

Here's a small selection of sample slides from various topic areas of the OCR Exercise Physiology specification. Both teacher and student slides are included here (the latter are supplied as PDF files for fill-in by students)

OCR Physical Education AS / A-Level Exercise Physiology PowerPoint Summaries

This resource has been written by Claire Miller and Ali Woodward for PEfocus and has been designed to support teaching and learning of the 'new' OCR AS and GCE/A-Level PE specification for teaching from September 2016.

All 12 of our new resources (6 Teacher resource files and 6 PowerPoint summaries) have been officially endorsed by the OCR examining board.

All content mirrors the OCR Exercise Physiology specification perfectly.

The Exercise Physiology resource comprises:

- ✓ Approx **60** full colour / fully animated teacher slides
- ✓ Student slides as PDFs – with gaps to fill
- ✓ Teacher slides as PDFs – with 'answers'

This resource can be used to present new work, for summing up topic areas and for consolidation at the end of the course.

We really hope that you and your learners will find it both engaging and helpful.

The aim of this resource is to build a bank of knowledge that can be used throughout the course as well as at the end for review.

A favoured layout is to print two slides per A3 sheet; many students find the large visual style manageable, engaging and valuable as a supplement to other notes and resources.



On print-outs, fill in the blanks as you work your way through the slides

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Diet and Nutrition

Nutrition plays a vital role in supporting the training and performance demands in sport. Healthy and balanced food choices help to ensure that the athlete has enough energy, which will improve training and performance and promote recovery.



Definition

Healthy, balanced diet

a way of eating all of the right nutrients that the body needs to be healthy.

Nutrient

a substance that provides nourishment essential for life and growth.

It is recommended that each day, an adult's healthy, balanced diet should contain approximately:

- 1,940 calories for females.
- 2,550 calories for males.
- and consist of ...
- 55% carbohydrate.
- 15% protein.
- no more than 30% fat.
- '5-a-day' fruit and vegetables to provide minerals, vitamins and fibre.
- 2.5 litres of water.



Sports Supplement

Products used to enhance athletic performance. May include vitamins, minerals, amino acids or a combination of these. See presentation 2.

A balanced diet will provide the nutrients and energy necessary for sport.

The food we eat can be divided into **7** food groups.



For each food group you need to know ...

- where we get it from.
- its function.
- its importance to performance in sport.

Diet and Nutrition

Nutrition plays a vital role in supporting the training and performance demands in sport. Healthy and balanced food choices help to ensure that the athlete has enough energy, which will improve training and performance and promote recovery.



Definition

The food we eat can be divided into 7 food groups.

Healthy, balanced diet

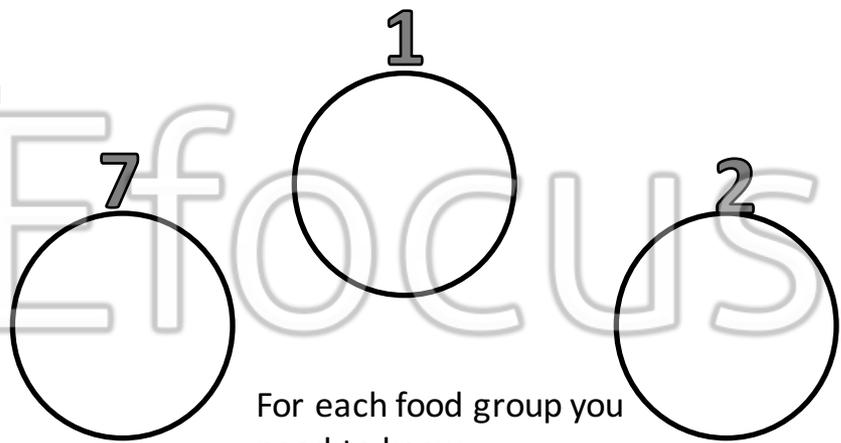
Fill in the definitions in the boxes.

Nutrient

Two empty boxes for definitions.



Write one food group in each circle.



