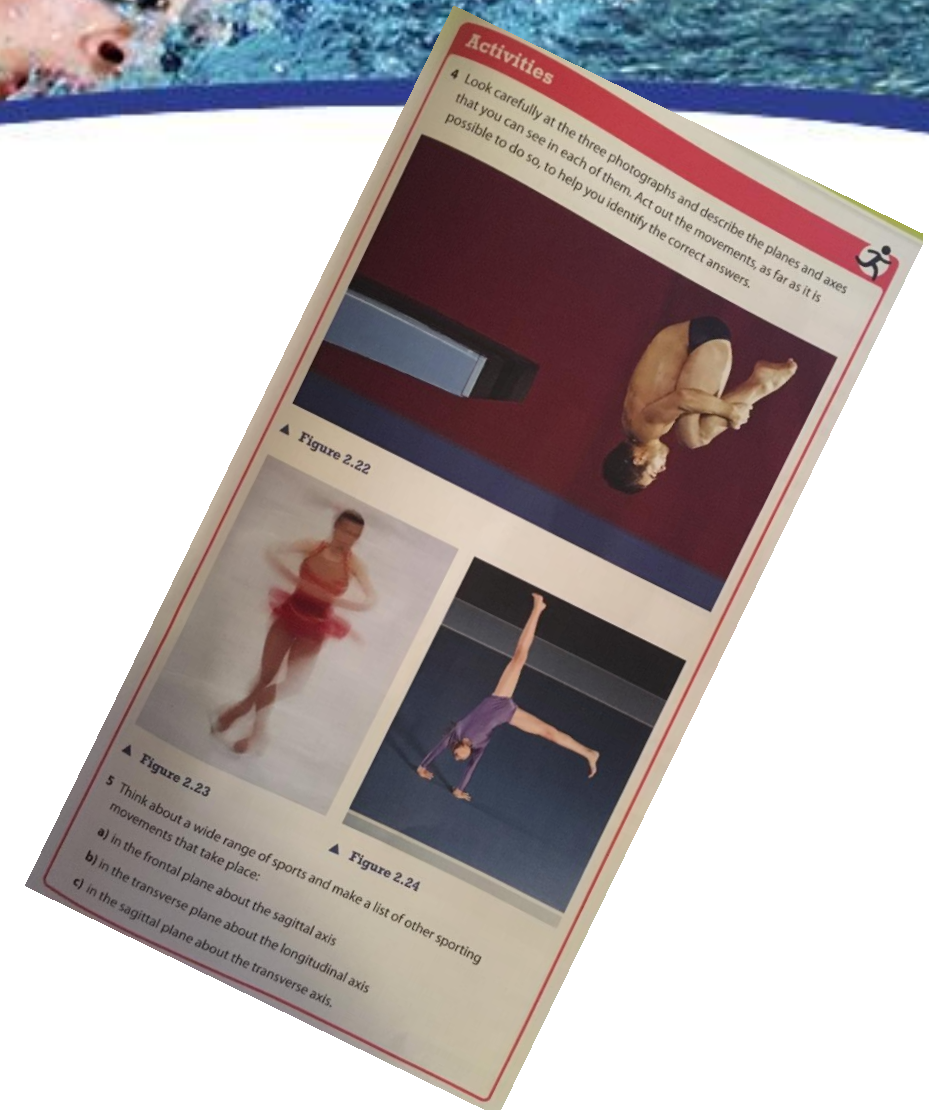
Frontal Plane and Sagittal axis	=	what type of movement? _____ sport example _____
Transverse Plane and Longitudinal axis	=	what type of movement? _____ sport example _____
Sagittal Plane and Transverse axis	=	what type of movement? _____ sport example _____

2.3 Planes of movement and axes of rotation

All: To identify the different planes and axes
Most: To define the different planes and axes



Complete the task on
page 1 in the textbook
to find sport examples
which represent the
different planes and
axis!



PLENARY
SESSION



Remember this?

Can you now
answer the
questions you
created based on
your learning from
the lesson?

The 5 W's

Lesson focus = planes of movement
and axes of rotation

Create a question that you would
like to know about the lesson focus
using

**Who, What, Why, Where and
When?**

Learning Objectives

- All:** To identify the different planes and axes
- Most:** To define the different planes and axes
- Some:** To provide sports examples for the different planes and axes