



Revision Series 2024

CTEC Sport Level 3:

Unit 1 Body Systems and the Effects of Physical Activity

◆ Notes pages ◆



The EverLearner

How to use this revision session and notes

- Complete this document when doing the live or on-demand revision shows.
- The imagery contained in the notes is designed for you to be able to study the core subject knowledge prior to the live session.
- During the live session, James will guide you through how to use that knowledge in your exam.
- Focus on the skills that James is presenting as much as the content. In most cases, students have a knowledge of the topic but struggle to respond to the command in the question. This is a focus of our revision.
- Complete the notes pages as extensively as possible and, if necessary, return to the show to complete it more than once in order to make the fullest notes possible.
- Have the National Mock Exam to hand and, ideally, your completed, marked version of it.
- Have the [exam infographics](#) to hand. These will be referred to throughout the show.

My ticklist:

- Notes pages
- Exam infographics
- Exam paper
- Exam mark scheme
- Exam model answers

During the live show, we will cover...

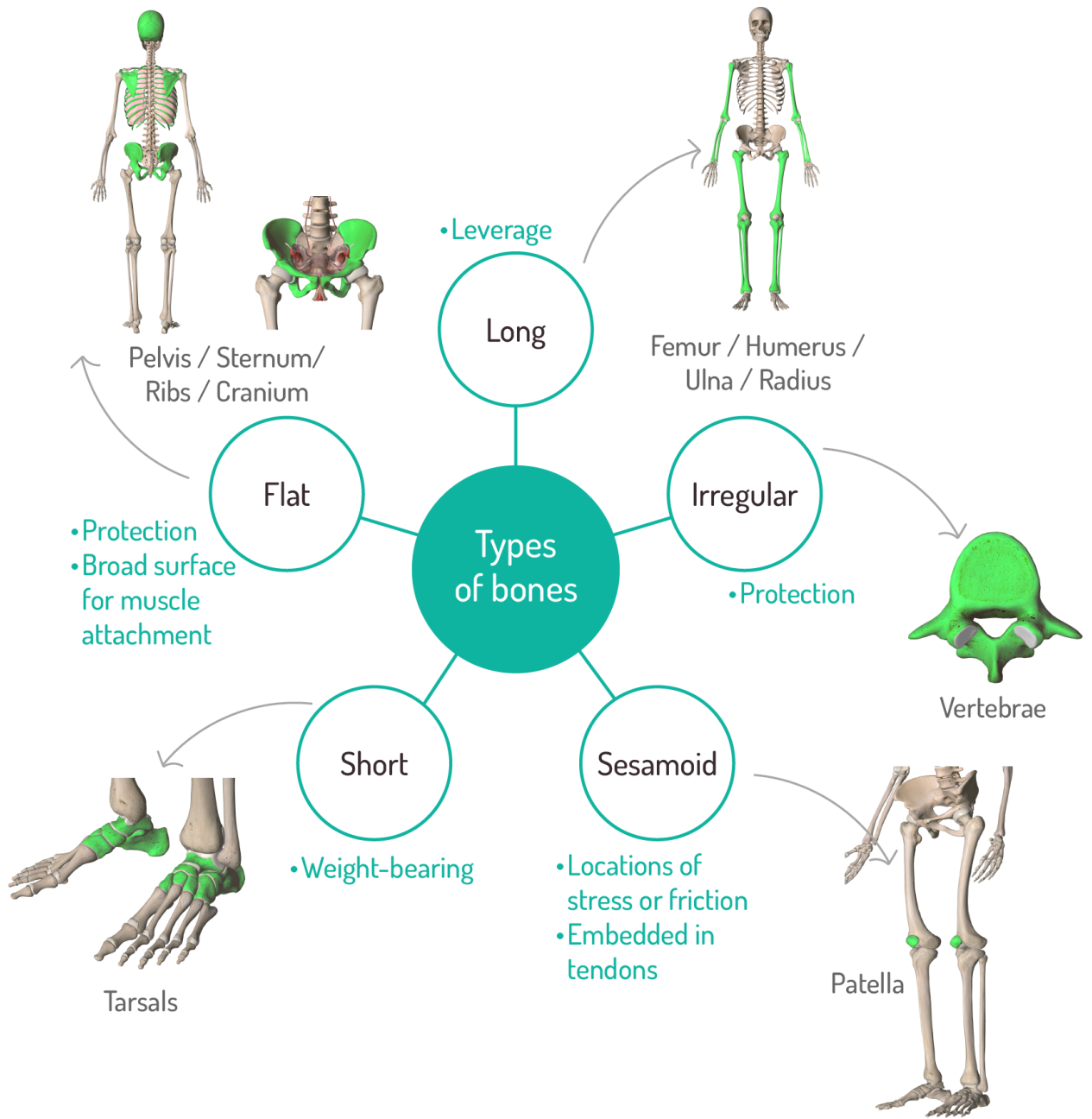
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We will also cover a wide array of exam skills including command terms for shorter and longer questions as well as the extended writing requirements of the paper.

You may also find it useful to study our previous revision shows when different samples of content and skills have been developed.