It is recommended that each day, an adult's healthy, balanced diet should contain approximately:

- _____ calories for females.
 - _____ calories for males.
- and consist of ...
- ___ % carbohydrate.
 - ___ % protein.
 - no more than ___ % fat.
 - '___ -a-day' fruit and vegetables to provide minerals, vitamins and fibre.
 - ___ litres of water.



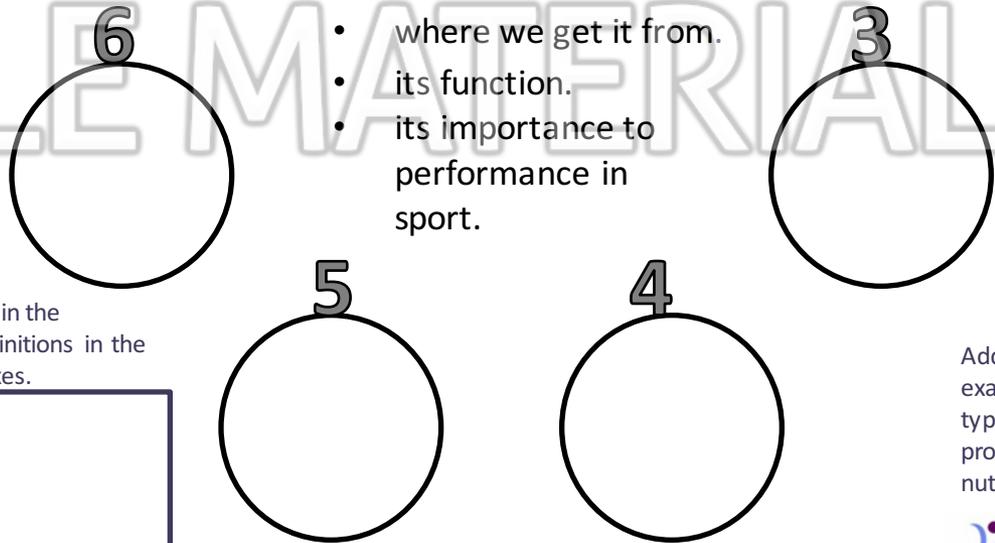
Fill in the gaps.

Sports Supplement

Two empty boxes for sports supplements.



Fill in the definitions in the boxes.



For each food group you need to know ...

- where we get it from.
- its function.
- its importance to performance in sport.



Add in an example of the type of food that provides each nutrient.

Aerobic training: Physiological adaptations

- When an appropriate programme of aerobic training is completed, the body undergoes several physiological adaptations (structural changes).
- These combine to increase aerobic capacity, allowing oxygen to be taken in, transported and utilised at a greater rate.
- Then the performer can exercise aerobically at higher intensities before experiencing fatigue.



The adaptations can be divided into four categories:

Cardiac Hypertrophy:

Increased size and contractility of the ventricles, so SV increases

Increased elasticity of the artery walls:

Increased regulation of blood pressure, and distribution of blood to working muscles

Capillarisation:

Increased number of capillaries at lungs and muscles, so gas exchange increases

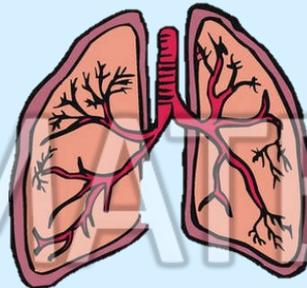
Increased red blood cells:

Oxygen carrying capacity of blood increased

1. Cardiovascular adaptations



2. Respiratory adaptations



Increased strength of respiratory muscles:

Increased lung volume, decreased fatigue of respiratory muscles, more efficient ventilation

Increased surface area of alveoli:

Increased diffusion of oxygen

Increased blood plasma:

Blood viscosity reduced which increases flow.



Exam tip:

Check the command word:
Identify = **bold key terms**
Explain = the rest of the information in each box



Aerobic training: Physiological adaptations

- When an appropriate programme of aerobic training is completed, the body undergoes several physiological adaptations (structural changes).
- These combine to increase aerobic capacity, allowing oxygen to be taken in, transported and utilised at a greater rate.
- Then the performer can exercise aerobically at higher intensities before experiencing fatigue.

