

AS Level OCR Cardiovascular System



Learning Objectives

The link between the Cardiac Cycle and the Conduction system of the heart.

The relationship between Stroke volume, Heart rate and Cardiac Output.

The changes that occur to SV, HR and CO (Q) during exercise.

The regulation of heart rate during exercise.

Venous Return: maintenance, mechanisms and performance.

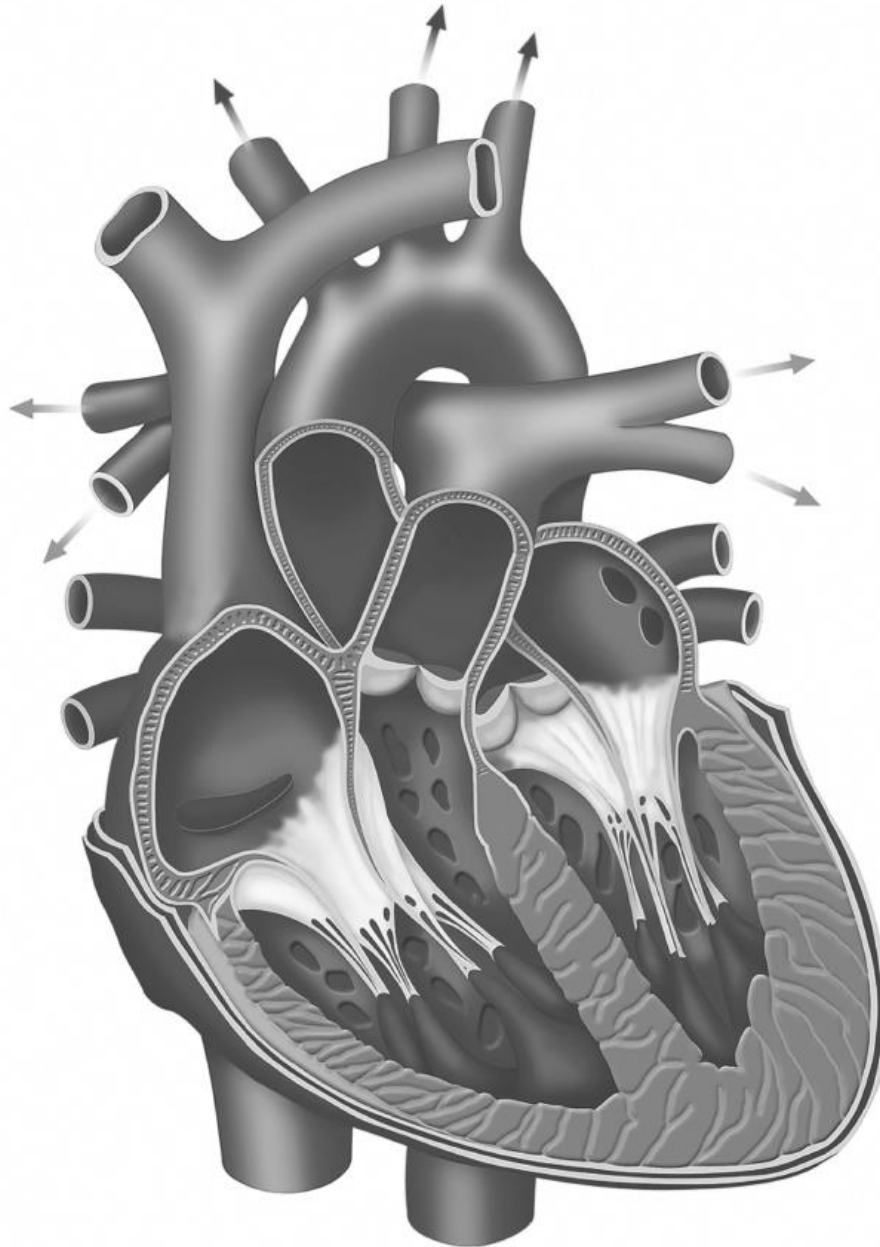
Distribution of cardiac output and Vascular shunting (Vasomotor control)

Oxygen and Carbon dioxide transport. Effects of smoking.

Effects of Warm up and Cool down on vascular system.

Blood Pressure. The impact of Physical activity on the Cardiovascular system.

