

GCSE Combined Science: Trilogy

Worksheet: Discovery and development of drugs

TIME 30 min	TOTAL 29 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Discovery and development of drugs

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

New drugs go through several stages of testing before doctors can prescribe them.

0 1 . 1

What is tested during preclinical testing?

Tick (✓) **one** box.

Only healthy human volunteers

☐

Only patients with the disease

☐

Cells, tissues and live animals

☐

Only computer models

☐

[1 mark]

0 1 . 2

What is a clinical trial?

.....

.....

[1 mark]

0 1 . 3

Explain the difference between the efficacy and the toxicity of a drug.

.....

.....

.....

.....

[2 marks]

0 2

Many drugs were first extracted from living organisms.

0 2 . 1

Which drug originates from foxgloves?

Tick (✓) **one** box.

Aspirin

☐

Digitalis

☐

Paracetamol

☐

Penicillin

☐

[1 mark]

0 2 . 2

The painkiller aspirin originates from which plant?

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.....

.....

[1 mark]

0 2 . 3

Which scientist discovered penicillin?

.....

.....

.....

.....

[1 mark]

0 2 . 4

Penicillin was discovered in a type of mould.
What type of organism is a mould?

.....

.....

.....

.....

[1 mark]

0 2 . 5

Most new drugs are now made by chemists in the pharmaceutical industry.
Suggest why scientists still study chemicals from plants.

.....

.....

[1 mark]

0 3

In a double-blind trial of a new drug to treat persistent heartburn, 250 patients took the drug and a different 250 patients took a placebo. Neither the patients nor the doctors knew which group each patient was in.
170 of the patients taking the drug, and 40 of the patients taking the placebo, said their symptoms improved.

0 3 . 1

Calculate the percentage of patients taking the drug whose symptoms improved.
Give your answer to 1 decimal place.

.....

.....

.....

.....

Percentage = %

[2 marks]

0 3 . 2

Explain why the trial was double-blind.

.....

.....

.....

.....

[2 marks]

0 4

In a double-blind trial of a new drug to treat persistent heartburn, 150 patients took the drug and a different 150 patients took a placebo. Neither the patients nor the doctors knew which group each patient was in.
105 of the patients taking the drug, and 44 of the patients taking the placebo, said their symptoms improved.

0 4 . 1

Calculate the percentage of patients taking the drug whose symptoms improved.
Give your answer to 1 decimal place.

.....

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Percentage = %

[2 marks]

0 4 . 2

Explain why some patients were given a placebo.

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[2 marks]

0 5

Scientists found a chemical in a marine sponge that killed cancer cells growing in a laboratory dish.

0 5 . 1

Describe the next steps that would need to be taken in the laboratory before this chemical could be tested on animals.

.....

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.....

[2 marks]

0 5 . 2

Explain why the chemical must also be tested on live animals before it is tested on human volunteers.

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.....

.....

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[2 marks]

0 5 . 3

Suggest **one** reason why very few chemicals found in living organisms are eventually developed into a marketed drug.

.....

.....

[1 mark]

0 6

New drugs are tested before they can be used to treat patients.

0 6 . 1

New drugs are tested for toxicity, efficacy and dose.

Explain what is meant by each of these terms.

.....

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.....

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.....

.....

[3 marks]

0 6 . 2

Preclinical testing is done in a laboratory.

Give **two** things that drugs are tested on during preclinical testing.

.....

.....

.....

.....

[2 marks]

0 6 . 3

The first clinical trials use healthy volunteers who are given very low doses of the drug.

Explain why very low doses are used.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Discovery and development of drugs · 29 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: Cells, tissues and live animals

01.2 [1 mark]

- testing a drug on human volunteers or patients (1)
-

01.3 [2 marks]

- efficacy is how well the drug works / treats the condition (1)
 - toxicity is how harmful the drug is / whether it has harmful side effects (1)
-
-

Question 2 (5 marks)

02.1 [1 mark]

Correct: Digitalis

02.2 [1 mark]

Answer: Willow

- willow (1)
-

02.3 [1 mark]

Answer: Alexander Fleming

- (Alexander) Fleming (1)
-

02.4 [1 mark]

Answer: Fungus

- fungus (1)
-

02.5 [1 mark]

- the starting point for a new drug may be a chemical extracted from a plant / plants may contain chemicals that could be useful drugs (1)
-

Question 3 (4 marks)

03.1 [2 marks]

Answer: 68.0%

- $170 \div 250 \times 100$ (1)
 - 68.0 (%) (1)
-

03.2 [2 marks]

- the doctors did not know which patients had the drug, so they could not influence the results, e.g. in how they judged or recorded improvements (1)
 - the patients did not know whether they had the drug, so their expectations could not affect the results (1)
-

Question 4 (4 marks)

04.1 [2 marks]

Answer: 70.0%

- $105 \div 150 \times 100$ (1)
 - 70.0 (%) (1)
-

04.2 [2 marks]

- to act as a control, so that patients who took the drug can be compared with patients who did not (1)
 - some patients feel better just because they believe they are being treated, so the comparison shows whether the drug itself has an effect (1)
-

Question 5 (5 marks)

05.1 [2 marks]

- test the chemical on other human cells and tissues, to check its effects on different (including healthy) cell types (1)
 - determine a range of doses and check for toxic effects at each dose (1)
-

05.2 [2 marks]

- testing on a whole living organism shows effects, e.g. on organs or side effects, that cannot be seen using cells or tissues alone (1)
 - it gives information on a safe dose and how the body processes the chemical before any human is exposed to it (1)
-

05.3 [1 mark]

- many chemicals turn out to be too toxic, not effective enough, or fail at some other stage of testing (1)
-

Question 6 (7 marks)

06.1 [3 marks]

- toxicity: whether the drug is harmful / has harmful side effects (1)
 - efficacy: whether the drug works / how well it works (1)
 - dose: how much of the drug should be given (and how often) (1)
-

06.2 [2 marks]

- cells (1)
- tissues (1)
- live animals (1)

Any 2 of the points above.

06.3 [2 marks]

- to check that the drug is safe / has no harmful side effects (in humans) (1)
 - a low dose reduces the risk of harm if the drug turns out to be toxic (1)
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