The adaptations can be divided into four categories:

Write the key terms that link to each description 

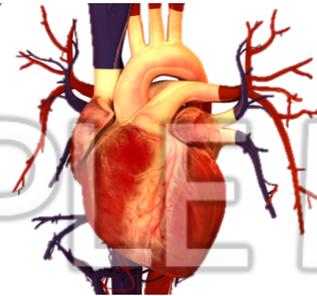
Increased size and contractility of the ventricles, so SV increases

Increased regulation of blood pressure, and distribution of blood to working muscles

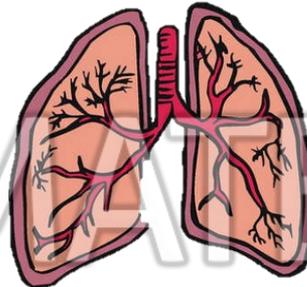
Increased number of capillaries at lungs and muscles, so gas exchange increases

Oxygen carrying capacity of blood increased

1. Cardiovascular adaptations



2. Respiratory adaptations



Increased lung volume, decreased fatigue of respiratory muscles, more efficient ventilation

Increased diffusion of oxygen

Blood viscosity reduced which increases flow.

Exam tip:

Check the command word:

Identify = the key terms you've added
Explain = the information below each key term

Training to develop strength: Types of training

Multi-gym:

A piece of equipment with a range of stations and adjustable weight stacks.
Movement of the weight is controlled - increasing safety.

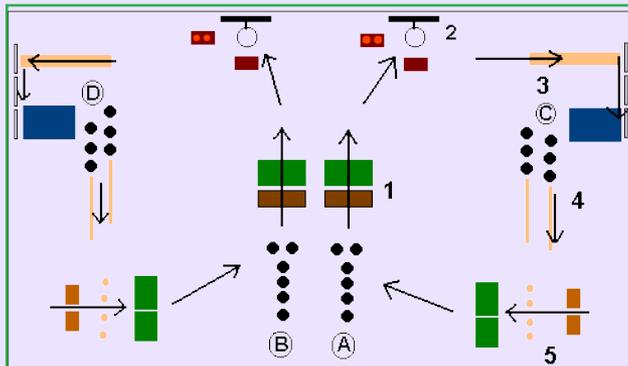


Weights:

Free weights using dumbbells or barbells can be used to work specific muscle groups. Other muscles (including the core stability muscles) also work as fixators to stabilise the movement increasing their isometric strength.

Plyometrics:

Training involving bounding, jumping, press ups with claps etc. This takes advantage of the stretch reflex - a contraction of a muscle in response to it being stretched, which is a protective mechanism. An eccentric contraction (controlled, downwards action) occurs first which causes a more forceful concentric contraction to follow. This increases explosive strength.



Circuit/Interval training:

Periods of work on a series of exercise stations, followed by a relief interval where the muscle group recovers. This recovery may occur whilst another area of the body is being worked at the next station.

Circuit/interval training can include free weights as well as body weight exercises, and usually targets strength endurance. An advantage is that it can be used with large groups .





Fill in blanks – and give examples of exercises used in each type of training

Multi-gym:

A piece of equipment with a range of _____ and adjustable _____ stacks.
Movement of the weight is controlled - increasing _____.



Examples of multi-gym exercises:

Weights:

Free weights using _____ or barbells can be used to work specific _____ groups. Other muscles (including the core stability muscles) also work as fixators to _____ the movement increasing their isometric _____.

Examples of free weights exercises:



Plyometrics:

Training involving bounding, jumping, press ups with claps etc. This takes advantage of the stretch _____ a contraction of a muscle in response to it being stretched, which is a protective mechanism.
An eccentric contraction (controlled, downwards action) occurs first which causes a more forceful concentric contraction to follow.
This increases _____ strength.

