

Exam Question

Beta blockers are another type of drug that slows the heart rate. The table shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

	No beta blockers taken		Taking beta blockers	
	At rest	During exercise	At rest	During exercise
Heart rate in beats per minute	68	150	52	88
Stroke volume in cm ³	80	120	54	98
Cardiac output in cm ³ per minute	5440	18 000	2800	8624

Some people who take beta blockers get out of breath when they exercise. Explain why beta blockers can have this effect during exercise.

You should refer to information given in the table.

[6 Marks]

These type of questions draw on knowledge from other units as well as health & disease & usually involve data

So what do we know from reading the question?

- Beta blockers slow down heart rate
- Stroke volume = volume of blood pumped out of the heart with each beat
- Cardiac output = total volume of blood pumped each minute
- The table shows a reduction in both cardiac output and stroke volume of those that take beta blockers.

Now, what do we need to know?

- What are the effects of exercise on our bodies? (faster breathing rate, increased heart rate).
- Why? (increase the rate of respiration, more O₂ needed for the reaction to release energy from glucose, more CO₂ produced and needing to be removed from body).

Model Answer

During exercise the body needs to transfer more energy, this energy is transferred during respiration. When we exercise the rate of respiration needs to increase to meet the demand, so more O₂ is needed.

Beta blockers reduce heart rate, so during exercise the beta blockers will reduce the heart rate which reduces the stroke volume and cardiac output. The heart cannot supply O₂ fast enough to meet the demand of the muscle cells. Breathing rate will still increase to increase the amount of O₂ absorbed and increase the amount of CO₂ removed from the body but this increased breathing rate cannot fully compensate for the changes (reduction) in the heart function.

