AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.3.1.9

Discovery and development of drugs

Past-paper questions

Tier	**Higher**
Question groups	**3**
Available paper years	**2019–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

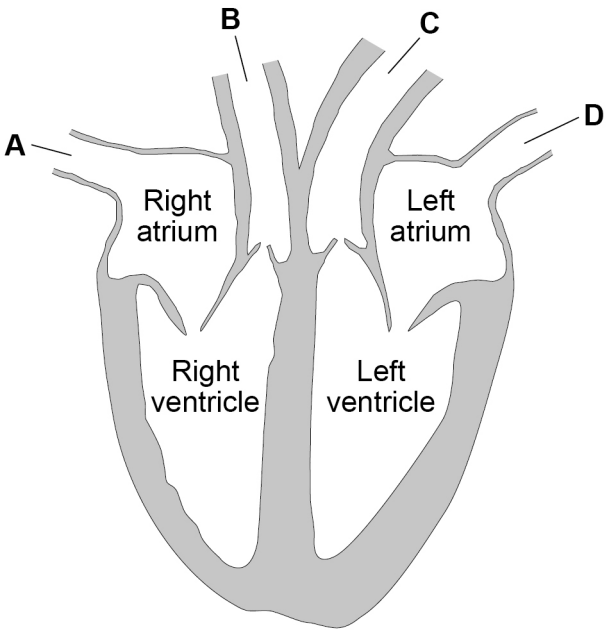
4.3.1.9 Discovery and development of drugs

Question 01

June 2019 | 8464/B/1H | Original Q1

0 1 **Figure 1** shows a human heart.

Figure 1



0 1 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 2 The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

[1 mark]

Tick (✓) **one** box.

Left atrium ☐

Left ventricle ☐

Right atrium ☐

Right ventricle ☐

4.3.1.9 Discovery and development of drugs

Question 01 · continued

Some people may be treated with a drug to slow their heart rate.

0 1 . 3 Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

[1 mark]

Tick (✓) **one** box.

- Bacteria ☐
- Foxgloves ☐
- Mould ☐
- Willow ☐

Question 1 continues on the next page

Question 01 · continued

Beta blockers are another type of drug that slows the heart rate.

Table 1 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.

Table 1

	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	**X**	98
Cardiac output in cm^3 per minute	5440	18 000	2800	8624

0 1 . 4 Calculate stroke volume **X** in **Table 1**.

Use the equation:

cardiac output = stroke volume × heart rate

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm^3

4.3.1.9 Discovery and development of drugs

Question 01 · continued

0 1 . 5 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 **Table 1**.

[6 marks]