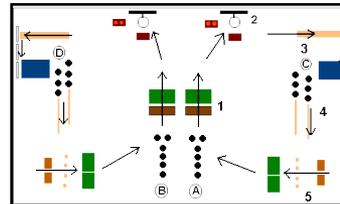
Examples of plyometrics exercises:



Circuit/Interval training:

Periods of work on a series of exercise stations, followed by a relief interval where the muscle group recovers. This recovery may occur whilst another area of the body is being worked at the next station. Circuit/interval training can include free weights as well as body weight exercises, and usually targets _____
An advantage is that it can be used with _____.

Examples of circuit/interval exercises:



Impact of training on lifestyle diseases



Definition

Definition



unhealthy cardiovascular system



A sedentary lifestyle that is high in coronary risk factors increases chance of:

- atherosclerosis
- coronary heart disease
- angina
- heart attack
- hypertension
- stroke
- high LDL cholesterol
- low HDL cholesterol



healthy cardiovascular system



Regular training and lifestyle choices greatly decrease risk of cardiovascular disease due to physiological adaptations and health benefits.

HEART

- cardiac hypertrophy / increased SV / decreased resting HR / more efficient heart / decreased cardiovascular strain.

BLOOD VESSELS

- increased efficiency of coronary arteries / increased O₂ delivery to heart muscle.
- increased elasticity of artery walls / more efficient vasodilation and vasoconstriction / reduced risk of hardening of artery walls / decreased blood pressure.

BLOOD

- decreased blood fats and LDL cholesterol / increased HDL cholesterol
- decreased blood viscosity / increased blood flow / decreased blood pressure.

OTHER

- body weight better managed / healthy energy balance.

conditions or habits that increase the risk of

most risk factors are modifiable by lifestyle choices..

- overweight or obese
- smoking
- high LDL cholesterol
- hypertension
- unhealthy diet.

3 types:

1. ischaemic stroke: caused by a blockage of O₂ supply to brain.
2. haemorrhagic stroke: caused by a bleed in or around brain
2. TIA a mini ischaemic stroke where symptoms last for less than 24 hours caused by a temporary blockage.

good cholesterol. Low in blood fats and removes LDL cholesterol from walls of arteries and transports to liver.

sedentary lifestyle

an inactive lifestyle.

atherosclerosis

a condition where fatty plaque builds up in the walls of arteries causing their walls to harden and their lumen to narrow.

coronary heart disease (CHD)

a condition where fatty plaque builds up in the walls of the coronary arteries causing them to narrow and reduce blood supply to the heart. This may lead to angina and heart attack.

coronary arteries

blood vessels that supply oxygen rich blood to the entire heart muscle.

angina

partial blockage of a coronary artery causing chest pain due to lack of O₂ to heart muscle.

heart attack

a complete blockage of a coronary artery causing total restriction of O₂ to heart muscle.

coronary risk factors

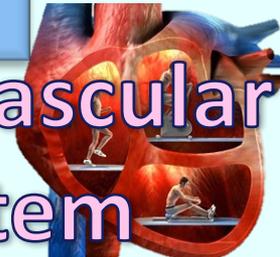
hypertension

stroke

LDL cholesterol

HDL cholesterol

cardiovascular system



Impact of training on lifestyle diseases



Definition

unhealthy cardiovascular system

A sedentary lifestyle that is high in coronary risk factors increases chance of:

- ath _____
- ang _____
- hyper _____
- high __ cholesterol
- c ___ h ___ d ___
- h ___ a ___
- s _____
- low __ cholesterol

healthy cardiovascular system

Regular training and lifestyle choices greatly decrease risk of cardiovascular disease due to physiological adaptations and health benefits.

HEART

-

BLOOD VESSELS

-
-

BLOOD

-
-

OTHER

-

Definition



Give some e.g.s of risk factors.