Topic 1: The functions of the skeleton and the link to types of bone

Functions of the skeleton	Support	Such as the lower body when landing from a _____ or the head when _____.
	Protection of vital organs by flat bones	Cranium protects the brain during a rugby tackle.
		_____ protect the lungs when being struck in a _____ bout.
		Sternum protects the _____ during a fall from the high bar in _____.
		_____ protect the spinal cord during a crash in motor sport.
	Movement	Leverage such as the ankle acting as a 2nd class lever during plantar flexion and providing mechanical advantage when jumping for a rebound in basketball.
	Structural shape and points of attachment	Muscles contract via tendons onto bones such as the _____ tendon pulling on the radius to cause elbow _____.
		Posture including sporting posture - upright posture, running posture, curve of the spine.
	Mineral storage	Calcium for bone strength allowing more _____ contractions against the bones during _____.
		Phosphorous for ongoing muscle _____ during an Olympic _____ event without fatigue.
		Iron for _____ which then transports oxygen to be utilised in _____ respiration during a triathlon.
	Blood cell production	In the bone marrow or long and flat bones
		RBCs for O ₂ and CO ₂ transport making aerobic respiration more efficient during a _____.
WBCs for immunity keeping performers healthy and training regularly.		
Platelets (cell fragments) for clotting when the skin is broken during a _____ from a BMX bike (race).		



Functions of the skeleton	Description	Type of bone(s)	Example of how this aids sports performance
Mineral storage	Calcium, phosphorus and iron are all stored in the bones.	_____	_____
Blood-cell production	_____	Long bones	This leads to athletes not fatiguing towards the end of long events, such as a netball match or marathon.
_____	Bones provide muscle attachment, which allows the muscles to pull on the bones and move at the joints.	_____	_____
_____	_____	Flat bones	Cranium protects the brain when heading the ball in football, ribs protect the heart and lungs when tackled in rugby.
Shape	_____	_____	Bending over in order to get into the correct position for a scrum in rugby.
Support	It gives the body a framework and holds the body upright, giving stability.	_____	_____



Want to know more?

Watch the FREE tutorial "Types of bones" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 2: Types of muscle contraction

Type of muscle contraction	Description	Sporting example
Isometric contraction	Muscle remains the same length under tension.	Holding a plank, an equally balanced pack pushing against each other in a rugby scrum.
Concentric contraction	Muscle shortens under tension.	Lifting a dumbbell in a bicep curl, the arm movement when shooting a three-pointer in basketball.
Eccentric contraction	Muscle lengthens under tension.	Lowering a dumbbell in a controlled manner during a biceps curl, landing after a jump to retrieve the ball in netball

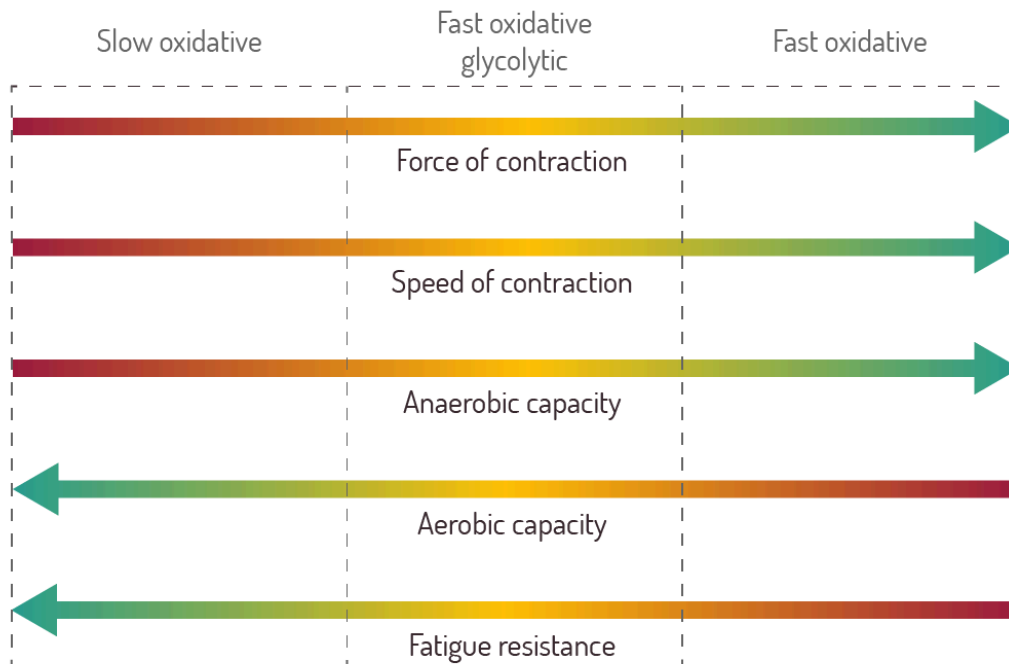
Skill	Joint	Muscle function	Muscle(s) acting	Type of contraction
Holding the 'set' position for a sprint start	Elbow	_____	_____	Isometric contraction
Standing in a ready position in tennis, about to receive a serve	Knee	_____	_____	Isometric contraction
Landing from a vault in gymnastics	Knee	_____	_____	Eccentric contraction
Following through, after hitting a serve in squash	Shoulder	_____	_____	Concentric contraction
Catching the netball from a centre pass	Elbow	_____	_____	Eccentric contraction
Hitting the ball in hockey in order to score	Elbow	_____	_____	Concentric contraction



Want to know more?

