Drug Testing, Bacterial Growth and Conservation (Topic 4): Edexcel SNAB A Level Biology Exam Questions by Topic

20 questions · 53 marks · about 64 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Paper 1 · June 2024 · Q3(a) · 1 mark

3 New drugs are tested in clinical trials before they can be used in treatments on patients.

One of the first people to isolate and test a drug was William Withering.

(a) Give the name of the drug he tested.

(1)

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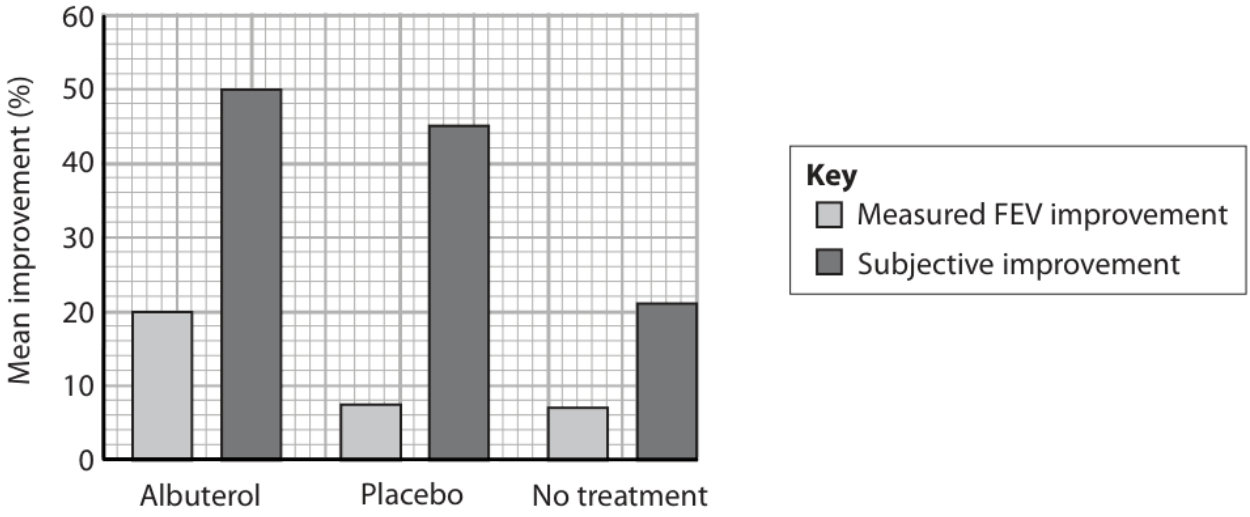
8 Medicinal drugs undergo clinical trials before they are licensed to be used.

(a) Albuterol is a drug used to reduce the symptoms of asthma.

In a clinical trial, people with asthma were given either Albuterol, a placebo or no treatment.

Measured improvement (FEV improvement) can be used to indicate the effectiveness of the treatment in reducing the symptoms of asthma. FEV is forced expiratory volume. Asthma reduces FEV.

The people in the trial were also asked to describe their improvement and this was recorded as 'subjective improvement'.



Comment on the measured improvement (FEV improvement) and subjective improvement for the different treatments.

(3)

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Question 3 · AS Paper 2 · June 2017 · Q8(b)(i) · 2 marks

(b) In January 2016, a clinical trial of a different drug involved 128 healthy volunteers aged 18 to 55. In this trial, different doses of the drug were given to 90 of these volunteers and the others were given a placebo.

Six people, who were given the drug, became ill and had to be treated in hospital.

(i) Explain why healthy volunteers were given different doses of the drug or a placebo.

(2)

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Question 4 · AS Paper 2 · June 2017 · Q8(b)(iii) · 3 marks

(iii) Compare and contrast this drug testing protocol with that used by William Withering when he tested digitalis soup.

(3)

Question 5 · A level Paper 1 · June 2023 · Q5(b)(ii) · 3 marks

(ii) Describe the stages of a three-phased clinical trial.

(3)

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Question 6 · AS Paper 2 · June 2023 · Q6(b)(i) · 2 marks

(b) Some natural antimicrobial medicines can be harmful to patients.

Any new drugs have to be tested before they can be given to patients.

These drugs are tested using a set of protocols.

(i) Explain the pre-clinical trials that will be carried out when testing a new drug.

(2)

Question 7 · AS Paper 2 · June 2023 · Q6(b)(ii) · 2 marks

(ii) A double-blind trial was used to determine the effectiveness of an antimicrobial drug.

Explain what is meant by the term **double-blind trial**.