-
-
-
-
-

coronary risk factors

most risk factors are modifiable by lifestyle choices..

hypertension

stroke

LDL cholesterol

HDL cholesterol

Use your knowledge of aerobic physiological adaptations to fill in some benefits to health for each component of the cardiovascular system.



sedentary lifestyle

atherosclerosis

coronary heart disease (CHD)

Fill in the definitions in the boxes.

coronary arteries

angina

heart attack

Acute and chronic injuries



	Sports injury	Acute injury	Chronic injury	Hard tissue injuries	Soft tissue injuries	Concussion
Definition	any kind of injury, pain or physical damage that occurs as a result of sport, exercise or physical activity.	sports injuries that occur in an instant.	sports injuries that occur over an extended period of time - sometimes called overuse injuries.	injury, pain or physical damage to the solid structures of the musculo-skeletal system: bone; cartilage.	injury, pain or physical damage to the soft structures of the musculo-skeletal system: muscles, tendons, ligaments.	a violent acceleration - deceleration force of the brain, resulting in impairment of neurological function.
Further information	most commonly associated with the musculo-skeletal system: muscles; bones; ligaments; tendons; cartilage.	acute and chronic injuries result in: <ul style="list-style-type: none"> • pain. • swelling. • tenderness. • weakness. • inability to use or place weight on injured area. 		Examples: <ul style="list-style-type: none"> • fracture. • stress fracture. • dislocation. • meniscus tear. 	Examples: <ul style="list-style-type: none"> • tear. • strain. • sprain. 	Can cause: <ul style="list-style-type: none"> • a contusion of the brain tissue. • a haemorrhage inside the skull.

FAQs:

Question: What is the difference between a sprain and a strain?

Answer:

- both are acute injuries.
- both are soft tissue injuries.
- a sprain refers to an injury of the ligament.
- a strain refers to an injury of the muscle or tendon.

Question: How are sprain and strain injuries classified?

Answer:

- they are graded into 3 categories.

Grade 1:

- minor stretching of soft tissue.
- little loss of joint stability.

Grade 2:

- stretching and some tearing of soft tissue.
- moderate joint instability.

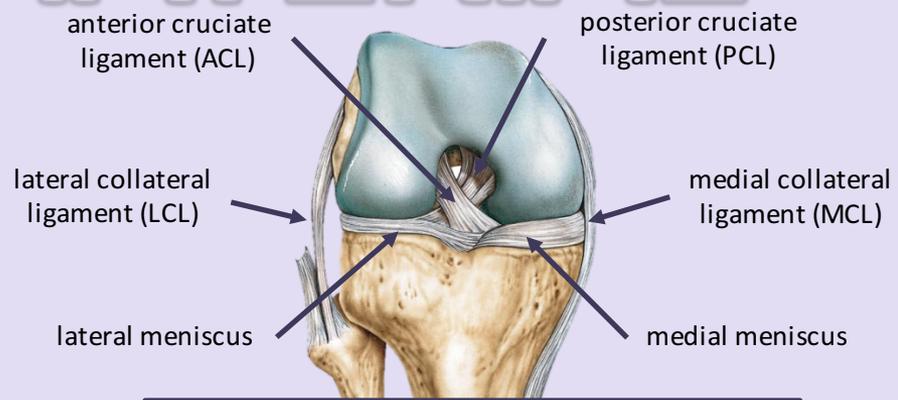
Grade 3:

- complete tear or rupture of soft tissue.
- gross joint instability.

Question: What is the most frequently injured joint in the body?

Answer:

- the knee because it is the least stable joint in the body relying on 4 ligaments and 2 meniscus to increase its stability.



anatomy of right knee – anterior view

Acute and chronic injuries

Fill in the definitions in the boxes.

Sports injury	Acute injury	Chronic injury	Hard tissue injuries	Soft tissue injuries	Concussion
<p>most commonly associated with the musculo-skeletal system: m _____; b _____; l _____; t _____; c _____.</p>	<p>acute and chronic injuries result in:</p> <ul style="list-style-type: none"> • pain / swelling / tenderness / weakness. • inability to use or place weight on injured area. <p>Examples:</p> <ul style="list-style-type: none"> • f _____. • d _____. • st _____. • sp _____. 	<p>Examples:</p> <ul style="list-style-type: none"> • tendinitis. • stress fracture. 	<p>Examples:</p> <ul style="list-style-type: none"> • f _____. • s _____ f _____. • d _____. • m _____ tear. 	<p>Examples:</p> <ul style="list-style-type: none"> • t _____. • st _____. • sp _____. 	<p>Can cause:</p> <ul style="list-style-type: none"> • a c _____ of the brain tissue. • a h _____ inside the skull.