Watch the FREE tutorial "Types of contraction" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 3: Muscle fibre types



Slow twitch		Fast oxidative glycolytic		Fast glycolytic	
Structural	Functional	Structural	Functional	Structural	Functional
Small muscle fibre diameter	_____	Large muscle fibre diameter	_____	Large muscle fibre diameter	_____
Small motor neurone size	_____	Large motor neurone size	_____	Large motor neurone size	_____
Red in colour	_____	Reddish in colour	_____	White in colour	_____
High mitochondrial density	_____	Low mitochondrial density	_____	Low mitochondrial density	_____
High myoglobin content	_____	Low myoglobin content	_____	Low myoglobin content	_____
High capillary density	_____	High glycogen stores	_____	High glycogen stores	_____
Low myosin ATPase	_____	Medium PC stores	_____	High PC stores	_____

Slow twitch		Fast oxidative glycolytic		Fast glycolytic	
Structural	Functional	Structural	Functional	Structural	Functional
Low PC stores	_____	Low capillary density	_____	Low capillary density	_____
_____	_____	High myosin/ATPase	_____	High myosin/ATPase	_____

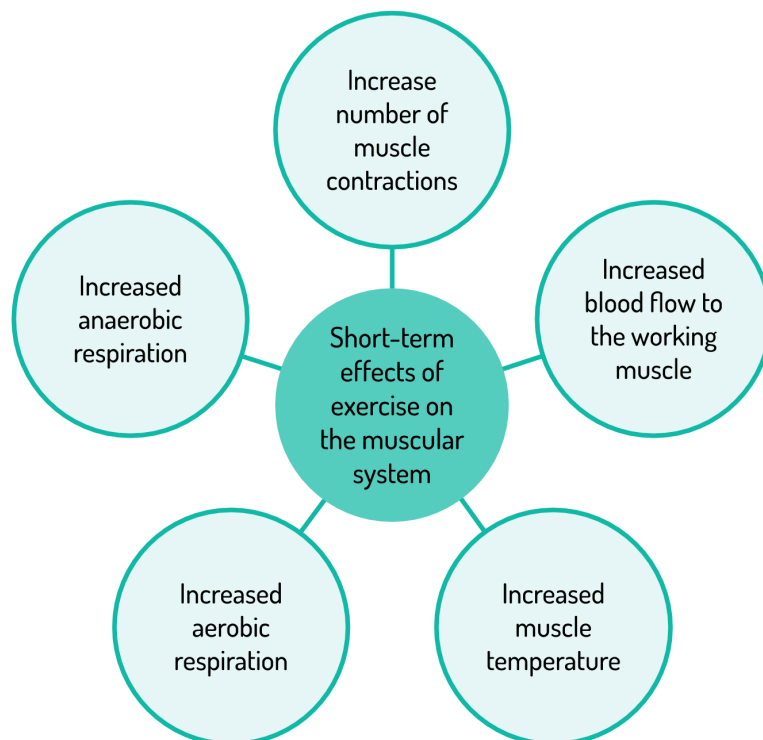
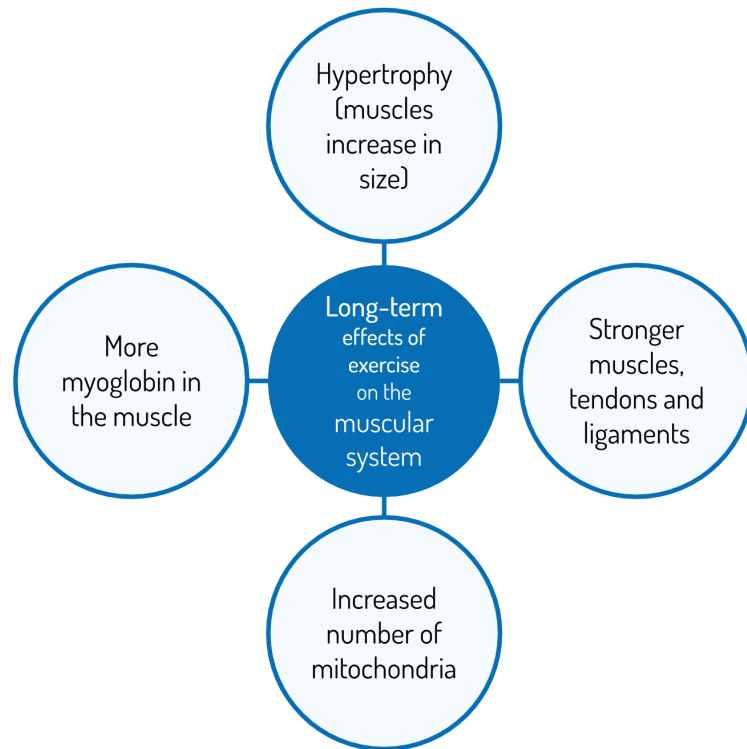
Athlete	% of muscle fibres sampled from the biopsy		
	Type I slow oxidative	Type IIa fast oxidative glycolytic	Type IIb fast glycolytic
Sandra	20	60	20
Milo	9	14	77
Yan	60	19	11
Clinton	30	51	19

Athlete	Sporting activity most suited to	Justification	Sporting activity least suited to	Justification
Sandra	_____	_____	_____	_____
Milo	_____	_____	_____	_____
Yan	_____	_____	_____	_____
Clinton	_____	_____	_____	_____



Want to know more? Watch the FREE tutorial "Muscle fibre types" on [TheEverLearner.com](https://www.theeverlearner.com)

Topic 4: The impact of physical activity, training and lifestyle on the muscular system



Long-term effect	Impact	Athlete who may benefit
Muscular hypertrophy	<hr/> <hr/> <hr/> <hr/> <hr/>	Gymnast
Improve muscular endurance	An Olympic rower is able to repeatedly apply force to the water over a period of 8-10 mins without fatigue and without passing the lactate threshold which means they can maintain pace and even accelerate for the finish.	Rower
Stronger tendons and ligaments	<hr/> <hr/> <hr/> <hr/> <hr/>	Netball player
Increased number of mitochondria	<hr/> <hr/> <hr/> <hr/> <hr/>	Triathlete
More myoglobin in the muscle	<hr/> <hr/> <hr/> <hr/> <hr/>	Tennis player