(2)

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Question 8 · AS Paper 2 · November 2021 · Q3(b) · 4 marks

(b) Modern drug testing protocols must ensure that new drugs are effective at treating patients.

Explain the role that a placebo and a double blind trial have in producing valid conclusions.

(4)

Placebo

Double blind trial

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Question 9 · A level Paper 1 · October 2020 · Q9(c)(i) · 3 marks

(c) The vaccine is still undergoing clinical trials, but was given approval for use in recent Ebola outbreaks.

(i) Describe how clinical trials of a vaccine would be conducted.

(3)

Question 10 · AS Paper 2 · June 2016 · Q4(b)(i) · 3 marks

(b) The salve was also tested on mice.

These mice had skin wounds infected with *S. aureus*. The salve was very effective in treating these infections.

(i) Explain why some bacteria can grow rapidly in skin wounds.

(3)

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Question 11 · A level Paper 2 · June 2018 · Q3(a) · 3 marks

3 Sepsis is a bacterial infection in the bloodstream. Sepsis can cause tissue death in limbs. This may require parts of a limb to be removed (amputation).

(a) Open wounds can become infected by bacteria, leading to sepsis.

Explain why bacteria are able to multiply in the bloodstream when they enter the body.

(3)

Question 12 · AS Paper 2 · June 2025 · Q8(a)(ii) · 3 marks

(ii) The seeds of many plants are stored at very low temperatures.

Explain the effect of temperature on bacterial growth.

(3)

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Question 13 · AS Paper 2 · June 2016 · Q6(a) · 2 marks

6 Svalbard Global Seed Vault (SGSV) is a seed bank. It keeps seeds from almost 4000 species of plants, focussing on food crops such as wheat, rice and maize.

(a) State suitable conditions for keeping seeds in a seed bank.

(2)

Question 14 · A level Paper 1 · June 2023 · Q5(a)(i) · 3 marks

5 Many plants are known to have medicinal properties and are used in traditional medicines. These plants are often endangered.

A drug to treat breast cancer has been extracted from *Taxus brevifolia*, the Pacific yew tree.

(a) Seeds from endangered plants are placed in seed banks to conserve the species.

(i) Describe how the seeds are preserved for long periods of time in a seed bank.

(3)

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Question 15 · A level Paper 1 · June 2023 · Q5(a)(ii) · 2 marks

(ii) Seed banks obtain seeds collected from a number of plants of each species.

Explain the advantages of this for the conservation of a plant species.

(2)

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Question 16 · AS Paper 2 · June 2016 · Q6(d) · 3 marks

(d) SGSV keeps seeds from more than 865 000 varieties of plant, including 200 000 varieties of wheat and rice. Some of these varieties are rare or extinct in the wild.

Since 2004, more than 410 million dollars have been spent on SGSV and other seed banks around the world.

However, it is estimated that 75% of global crop diversity is not stored in international seed banks.

Critics argue that many crop varieties stored in SGSV are not actually used for food, and that the money would be better spent supporting farmers who are growing food crops.

Justify the continued funding of SGSV.

(3)

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Question 17 · AS Paper 2 · June 2024 · Q5(c) · 3 marks

(c) Explain how breeding programmes in zoos can maximise genetic variation in populations before reintroduction to their natural habitat.

(3)

Question 18 · A level Paper 1 · November 2021 · Q5(a) · 3 marks

5 Wildlife conservation can involve keeping animals in zoos as well as protecting habitats.

(a) Describe the roles that zoos play in animal conservation.

(3)

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Question 19 · A level Paper 1 · June 2025 · Q4(b)(i) · 3 marks

(b) Cheetahs from Africa are being reintroduced into a national park in India.

They are being taken from game reserves in Namibia and South Africa.

(i) Explain the advantages of introducing cheetahs from these two populations.

(3)

Question 20 · A level Paper 1 · June 2025 · Q4(b)(ii) · 2 marks

(ii) The animals chosen were all born in the wild alongside other predators.

Deduce why this may increase the survival chances of the cheetahs when they are relocated to the national park in India.

