

(Discovery and development of drugs)

Q1.a)(2020)

Monoclonal antibodies (mAbs) are usually made using mouse lymphocytes.

Candida albicans infection produces serious symptoms in patients with a poor immune system.

Recently scientists have produced mAbs to *Candida albicans* using human lymphocytes produced naturally after an infection.

Candida albicans lives in the throat of infected patients.

A sample is taken from the throat of a patient with a suspected *Candida albicans* infection.

The sample is transferred onto a microscope slide.

Describe how the mAbs and a fluorescent dye could be used to see any *Candida albicans* pathogens on the slide.

[3 marks]

Q1.b)(2020)

In a laboratory the human lymphocyte mAbs were injected into animals infected with *Candida albicans*.

The mAbs caused increased phagocytosis of the *Candida albicans* pathogens.

Doctors intend to start a trial to give the mAbs to patients severely ill with *Candida albicans*.

Explain how increased phagocytosis of the *Candida albicans* pathogen will help the patient.

[2 marks]

Q1.c)(2020)

It has been shown that this mAbs treatment is effective in the laboratory using both:

- infected tissue culture cells
- infected live animals.

The mAbs treatment for *Candida albicans* is now ready for clinical trials on people.

Describe how the clinical trials should be carried out.

[6 marks]

Q1.d)(2020)

Scientists have also used human lymphocytes to make mAbs to other pathogens and to some types of cancer cells.

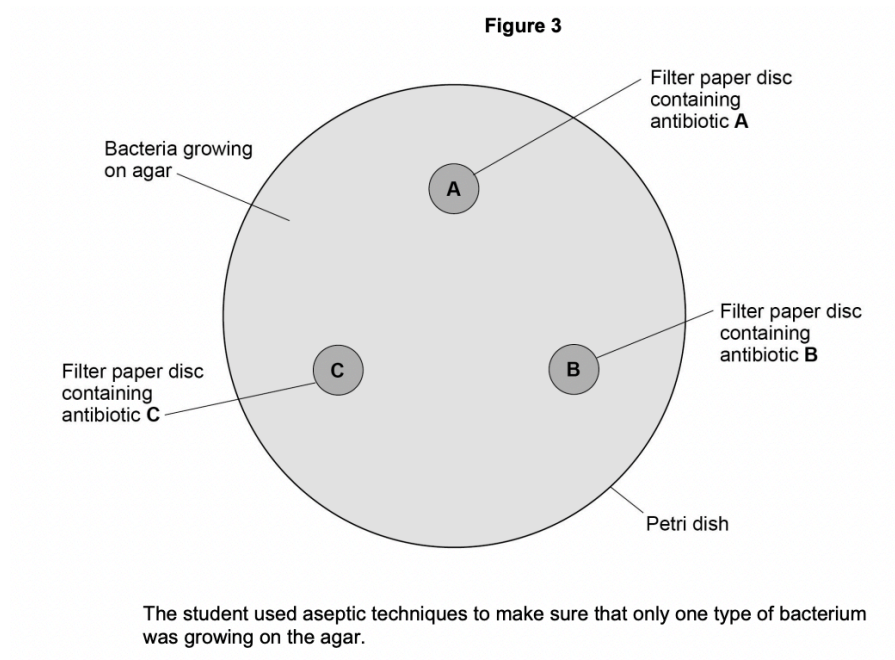
Suggest **one** reason why these new mAbs have been more successful in treating diseases in humans than mAbs made using mice.

[1 mark]

Q2.a)(2021)

A student investigated the effectiveness of three different antibiotics.

Figure 3 shows how the student set up an agar plate.



Describe **two** aseptic techniques the student should have used.

[2 marks]

- 1 _____
- _____
- _____
- 2 _____
- _____

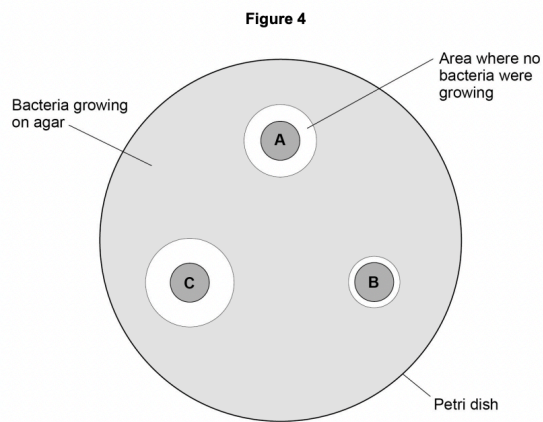
Q2.b)(2021)

Infection and Response

<http://www.pcfgstudy.com>

The student placed the agar plate in an incubator at 25 °C for 48 hours.

Figure 4 shows the agar plate after 48 hours.



Which antibiotic is the **least** effective?

Give a reason for your answer.

[1 mark]

Least effective antibiotic _____

Reason _____

Q2.c)(2021)

Calculate the area where no bacteria were growing for antibiotic C.

Use $\pi = 3.14$

Give the unit.

[5 marks]

Area = _____ Unit _____

Q2.d)(2021)

Suggest **one** way the student could improve the investigation.

[1 mark]

Q3.(2023)

In the past many drugs were extracted from plants.

Aspirin is a painkiller.

Which plant does aspirin originate from?

[1 mark]

Q4.a)(2023)

Scientists have extracted chemical **A** from the deadly nightshade plant.

Chemical **A** can be used as a painkiller.

Table 1 shows information about where chemical **A** is found.

Table 1

Part of deadly nightshade plant	Mass of chemical A in 100 g of plant tissue in grams
Roots	1.3
Leaves	1.2
Berries	0.7

The scientists usually extract chemical **A** from the berries of the deadly nightshade plant.

Suggest **one** reason why berries are used instead of leaves or roots.

[1 mark]

Q4.b)(2023)

A deadly nightshade plant has chlorosis (yellow leaves).

The mass of chemical **A** found in the **leaves** of the plant is 60% of the mass shown in **Table 1**.

Calculate the mass of chemical **A** in 200 g of the **leaves** with chlorosis.

Give your answer in mg.

[4 marks]

Mass of chemical **A** = _____ mg

Q4.c)(2023)

Suggest **one** reason why the leaves of the deadly nightshade plant have chlorosis.

[1 mark]

Q4.d)(2023)

Chemical **A** has **not** been tested in large-scale clinical trials in the UK.

It is important for drugs to be tested in clinical trials before the drugs are approved for use by the public.

Give **two** reasons why.

[2 marks]

1 _____

2 _____

Q4.e)(2023)

There are many online reports making claims about the effects of chemical **A**.

Some of these reports are biased.

Suggest **one** reason why a report making claims about the effects of chemical **A** may be biased.

[1 mark]

Q4.f)(2023)

How can scientists be sure that claims about new drugs are valid?

[1 mark]

Tick (✓) **one** box.

Advertise the claims on social media.

☐

Ask an international company to produce the drug.

☐

Have the claims peer reviewed.

☐

Publish the claims in a newspaper.

☐

Q5.(2024)

New cancer drugs are tested in clinical trials.

Preclinical testing happens before clinical trials.

What is involved in preclinical testing of drugs?

[1 mark]

Tick (✓) **one** box.

Testing the drugs for side effects

☐

Testing the drugs on live tissues in a laboratory

☐

Testing the drugs to find the optimum dose

☐

Testing the drugs with chemicals in a laboratory

☐