AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.2.7

Cancer

Past-paper questions

Tier	**Higher**
Question groups	**22**
Available paper years	**2007–2024**

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.

4.2.2.7 Cancer

Question 01

March 2007 | BLY1A | Original Q4 | Legacy

QUESTION FOUR

Read the passage.

Sunshine For Breakfast

A journalist for a national newspaper reported that American army doctors had recognised that soldiers stationed in many sunny countries were less likely to suffer from some types of cancer.

They suggested that this was due to increased levels of vitamin D which is made in the skin when exposed to sunlight.

Vitamin D can be found in a range of foods such as cheese, eggs and milk.

Vitamin D helps with the absorption of calcium and phosphorus from food and reduces the chances of suffering from rickets.

The doctors compared data from large numbers of soldiers who had spent most of their careers in either sunny or less sunny climates.

Following the newspaper report, shoppers quickly bought all the vitamin D tablets from supermarkets and shops.

A spokesman for a leading health store said, 'It is unlikely that someone could overdose on vitamin D.'

4A What initial observation was made by the doctors?

1 Shoppers bought large amounts of vitamin D tablets when the newspaper report was released.

2 Soldiers in sunny countries are less likely to suffer from some types of cancer.

3 Vitamin D can be found in a range of foods such as cheese, eggs and milk.

4 Vitamin D is made in the skin.

4B What explanation did the doctors give for the initial observation?

1 Sunlight contains vitamin D.

2 There is insufficient data to come to a conclusion.

3 Vitamin D can be made in the skin when exposed to sunlight.

4 Vitamin D might help to reduce the number of some types of cancers.

4.2.2.7 Cancer

Question 01 · continued

4C Which of these groups of people is most likely to provide valid evidence about the effect of vitamin D?

1 American army doctors

2 the journalist who wrote the newspaper article

3 one of the soldiers who were studied

4 the spokesman for the leading health store

4D A lack of vitamin D in the diet can lead to any of the following problems **except** . . .

1 a deficiency disease.

2 liver problems caused by absorbing too much calcium.

3 malnourishment.

4 rickets.

4.2.2.7 Cancer

Question 02

November 2007 | BLY1A | Original Q1 | Legacy

QUESTION ONE

Read the passage:

> Scientists in America noticed that soldiers who had spent a long time in sunny countries were much less likely to suffer from cancer.
> They suggested that this was due to increased levels of vitamin D. The skin makes vitamin D when exposed to sunlight.
> To investigate this suggestion, the scientists collected data from large numbers of soldiers who had spent many years in sunny countries and compared this with data from large numbers of soldiers who had spent many years in less sunny countries.

Match words, **A**, **B**, **C** and **D**, with the statements **1–4** in the table.

A a hypothesis

B a survey

C an independent variable

D an observation

	Information
1	high levels of vitamin D might reduce the chances of suffering from some cancers
2	soldiers who spend a lot of time in sunny countries are less likely to suffer from some cancers
3	the number of years spent in sunny countries
4	the collection of data from large numbers of soldiers

4.2.2.7 Cancer

Question 03

November 2007 | BLY1A | Original Q6 | Legacy

QUESTION SIX

This question is about hormones and contraception.

6A Which line in the table is correct?

	FSH	Oestrogen
1	secreted by the pituitary gland	stimulates FSH production
2	causes eggs to mature	secreted by the pituitary gland
3	stimulates production of oestrogen	secreted by the ovaries
4	used in oral contraceptives	causes eggs to mature

6B Which of the following is true of the hormone LH?

1 The production of LH is stimulated by FSH.

2 It is produced by the ovary.

3 The production of LH is stimulated by a hormone from the ovaries.

4 It is used in contraceptive pills.

6C There are several types of contraceptive pill available for women.
One type of contraceptive pill contains oestrogen.

What is the effect of this type of contraceptive pill?

1 It inhibits the production of FSH.

2 It prevents a fertilised egg from implanting in the womb.

3 It prevents LH production.

4 It reduces the number of eggs released at ovulation.

4.2.2.7 Cancer

6D The contraceptive pill has been linked to cervical cancer.
However, it is believed that most cases of cervical cancer are linked to a virus, HPV.
A new vaccine has been produced to combat HPV.