(2)

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Mark schemes

Question 1 · A level Paper 1 · June 2024 · Q3(a) · 1 mark

Question Number	Answer	Additional guidance	Mark
3(a)	• digitalin / digitalis / digitalis soup (1)	ALLOW extract of foxglove plants / foxglove extract IGNORE 'foxglove' alone IGNORE digoxin	(1)

Question 2 · AS Paper 2 · June 2017 · Q8(a) · 3 marks

Question Number	Answer
8(a)	An answer that makes reference to three of the following: • Albuterol has the greatest FEV improvement **(1)** • little difference between no treatment and placebo on FEV **(1)** • placebo effect demonstrated by greater subjective improvement compared to no treatment **(1)**

Additional Guidance	Mark
	(3)

Question 3 · AS Paper 2 · June 2017 · Q8(b)(i) · 2 marks

Question Number	Answer
8(b)(i)	An explanation that makes reference to two of the following: • check for side effects **(1)** • different doses to determine safe dose **(1)** • placebo to make sure that any side effects described were due to the drug **(1)**

Additional Guidance	Mark
	(2)

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Question 4 · AS Paper 2 · June 2017 · Q8(b)(iii) · 3 marks

Question Number	Answer
8(b)(iii)	An explanation that makes reference to the following: • both trials used different doses (to determine safe dose) **(1)** • William Withering did not use healthy volunteers and this drug trial did **(1)** • William Withering did not use a placebo while this trial did **(1)**

Additional Guidance	Mark
ALLOW different concentrations	**(3)**

Question 5 · A level Paper 1 · June 2023 · Q5(b)(ii) · 3 marks

Question Number	Answer
5(b)(ii)	A description that includes the following • (Stage 1 involves testing on) healthy individuals / {side effects / metabolism} (in humans) (1) • (Stage 2 tests drugs on) small groups of patients (with the condition)/ (Stage 2 tests) to see if the drug is effective (1) • (Stage 3 involves) double-blind testing a large group of patients (1)

Additional guidance	Mark
ALLOW description – e.g. half given a {placebo / existing drug}	(3)

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Question 6 · AS Paper 2 · June 2023 · Q6(b)(i) · 2 marks

Question Number	Answer
6(b)(i)	An explanation that that makes reference to the following: • {tested on animals / tissue samples} (1) • to determine {toxicity / safe dosage} (1)

Additional guidance	Mark
ALLOW – tested for safety IGNORE side effects	(2)

Question 7 · AS Paper 2 · June 2023 · Q6(b)(ii) · 2 marks

Question Number	Answer
6(b)(ii)	An explanation that makes reference to two of the following: • a trial using {a placebo / pre-existing medication} (1) • where the patients and the doctors do not know who has been given the drug and who has not (1) • to prevent bias (1)

Additional guidance	Mark
ALLOW reduction of bias	(2)

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Question 8 · AS Paper 2 · November 2021 · Q3(b) · 4 marks

Question Number	Answer
3(b)	An explanation that makes reference to the following: Placebo • because it provides a control group for comparison (1) • therefore ensuring that the { active ingredient / drug } is causing the effect (1) Double Blind Trial • because neither doctors nor patients know who has been given the actual drug (1) • therefore ensures that bias is removed from the trial (1)

Additional guidance	Mark
ALLOW that improvement is not due to a psychological effect	**(4)**

Question 9 · A level Paper 1 · October 2020 · Q9(c)(i) · 3 marks

Question Number	Answer
9(c)(i)	A description that makes reference to three of the following • (small groups of) healthy volunteers are given the vaccine to test for side effects (1) • (healthy volunteers) tested for presence of antibodies to the virus (following vaccination) (1) • a group of people at risk of contracting the disease is given the vaccine (1) • the number of people who develop the viral disease (following vaccination) are monitored (1)

Additional guidance	Mark
	(3)

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Question 10 · AS Paper 2 · June 2016 · Q4(b)(i) · 3 marks

Question Number	Answer
4(b)(i)	An explanation making reference to three of the following: • the temperature is warm, increasing the rate of reactions in bacteria (1) • availability of energy source from { tissue / blood } (1) • availability of water for bacterial cell functions (1) • consideration of the role of oxygen (1) EITHER oxygen availability is good, allowing (aerobic) respiration OR oxygen supply is limited, but some bacteria are able to respire anaerobically

Additional Guidance	Mark
ALLOW increasing enzyme activity IGNORE optimum temperature e.g. glucose IGNORE nutrients ALLOW named substance for growth e.g amino acids	(3)

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Question 11 · A level Paper 2 · June 2018 · Q3(a) · 3 marks

Question Number	Answer
3(a)	An explanation that makes reference to three of the following: • { warm conditions / water / glucose / amino acids / ideal pH } available (1) Plus 2 of the following: • suitable { temperature / pH } for bacterial enzymes (1) • glucose used for {respiration / energy} (1) • amino acids used for growth (1)

Additional Guidance	Mark
ALLOW 37°C ALLOW optimum	**(3)**

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Question 12 · AS Paper 2 · June 2025 · Q8(a)(ii) · 3 marks