Label the structure of the heart



Superior Vena Cava

Pulmonary artery

Aorta

Septum

Bicuspid (mitral valve)

Left ventricle

Right Atrium

Tricuspid valve

Left atrium

Right ventricle

Aortic valve

Pulmonary valve

Inferior Vena Cava

Where is the Sinoatrial (SA) node located?

You need to be able to link the cardiac Conduction system with the Cardiac cycle.

Diastole (0.5 s) (Heart fills)	Both atria fill with blood.
	Atrial blood pressure rises above ventricular blood pressure.
	Some blood is <u>passively</u> forced into ventricles.
Systole (0.3 s) (Heart empties)	
	Both atria contract (<u>atrial systole</u>) forcing remaining blood into the ventricles.
	Both ventricles contract (<u>ventricular systole</u>) increasing ventricular pressure.
	Increased pressure forces open the pulmonary and aortic valves.
	Blood is forced into the aorta and pulmonary artery (stroke volume)
	Diastole of the next cardiac cycle starts again
Aortic and pulmonary valves close, to prevent backflow of blood.	

Put the following into the table above to find the link between the conduction system and the cardiac cycle. (HINT: they aren't in the right order!)

- **SA Node** initiates cardiac impulse
- Impulse travels through **Purkinje fibres** in ventricle walls
- Impulse passes through AV node and through **Bundle of His**
- Cardiac impulse passes through **atria walls**
- The **impulse branches** into both the left and right ventricle

Stroke volume, Heart rate and Cardiac output at rest

	Definition	Values (UNITS?)
Stroke volume (SV)	$SV = EDV - ESV$	Rest – Sub-max – Max –
Heart rate (HR)		Rest – Sub-max – Max –
Cardiac output (Q)	$Q =$	Rest – Sub-max – Max –

What are EDV and ESV?