*** Short-term effects include during and immediately after exercise and physical activity. ***

Immediate effects of exercise	How the effect aids immediate performance
Increased number of muscle contractions	<hr/> <hr/> <hr/>
Increased blood flow to the working muscles	<hr/> <hr/> <hr/>
Increased aerobic respiration	<hr/> <hr/> <hr/>
Increased anaerobic respiration	<hr/> <hr/> <hr/>

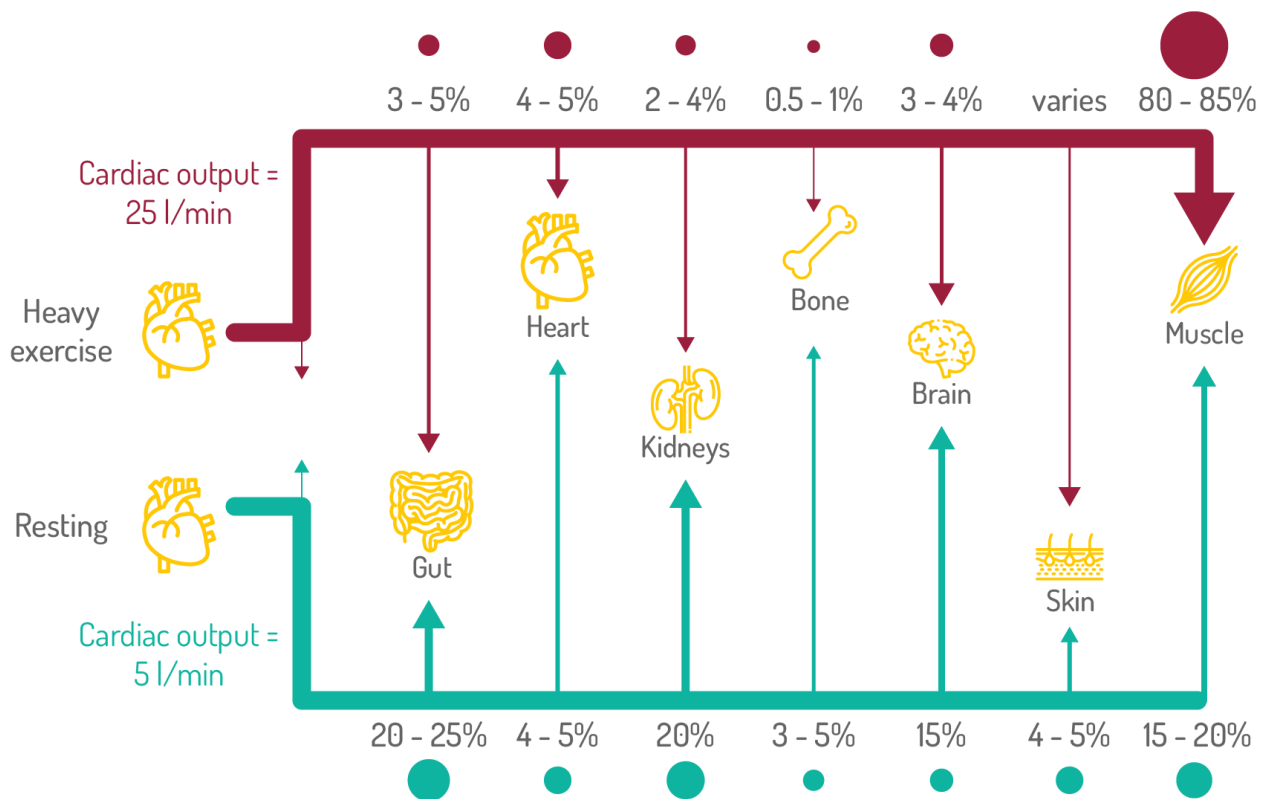
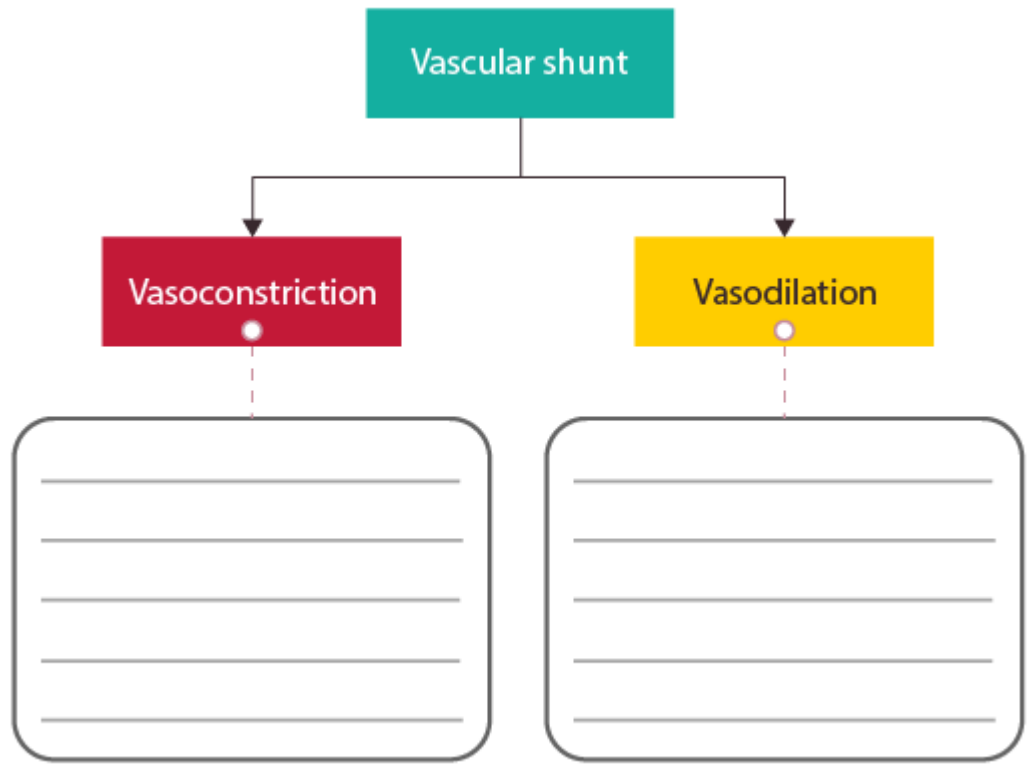
Immediate effects of exercise	Why does this immediate effect occur?
Muscle fatigue	<hr/> <hr/> <hr/>
Increased body temperature	<hr/> <hr/> <hr/>



Want to know more?

