Heart rate and coronary risk

Student activity • observation and reasoning

YEAR 10 / LESSON 64 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

Why does heart rate change, and how is that different from long-term disease risk?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, paper models, pencil and ruler

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 2.66–2.67. Heart-rate responses and coronary risk.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Explain how exercise increases muscle oxygen demand and carbon-dioxide production, connecting this to circulation.

2. Describe adrenaline's effect on heart rate as part of preparing the body for activity.

3. Analyse a clearly labelled hypothetical trace: 72 beats min^{-1} at rest, 108 after activity and 84 during recovery. Do not use it to diagnose fitness.

4. Draw a coronary artery with narrowed lumen and explain reduced oxygen delivery to heart muscle.

5. Compare modifiable and non-modifiable risk factors using published information, including smoking, blood pressure, blood lipids, activity and family history.

6. Distinguish a temporary heart-rate response from coronary disease, and an association or risk factor from a guaranteed individual outcome.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

The numerical trace is invented for practice. Heart rate varies with many factors and is not by itself a diagnosis. Coronary disease involves impaired supply to heart muscle, often associated with atherosclerosis. This is an evidence lesson, not a personal health screen.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Why can exercise raise heart rate?

2. What can adrenaline do?

3. Calculate the example increase from 72 to 108.

4. Why can coronary narrowing harm heart muscle?

5. Give one modifiable risk factor.

6. Does a risk factor guarantee disease?