EDV -

ESV -

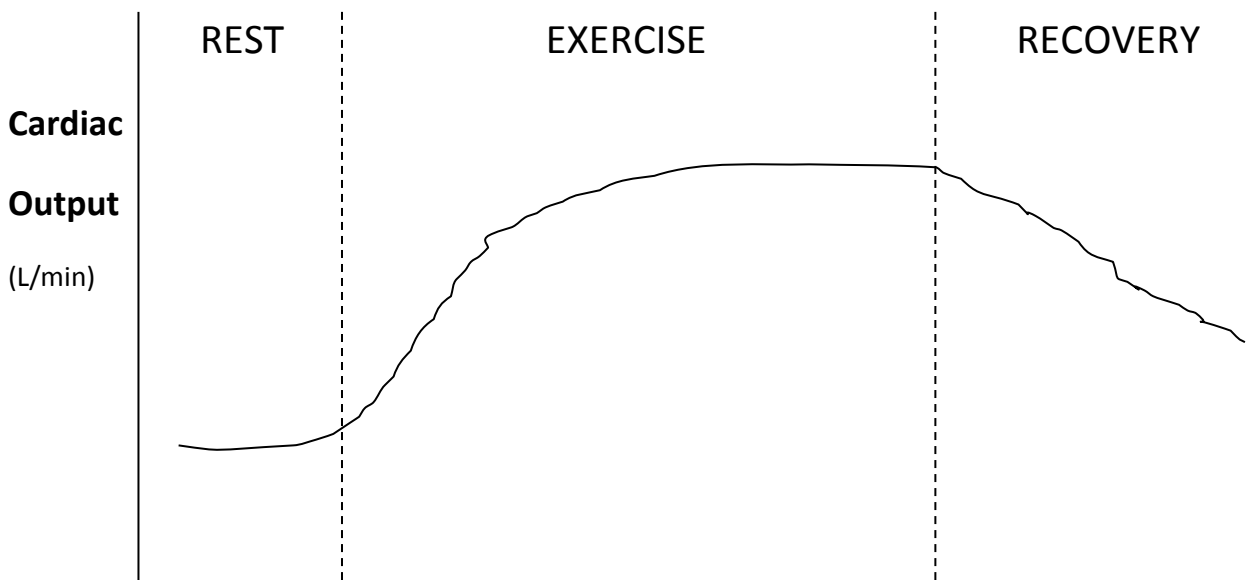
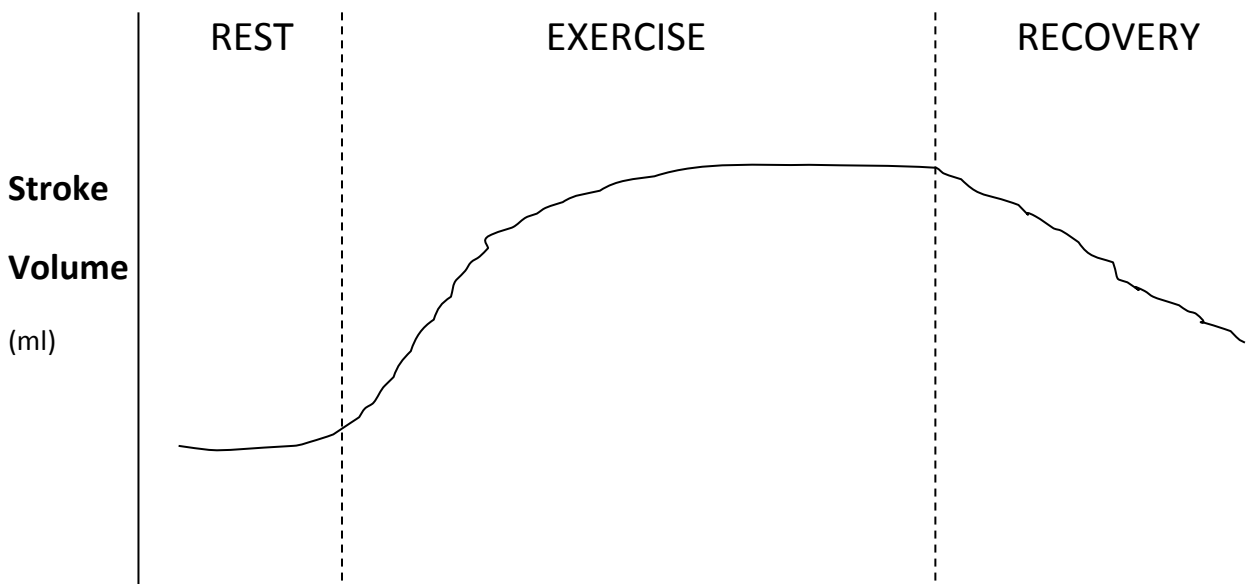
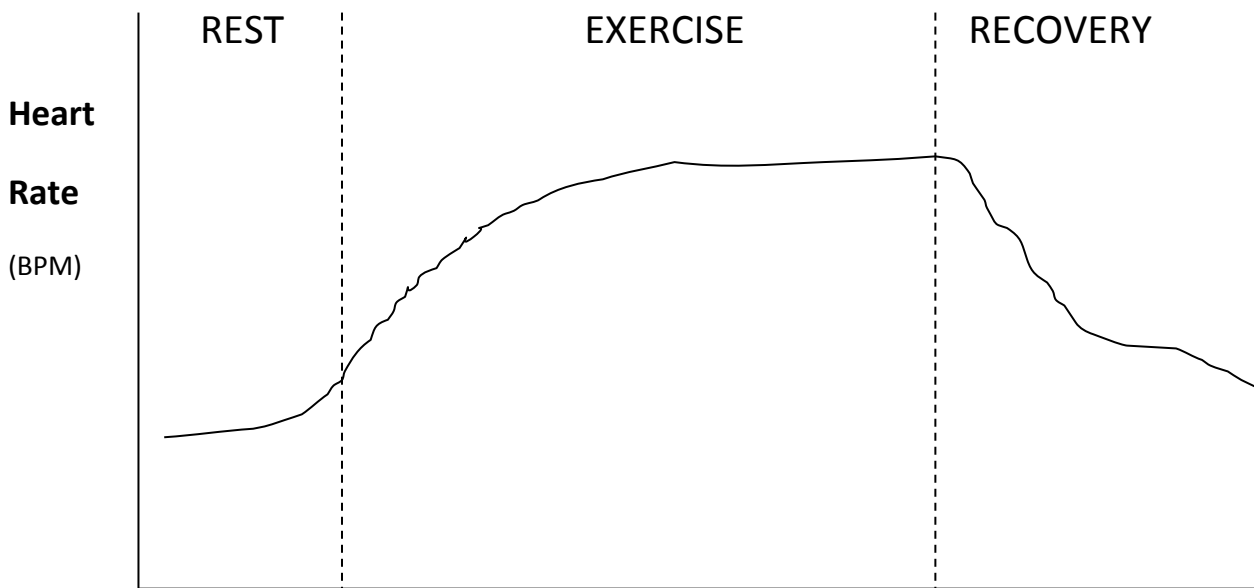
How is maximum Heart rate calculated?