Watch the tutorial "Short-term muscular responses to exercise" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 5: Vascular shunt mechanism and the role of the arterioles and pre-capillary sphincters



Adapted from Dahl et al. (2003)

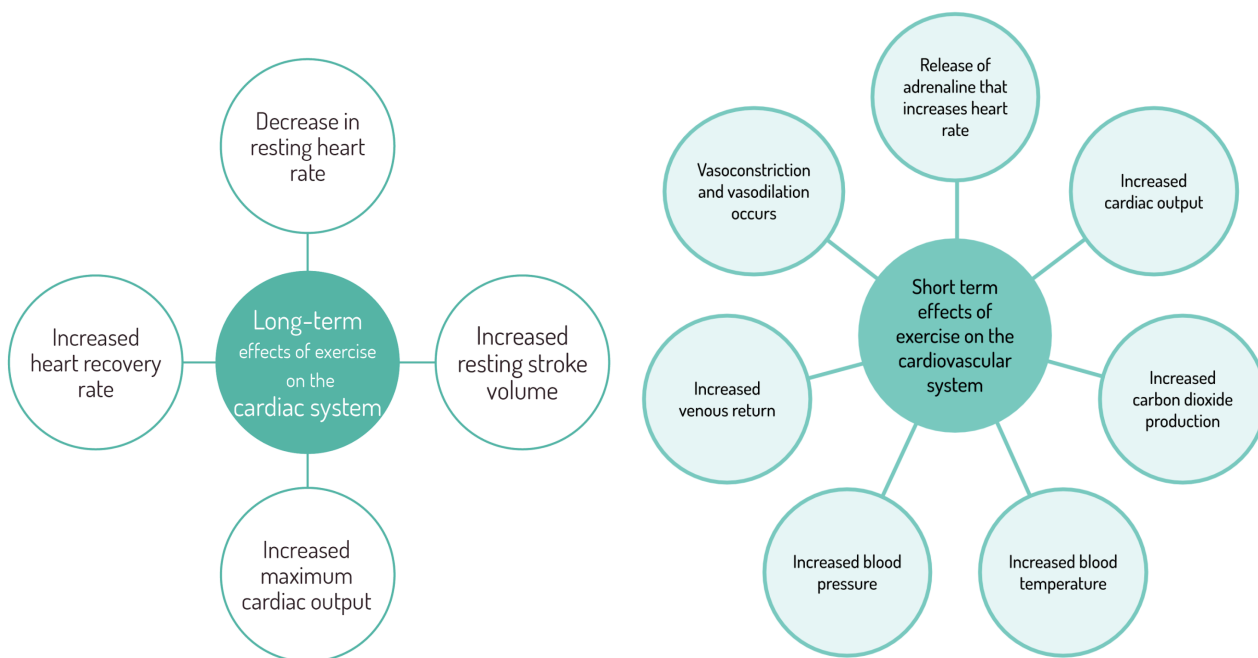
Vascular shunting description	Explanation how	Explanation why
More blood to the working muscles (approximately 80% to the muscles, up from 20% at rest)	_____ _____ _____	_____ _____ _____
_____ _____ _____	_____ _____ _____	To reduce body temperature
Less blood goes to the non-essential organs (Kidneys, liver, gut)	_____ _____ _____	_____ _____ _____
_____ _____ _____	_____ _____ _____	Risk of brain damage if there is a lack of oxygen to the brain
Arterioles carrying oxygenated blood from arteries to capillaries will vasodilate	_____ _____ _____	_____ _____ _____



Want to know more?

Watch the tutorial "Redistribution of blood" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 6: The impact of physical activity, training and lifestyle on the cardiovascular system



Long-term effect	Impact	Athlete who may benefit
Decrease in resting heart rate	<hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
Increased resting stroke volume	<hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>

Long-term effect	Impact	Athlete who may benefit
Increased maximum cardiac output	<hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
Increased heart recovery rate	<hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>

Immediate effects of exercise	How this aids immediate performance
Vascular shunting occurs	<hr/> <hr/> <hr/>
Release of adrenaline that increases the heart rate	<hr/> <hr/> <hr/>
Increased cardiac output	<hr/> <hr/> <hr/>
Increased venous return	<hr/> <hr/> <hr/>