12

4.3.1.9 Discovery and development of drugs

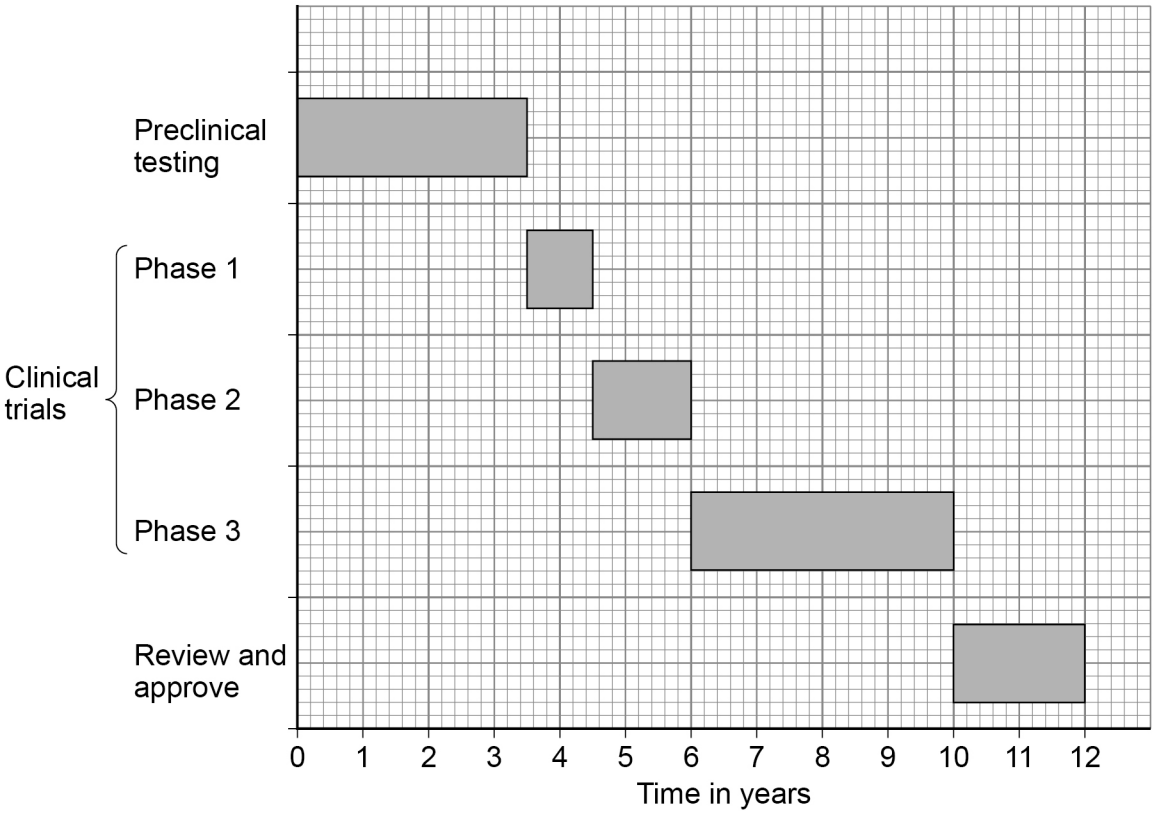
Question 02

November 2020 | 8464/B/1H | Original Q6

0 6 New drugs are tested and trialled before they can be licensed to treat patients.

Figure 6 shows how much time the different stages of testing took for one new drug.

Figure 6



0 6 . 1 How much more time did the clinical trials take compared with the preclinical testing?

[1 mark]

Tick (✓) **one** box.

- 3 years ☐
- 3.5 years ☐
- 5 years ☐
- 6.5 years ☐

4.3.1.9 Discovery and development of drugs

Question 02 · continued

During Phase 1 clinical trials low doses of the drug are tested on healthy volunteers.

0 6 . 2 Suggest **one** reason why **low doses** of the drug are used in Phase 1 clinical trials.

[1 mark]

0 6 . 3 Suggest **two** reasons why **healthy** volunteers are used in Phase 1 clinical trials.

[2 marks]

1

2

0 6 . 4 The results of clinical trials can only be published after peer review by other scientists.

Suggest **one** reason why the results must be reviewed by other scientists.

[1 mark]

Question 6 continues on the next page

4.3.1.9 Discovery and development of drugs

Question 02 · continued

0 6 . 5 A drug is only licensed for the medical conditions it was tested to treat in the clinical trials.

Drug regulations:

- control what drugs a doctor can prescribe
- ensure doctors can prescribe a drug with confidence
- protect patients.

AMD is an eye condition that can result in very poor vision.

Doctors treat approximately 40 000 new cases of AMD each year.

Two drugs licensed to treat AMD in the UK are drug **A** and drug **B**.

In many other countries drug **C** is used to treat AMD. Drug **C** is only licensed in the UK to treat cancer.

The cost per injection for each drug is:

- drug **A** £561
- drug **B** £800
- drug **C** £28

The number of injections required to treat AMD is the same for each drug.

4.3.1.9 Discovery and development of drugs

Question 02 · continued

In 2018 the High Court in the UK gave permission for drug **C** to be used to treat AMD.

Evaluate the decision to allow the use of drug **C** to treat AMD in the UK.

[6 marks]

11

4.3.1.9 Discovery and development of drugs

Question 03

June 2024 | 8464/B/1H | Original Q3

0 3 This question is about communicable diseases.

Measles is a communicable disease caused by a pathogen.

0 3 . 1 What type of microorganism causes measles?

[1 mark]

Vaccinations help reduce the spread of measles.

0 3 . 2 Suggest **two** ways the spread of measles can be reduced.

Do **not** refer to vaccination in your answer.

[2 marks]

1

2

0 3 . 3 Describe how the measles vaccine helps a person to become immune to the measles pathogen.

[4 marks]

4.3.1.9 Discovery and development of drugs

Question 03 · continued

Norovirus is a type of virus.

0 3 . 4 Explain how viruses cause illness.

[2 marks]

0 3 . 5 Drugs can help to reduce the symptoms of the norovirus infection.

New drugs must go through clinical trials before being licensed for use.

Give **three** reasons why clinical trials are needed.

[3 marks]

1

2

3

12