Question number	Answer
8(a)(ii)	An explanation that makes reference to three of the following: • at low temperatures growth is slow / as temperature increases so does growth of bacteria (1) • because enzyme activity is {reduced at lower temperatures / increased at higher temperatures } (1) • because at { low temperatures enzymes have less kinetic energy / high temperatures enzymes have more kinetic energy } (1) • at high temperatures bacterial growth stops as enzymes are denatured (1)

Additional guidance	Mark
ALLOW bacteria cannot grow at low temperatures	(3)

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Question 13 · AS Paper 2 · June 2016 · Q6(a) · 2 marks

Question Number	Answer
6(a)	An answer making reference to the following: • cold (1) • dry (1)

Additional Guidance	Mark
ALLOW frozen, low temperature, -20°C (or below) NOT 0°C IGNORE cool ALLOW desiccated, no water, no moisture IGNORE refs to humidity	(2)

Question 14 · A level Paper 1 · June 2023 · Q5(a)(i) · 3 marks

Question Number	Answer
5(a)(i)	A description that makes reference to the following • the seeds are cleaned / (surface) sterilised (1) • the seeds are dried / seeds stored in dry conditions (1) • they are stored at {cold temperature / -20°C} (1)

Additional guidance	Mark
ALLOW disinfected IGNORE low humidity ALLOW frozen	(3)

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Question 15 · A level Paper 1 · June 2023 · Q5(a)(ii) · 2 marks

Question Number	Answer
5(a)(ii)	An explanation that makes reference to two of the following • (seeds from different plants of the same species) ensures {genetic diversity / a large gene pool / genetic variation} (1) • therefore greater chance of {survival/adaptation} (1) • (if the plants are reintroduced) {conditions may have changed / may be a different habitat} (1)

Additional guidance	Mark
ALLOW different genotypes / different alleles ALLOW reduces risk of extinction ALLOW examples of change such as presence of disease	(2)

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Question 16 · AS Paper 2 · June 2016 · Q6(d) · 3 marks

Question Number	Answer
6(d)	An answer making reference to **three** of the following: • SGSV conserves genetic diversity of crops (1) • crop varieties kept in SGSV are protected from { natural disasters / drought / mismanagement / economic factors / effects of climate change } (which can threaten varieties grown by farmers) (1) • crop varieties in SGSV may have traits that are useful in the future, such as { drought resistance / pest resistance / disease resistance / tolerance of changing environmental conditions } (1) • SGSV helps to ensure future food security (if crop varieties currently grown were to fail) (1)

Additional Guidance	Mark
NOT increases genetic diversity ALLOW seeds for crop varieties IGNORE protection from diseases / pests IGNORE ref to medicinal uses	(3)

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Question 17 · AS Paper 2 · June 2024 · Q5(c) · 3 marks

Question number	Answer
5(c)	An explanation that makes reference to the following: • use of stud books to select individuals to breed from (1) • therefore preventing closely related individuals breeding / to avoid {inbreeding depression /genetic drift } (1) • exchange of {individuals/gametes} between zoos (1)

Additional guidance	Mark
ALLOW (genetic) testing of potential parents	(3)

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Question 18 · A level Paper 1 · November 2021 · Q5(a) · 3 marks

Question Number	Answer
5 (a)	A description that makes reference to three of the following: • description of role in protection (1) • description of role in repopulation (1) • description of role in education (1) • description of role in research (1)

Additional Guidance	Mark
E.g. protection from poachers, hunting, vet care, administering medicines E.g. increase numbers, breeding programmes, release back into the wild E.g. conservation E.g. Improving health, discovering better nutrition, breeding cycles, developing a genetic database	**(3)**

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Question 19 · A level Paper 1 · June 2025 · Q4(b)(i) · 3 marks

Question Number	Answer
4(b)(i)	An explanation that makes reference to three of the following: • (the two populations) will have different gene pools (1) • (therefore) genetic diversity is {maintained / increased} (1) • the new population is more likely to have alleles to adapt to a change in the environment (1) • it reduces inbreeding depression (1)

Additional guidance	Mark
ALLOW introduces new alleles to the population ALLOW increases {size of gene pool / number of different alleles} ALLOW more chance of advantageous alleles ALLOW introduced cheetahs may have advantageous alleles ALLOW description of inbreeding depression e.g. breeding between siblings increases chance of genetic {condition / disease}	(3)

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Question 20 · A level Paper 1 · June 2025 · Q4(b)(ii) · 2 marks

Question Number	Answer
4(b)(ii)	An answer that makes reference to two of the following: • (animals born in the wild) know how to hunt (1) • therefore they will not starve (1) • leading to an increase in population (1)

Additional guidance	Mark
ALLOW learning how to escape predators IGNORE reference to competing with other predators ALLOW less likely to be {killed /eaten} by predators	(2)

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