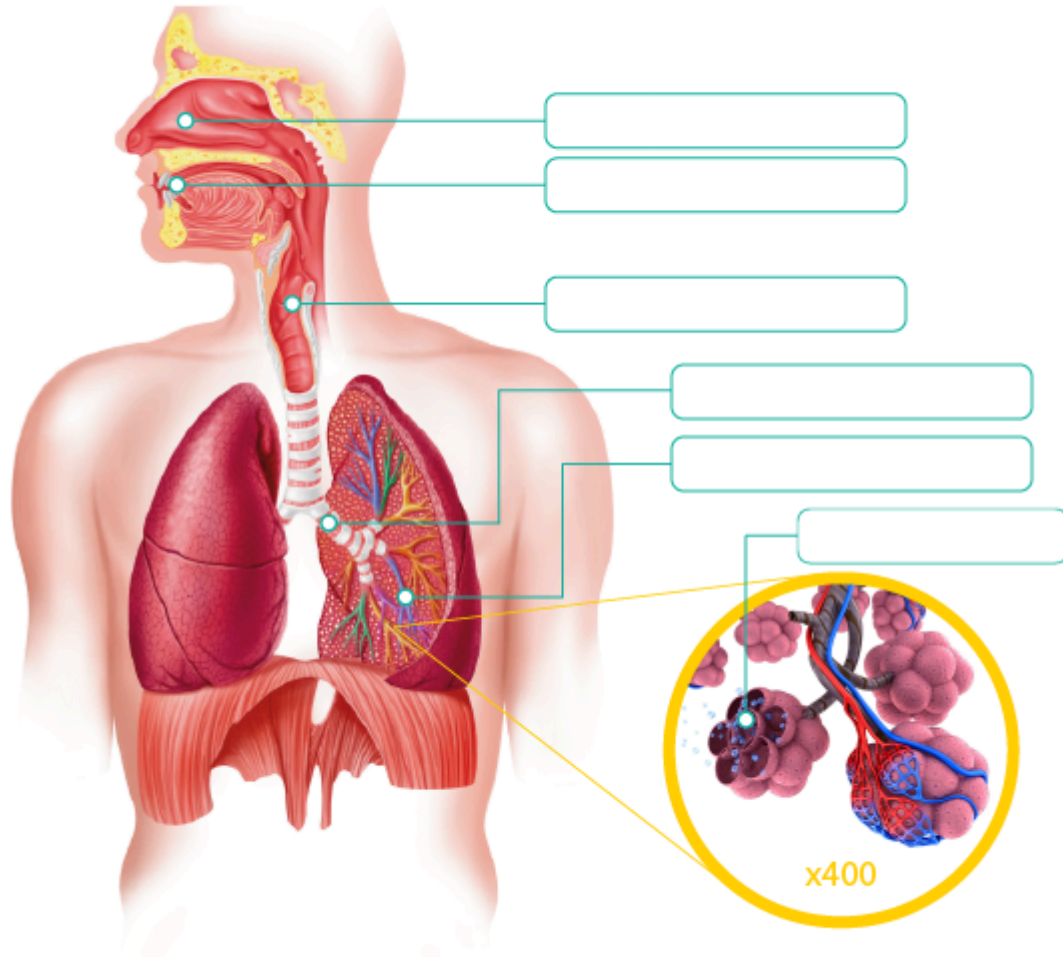
Immediate effects of exercise	Why does this immediate effect occur?
Increased carbon dioxide production	<hr/> <hr/> <hr/>
Increased blood temperature	<hr/> <hr/> <hr/>
Increased blood pressure	<hr/> <hr/> <hr/>



Want to know more?

Watch the tutorial "Short-term cardiovascular responses to exercise" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

Topic 7: The structures of the lungs and their roles



Structure	Description	Function
Nasal cavity	_____	Warms, moistens and filters air from the atmosphere.
	_____	Prevents food from entering the trachea
Pharynx	Muscular tube in the middle of your neck.	_____

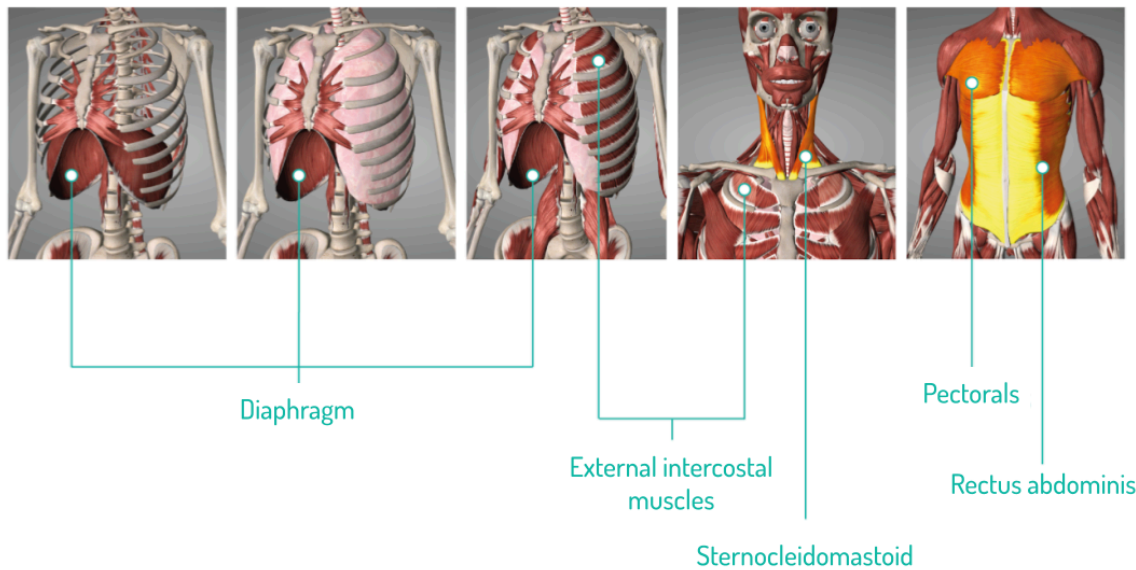
Structure	Description	Function
	_____	The voice box
	Hollow tube made of rings of fibrous cartilage	Allows passage of air into the lungs.
Bronchi	_____	_____
Bronchioles	Contain smooth muscle and no supporting cartilage	_____
Alveoli	_____	_____



Want to know more?

Watch the tutorial "Structure of the respiratory system" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).