KEY WORDS

Definition

Further information

FAQs:

Question: What is the difference between a sprain and a strain?

Answer:

- both are _____ injuries.
- both are _____ tissue injuries.
- a sprain refers to an injury of the _____.
- a strain refers to an injury of the _____ or _____.

Question: How are sprain and strain injuries classified?

Answer:

- they are graded into 3 categories.

Grade 1:

- minor s _____ of soft tissue.
- little loss of j _____ s _____.

Grade 2:

- s _____ and some t _____ of soft tissue.
- moderate j _____ s _____.

Grade 3:

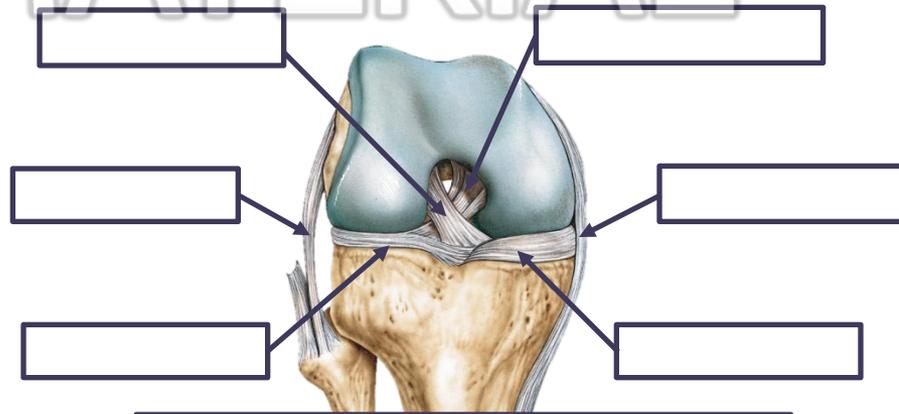
- complete t _____ or r _____ of soft tissue.
- gross j _____ ins _____.

Label the right knee joint.

Question: What is the most frequently injured joint in the body?

Answer:

- the knee because it is the least stable joint in the body relying on 4 _____ and 2 _____ to increase its stability.



anatomy of right knee – anterior view



SALTAPS

Definition

an assessment tool to evaluate the degree of seriousness of an acute injury. It will help decide if athlete can continue or if they need further medical intervention.

- look at the area of pain **and** the area around it.
- check for signs and symptoms of acute injury.
- compare left and right limb to look for differences e.g.
 - swelling?
 - bruising?
 - deformities to joint or bone?

- (athlete moving joint)
- assess the range of movement around the injured joint.
 - ask athlete to move injured limb as far as is comfortable for them.
 - ask if they had to stop because of pain or because of stiffness to the joint.
 - compare range of movement of injured limb with opposite limb.

- assess for strength of injured limb in mid range of movement, as this is the easiest place for muscle recruitment. e.g.
 - in the knee joint at the middle point of full extension and full flexion.
- use isometric muscle strength testing by asking athlete to push against the therapist and resist the external force.
- always keep an eye on the athlete's face for a pain response in addition to a verbal response.

See

- The therapist may have already seen the injury happen e.g.
 - a player's boot got stuck in the ground and their knee twisted inwards.

Ask

- clarify what happened to cause the acute injury.
- ask the athlete questions to get more details of the level and area of pain e.g.
 - talk me through what happened.
 - where is the pain?
 - is it a sharp pain or dull ache?
 - did you hear anything when it happened?
 - have you got pain anywhere else? hip? ankle?

Look

Touch

- touch gently all areas around the injured joint.
- start on the opposite side to where the pain has been identified.
- touch area of pain last. If this area is touched first it can create a positive pain response to other areas as the injured area has been aggravated.
- always keep an eye on the athlete's face for a pain response in addition to a verbal response.