What is bradycardia? Who might experience bradycardia?

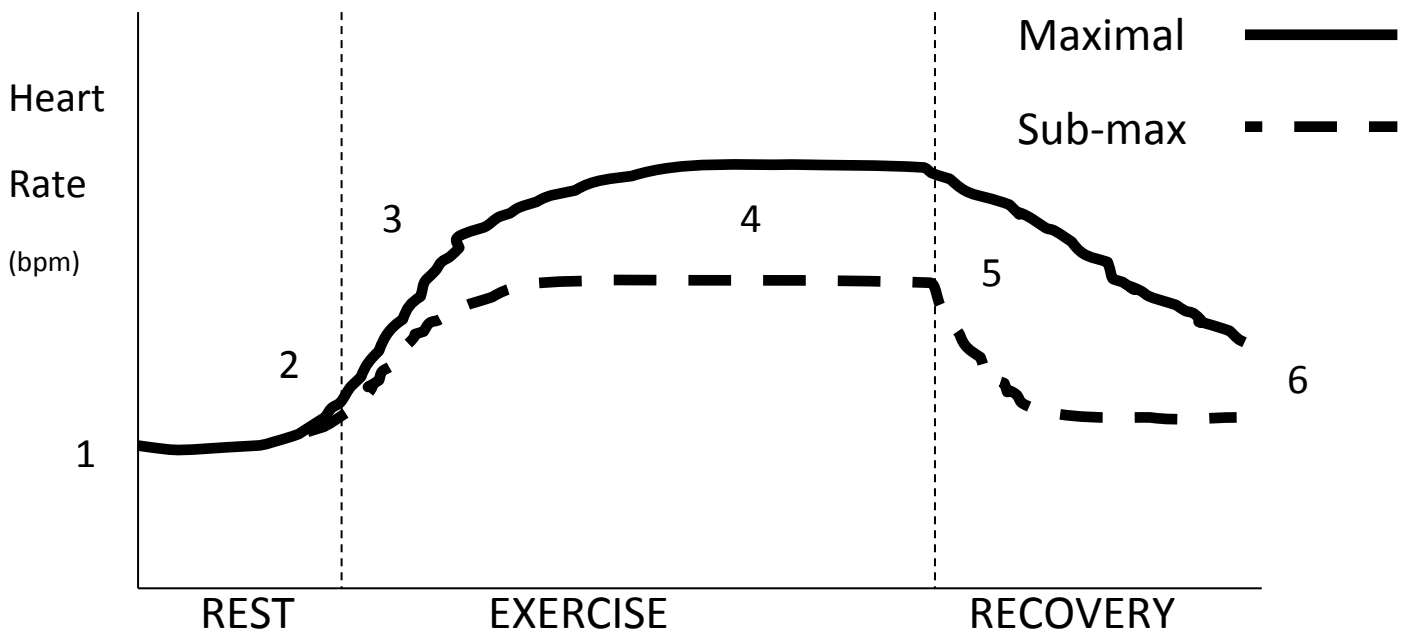
How is it possible for an elite athlete to have a similar resting Cardiac Output as a sedentary individual?

Responses of HR, SV and CO to exercise

(Annotate the diagrams – what is happening at each stage?)



Heart rate responses to exercise (It may be useful to draw this graph in answers)