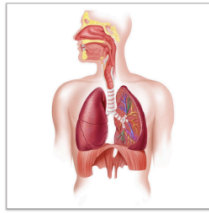
Topic 8: The mechanics of breathing



	Inspiration		Expiration	
Muscle	Description	How it aids respiration	Description	How it aids respiration
External intercostal muscles	Contract causing the ribcage to move up and out.	Increases volume of the thoracic cavity, reducing pressure in the lungs, increasing the depth of breathing.	Relaxes causing the ribcage to move down and in.	Decreases volume of thoracic cavity and increases pressure in the lungs.
Sternocleidomastoid	Contracts to raise sternum and rib cage.	Increases volume of the thoracic cavity, reducing pressure in the lungs, increasing the depth of breathing.	Relaxes.	_____

	Inspiration		Expiration	
Muscle	Description	How it aids respiration	Description	How it aids respiration
Rectus abdominis	_____	_____	Contracts to pull down sternum and ribcage.	Decreases volume in thoracic cavity.
Pectoralis minor	Contract to raise the sternum and ribcage.	Increases volume of the thoracic cavity, reducing pressure in the lungs, increasing the depth of breathing.	_____	_____
Diaphragm	_____	_____	Relaxes causing the ribcage to move down and in.	Decreases the volume of the thoracic cavity and increases pressure in the lungs.
Internal intercostal muscles	_____	_____	Contracts causing the rib cage to move down and in.	Decreases the volume of the thoracic cavity and increases pressure in the lungs.
Scalene	Contracts lifting the first two ribs.	Increases volume of the thoracic cavity, reducing pressure in the lungs, increasing the depth of breathing.	_____	_____

12. Complete the paragraph below, which describes the mechanics of breathing.



A is the process of moving air into the lungs. The **B** needs to be **C** in the lungs than in the atmosphere. The diaphragm moves upwards and outwards, **D** .. the volume of the thoracic cavity.

A: _____
B: _____
C: _____
D: _____

Marks: **[4]**

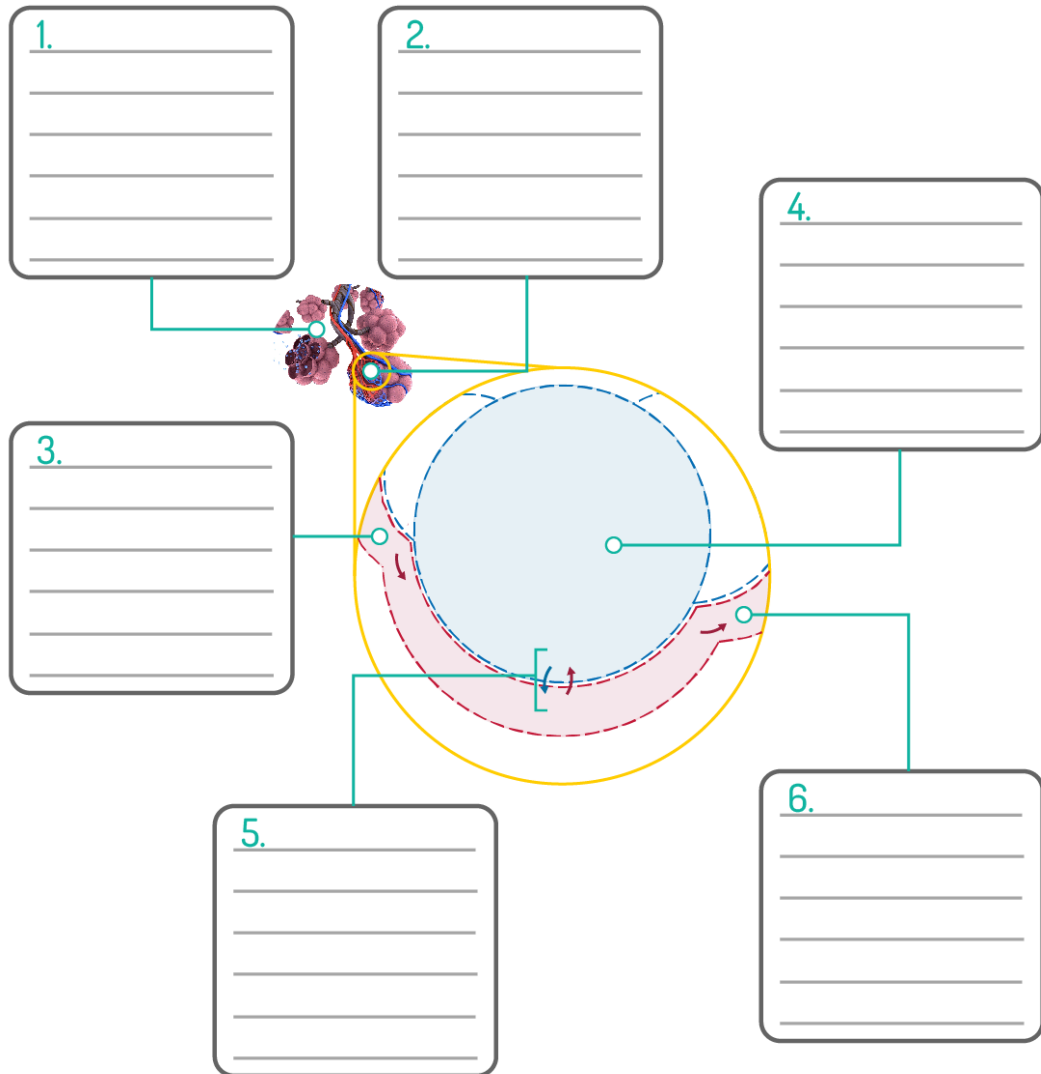


Want to know more?