Active

movement

- (the therapist moving joint)
- assess the range of movement around the injured joint by the therapist moving joint to remove activation of muscles.
 - athlete must relax completely and let therapist know when to stop.
 - ask if they had to stop because of pain or because of stiffness to the joint.
 - compare range of movement of injured limb with opposite limb.
 - always keep an eye on the athlete's face for a pain response in addition to a verbal response.

Passive

movement

Strength

Fill in the definition in the box.

KEY WORDS



SALTAPS

Definition

- look at the area of pain **and** the area around it.
 - check for signs and symptoms of a _____ injury.
 - _____ left and right limb to look for differences
- e.g.
- -
 -



Give 3 e.g.s of signs and symptoms the therapist might look for.

(_____ moving joint)

- assess the r_____ o_____ m_____ around the injured joint.
- ask _____ to move injured limb as far as is comfortable for them.
- ask if they had to stop because of pain or because of stiffness to the joint.
- _____ r_____ o_____ m_____ of injured limb with opposite limb.

- assess for s_____ of injured limb in mid range of movement, as this is the easiest place for muscle recruitment.

e.g.

-

Give an e.g..



- use _____ muscle strength testing by asking athlete to push against the therapist and resist the external force.
- always keep an eye on the athlete's _____ for a pain response in addition to a verbal response.



Fill in the gaps.

S

- The therapist may have already seen the injury happen e.g.

Give an e.g..



A

- clarify what happened to cause the acute injury.
- ask the athlete questions to get more details of the level and area of pain e.g.

-

-

-

Give 3 e.g.s of questions the therapist might ask.



T

- t_____ gently all areas around the injured joint.
- start on the _____ side to where the pain has been identified.
- t_____ area of pain last. If this area is t_____ first it can create a positive pain response to other areas as the injured area has been aggravated.
- always keep an eye on the athlete's _____ for a pain response in addition to a verbal response.

Fill in the gaps.



A

movement

P

movement

S

(the _____ moving joint)

- assess the range of movement around the injured joint by the _____ moving joint to remove activation of muscles.
- athlete must _____ completely and let _____ know when to stop.
- ask if they had to stop because of pain or because of stiffness to the joint.
- compare r_____ o_____ m_____ of injured limb with opposite limb.
- always keep an eye on the athlete's _____ for a pain response in addition to a verbal response.

*GCE/A-level only

11.6 Rehabilitation of injury – treatments: Heat, cold and contrast therapies

KEY WORDS

	Analgesia	Vasodilation	Vasoconstriction	Cryotherapy	'game ready' systems
Definition	relief from pain.	a decrease in sympathetic stimulation causes a widening of the blood vessel.	an increase in sympathetic stimulation causes a narrowing of the blood vessel.		

Heat

- improves treatment of soft tissue injuries.
- provides pain relief.
- vasodilation of blood vessels.
- increases blood flow to injured site.
- increases bleeding and swelling if applied in first 24 hours of acute injury.
- burns.
- warm shower or bath.
- heat packs.
- apply for 15 minutes.
- check for redness after 5 minutes.

Cold

- provides analgesia, decreasing pain.
- vasoconstriction of blood vessels.
- decreases swelling.
- ice burns.
- superficial nerve damage.
- cryotherapy.
- ice packs.
- ice wraps.
- ice massage.
- ice baths.
- game ready systems.
- apply for 5-10 minutes.

Contrast therapies

- decreases swelling by alternating heat and cold.
- provides pain relief.
- increases blood flow to injured site.
- increases bleeding and swelling if used in first 24 hours of acute injury due to heat phase.
- burns.
- hot bath to cold bath.
- 4 minutes hot / 1 minute cold.
- repeat 3-7 times.
- always finish with cold to encourage vasoconstriction.