Describe what is happening to Heart rate at points 1 to 6

1

2

3

4

5

6

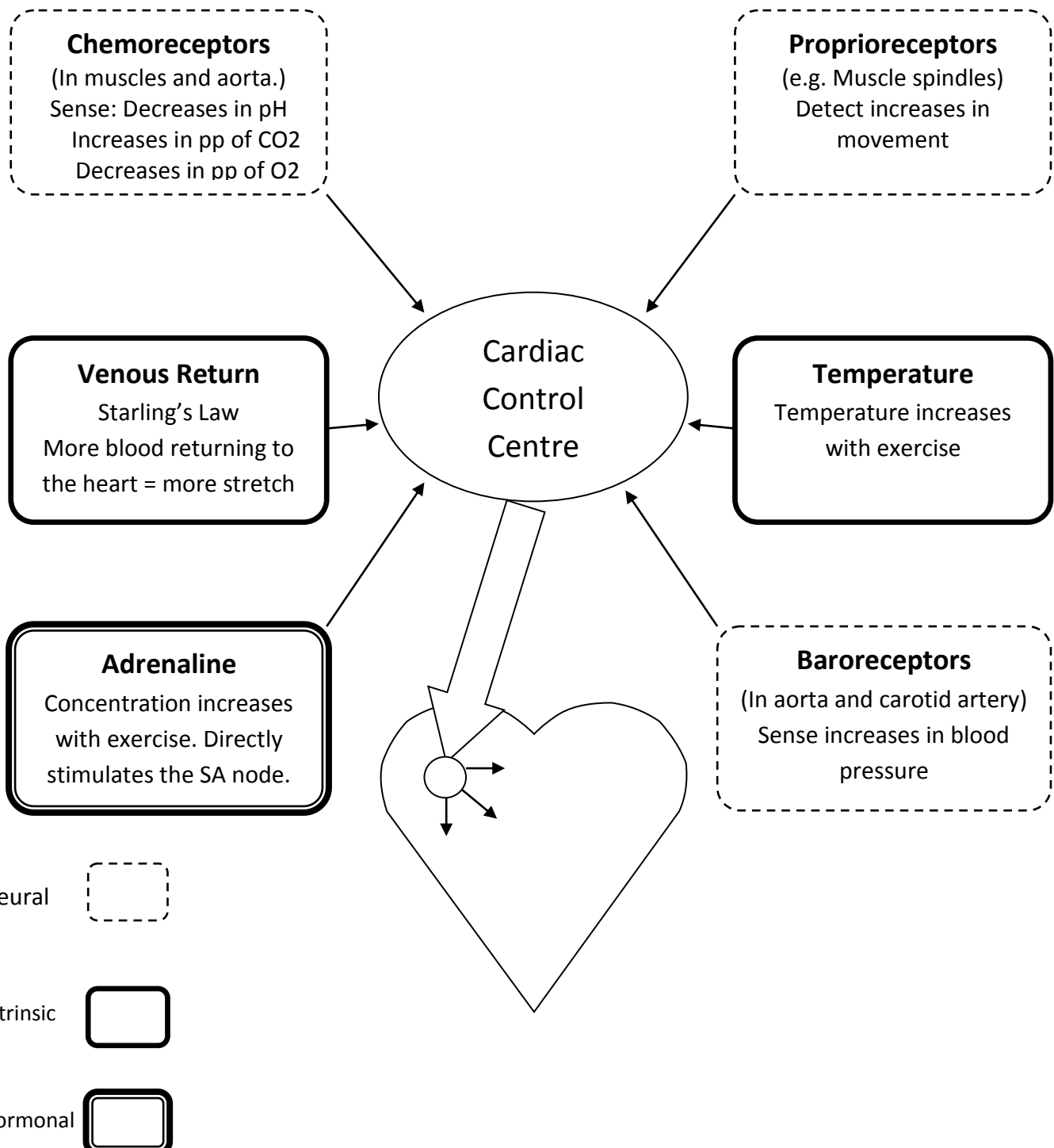
Control of Heart rate during exercise

Heart rate changes during exercise are controlled by three factors:

1. Neural control
2. Hormonal control
3. Intrinsic control

The control mechanisms act on the Cardiac Control Centre (CCC) in the Medulla Oblongata.