Watch the tutorial "Mechanics of breathing" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only)

Topic 9: Gaseous exchange at the alveoli

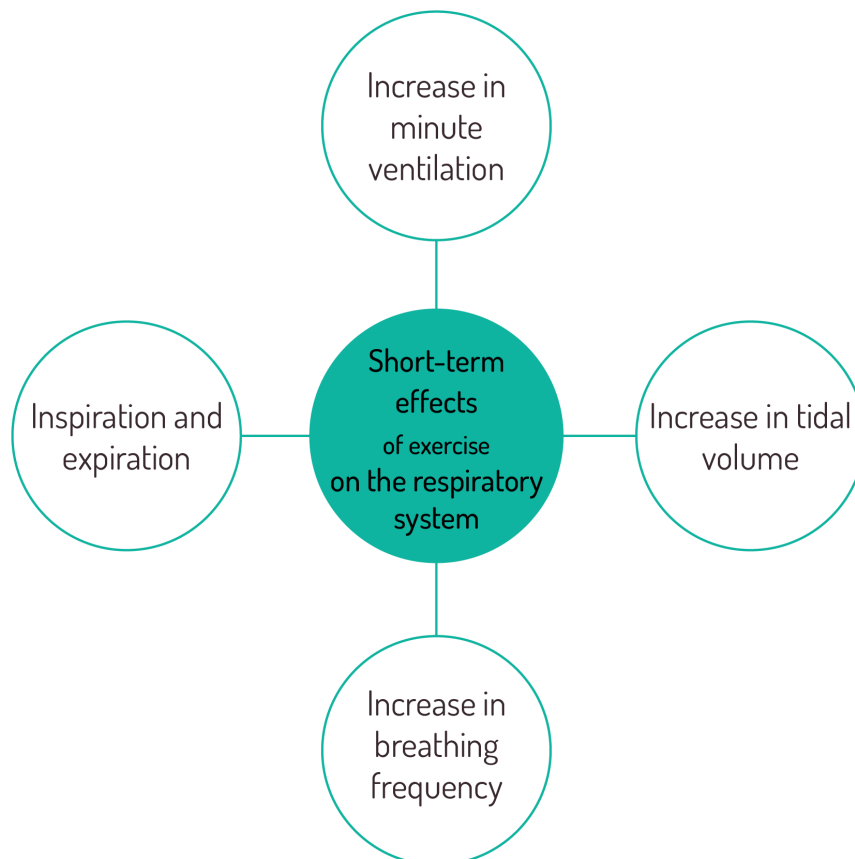
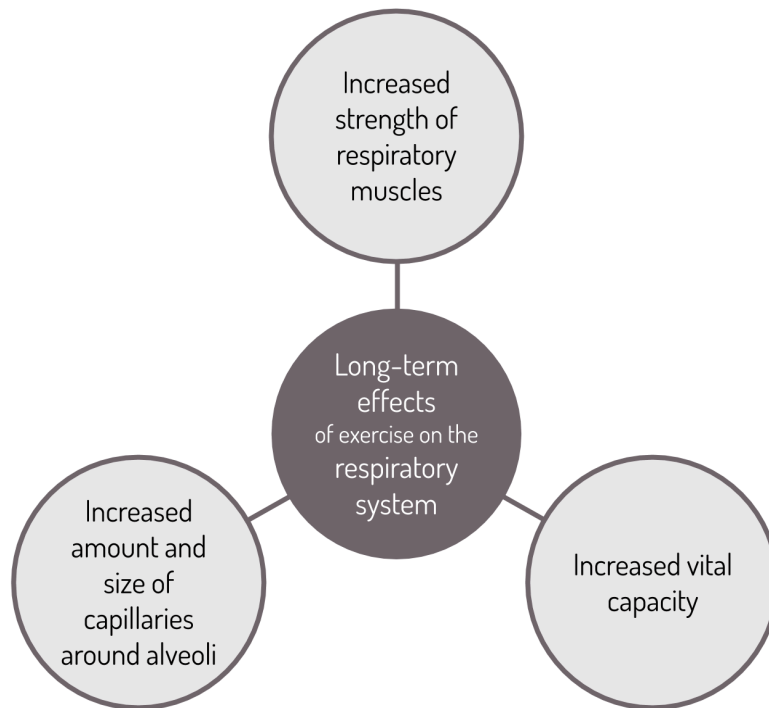
Annotate the “story of gaseous exchange” in the boxes.



17. Describe how the structure of alveoli aids the movement of oxygen into the blood and carbon dioxide into the air.

Marks: [3]

Topic 10: The impact of physical activity, training and lifestyle on the respiratory system



Long-term effect	Impact	Athlete who may benefit
Increased strength of respiratory muscles	Due to stronger muscular contraction, the respiratory muscles can expand the thoracic cavity further drawing more air into the lungs. This allows the rugby player to diffuse oxygen into the blood at a greater rate and have a more efficient process of aerobic respiration. This helps when tackling and running with the ball towards the end of the match.	Rugby player
Increased vital capacity	_____	Rower
Increased amount and size of capillaries around the alveoli	_____	Tennis player

*** Short-term effects include during and immediately after exercise and physical activity. ***

Immediate effects of exercise	How this effect aids immediate performance
Increase in tidal volume	_____
Increase in breathing frequency	_____

Immediate effects of exercise	How this effect aids immediate performance
Increase in minute ventilation	<hr/> <hr/> <hr/>
Decrease in inspiration and expiration reserve volumes	<hr/> <hr/> <hr/>



Want to know more?

Watch the tutorial "Short-term respiratory responses to exercise" on [TheEverLearner.com](https://www.theeverlearner.com) (subscribers only).