Benefits:

Risks:

Examples:

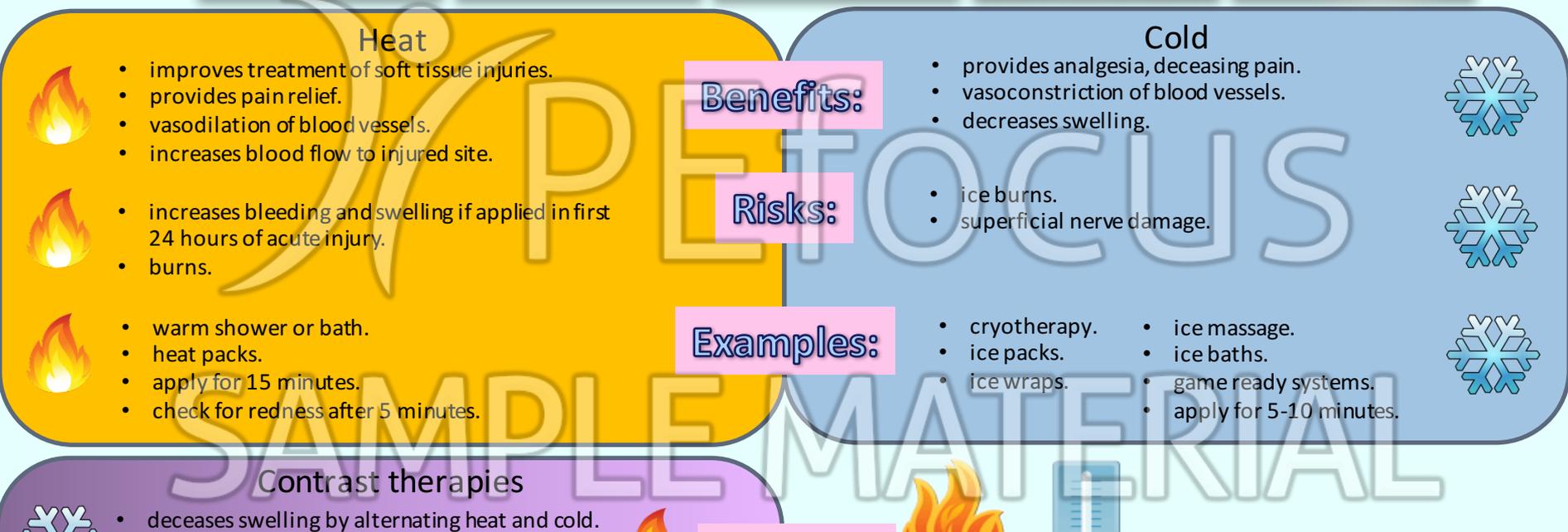
Benefits:

Risks:

Examples:

Good treatment for:

- stress fractures.
- dislocation.
- sprain.
- torn cartilage.
- exercise induced muscle damage.



11.6 Rehabilitation of injury – treatments: Heat, cold and contrast therapies

KEY WORDS

Analgesia

Vasodilation

Vasoconstriction

Cryotherapy

'game ready' systems



Definition

Fill in the definitions in the boxes.

Heat



- improves treatment of _____ tissue injuries.
- provides _____ relief.
- vas _____ of blood vessels.
- _____ blood flow to injured site.
- _____ bleeding and swelling if applied in first _____ hours of acute injury.
- burns.

Fill in the gaps.

- warm shower or bath.
- heat packs.
- apply for _____ minutes.
- check for redness after 5 minutes.



Benefits

Risks

Examples

Cold



- provides analgesia, decreasing _____.
- vaso _____ of blood vessels.
- _____ swelling.
- _____ burns.
- superficial nerve damage.

Fill in the gaps.



- cryotherapy.
- ice packs.
- ice wraps.
- ice massage.
- ice baths.
- game ready systems.
- apply for _____ - _____ minutes.

Contrast therapies



- _____ swelling by alternating _____ and _____.
- provides _____ relief.
- _____ blood flow to injured site.
- _____ bleeding and swelling if used in first 24 hours of acute injury due to heat phase.
- burns.

Fill in the gaps.

- hot bath to cold bath.
- _____ minutes hot / _____ minute cold.
- repeat _____ - _____ times.
- always finish with cold to encourage vaso _____.



Benefits

Risks

Examples

Good treatment for:

- s _____ f _____.
- d _____.
- s _____.
- t _____ c _____.
- e _____ i _____.
- m _____ d _____.