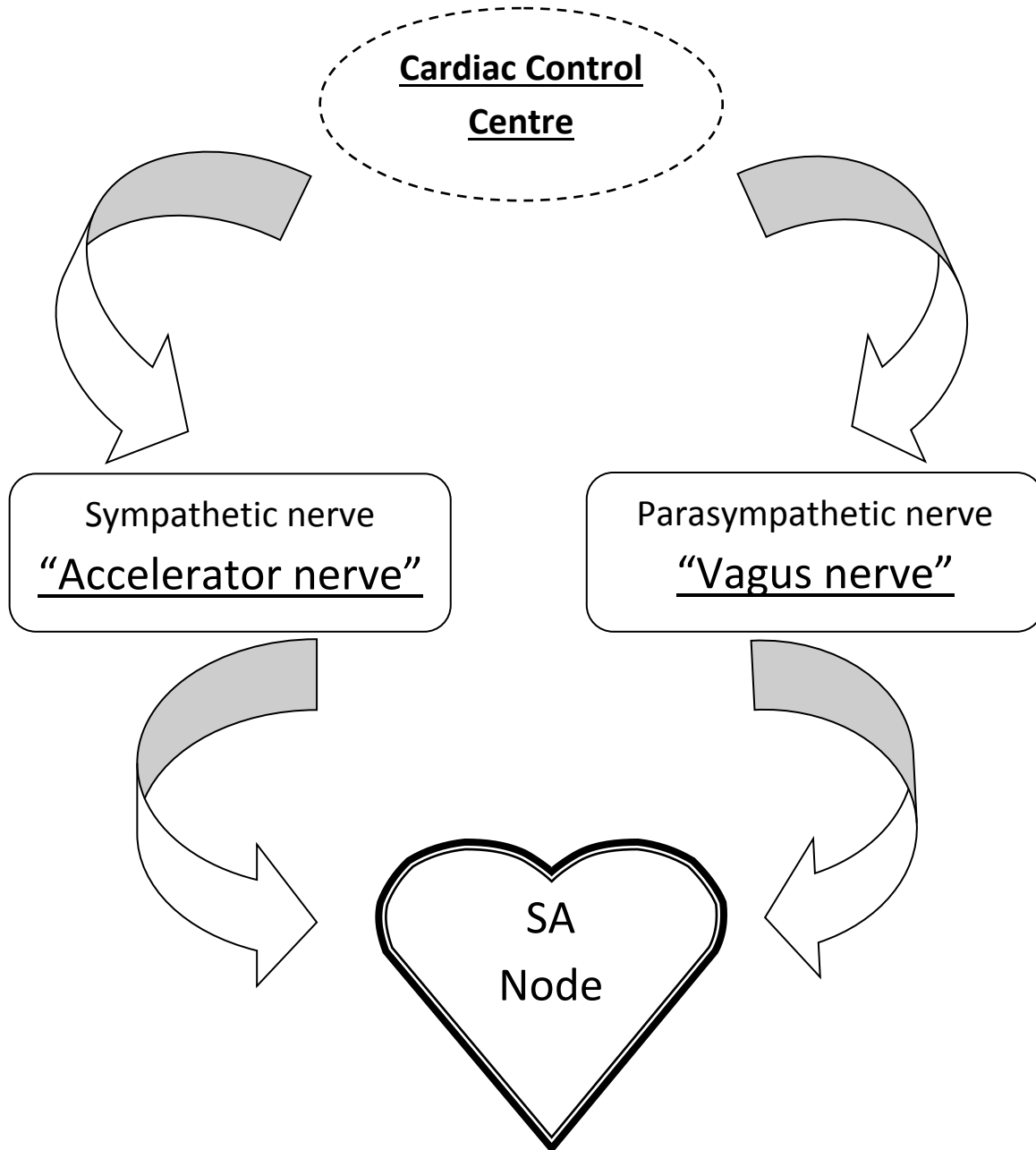
Which of the following control mechanisms increase HR (5), and which decrease it (1)?



Sympathetic and Parasympathetic control of heart rate

The (ANS) consists of two parts:

1. The Sympathetic Nervous System (SNS) causes HR to
.....
2. The Parasympathetic Nervous System (PNS) cause HR to
.....



Describe how the cardiac control centre acts on the SA node during exercise.

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You should now be able to describe and explain:

- The cardiac cycle
- The conduction system of the heart
- The link between the cardiac cycle and conduction system
- The relationships of stroke volume, heart rate and cardiac output
- The changes that occur to SV, HR and CO.
- The regulation of Heart rate during exercise

Past exam questions on the heart:

<u>Year</u>	<u>Question</u>	<u>Description</u>
Spec	1b	Neural control of the heart
Jan 09	1c	Neural control of the heart – exercise and recovery
May 09	1b	Conduction system of the heart
Jan 10	1d	Neural control of the heart - exercise
Jan 11	1c	Intrinsic control of HR and cardiac output
Jun 11	1a	Stroke volume – changes during exercise

Try to answer the past paper questions, then look at the mark schemes for the model answer.