This vaccine . . .

1 will contain dead or weakened HPV viruses.

2 will contain antibodies against the HPV virus.

3 will destroy the HPV virus.

4 will cause the body to produce antibiotics.

Turn over for the next question

4.2.2.7 Cancer

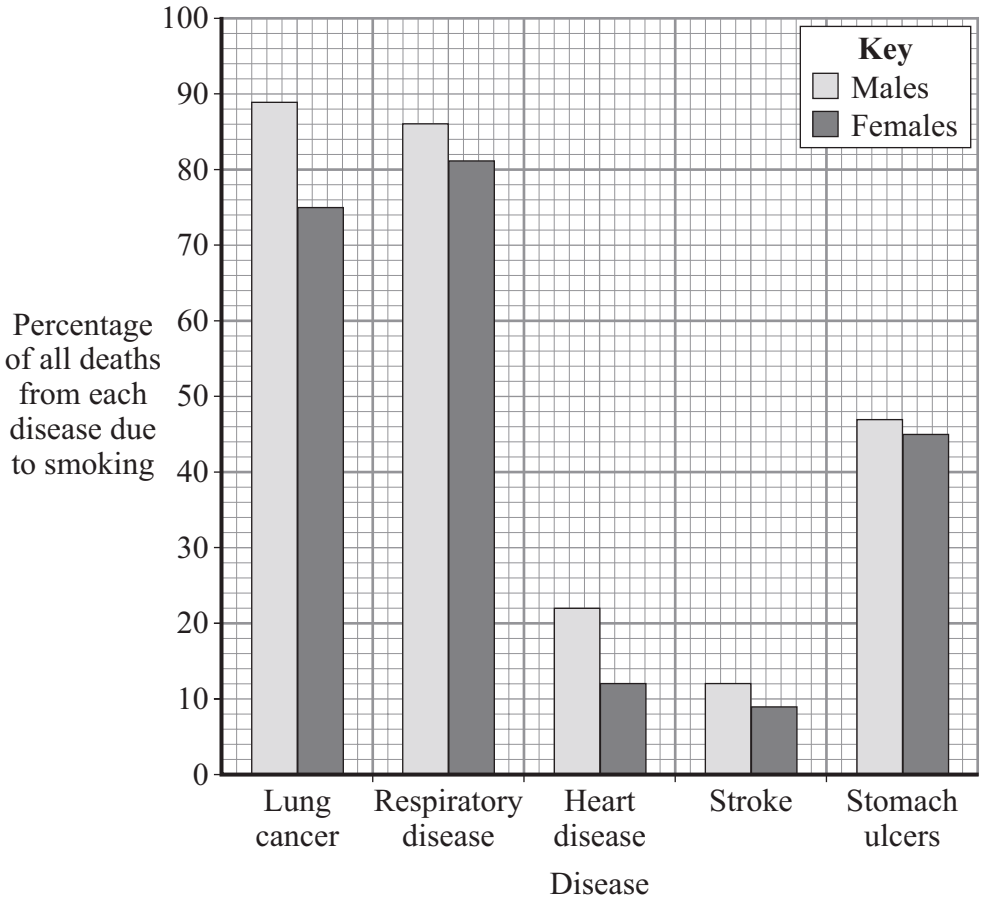
Question 04

June 2008 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

This question is about smoking and disease.

The bar chart shows the percentages of deaths due to smoking for five different diseases.



3A In women, which disease shows the highest percentage of deaths that are thought to be due to smoking?

1 lung cancer

2 respiratory disease

3 heart disease

4 stroke

4.2.2.7 Cancer

Question 04 · continued

3B What percentage of deaths from respiratory disease in males is due to causes other than smoking?

1 12

2 14

3 81

4 86

3C The total number of women who died from stomach ulcers was 2220.

How many of these deaths were caused by smoking?

1 550

2 999

3 1110

4 1665

3D Which is the best conclusion that can be drawn from the bar chart?

1 Smoking causes most of the deaths due to stomach ulcers.

2 The chance of dying from any of the five diseases is increased if you smoke.

3 There is a strong link between smoking and death from heart disease.

4 The chance of dying from a stroke is not increased by smoking.

4.2.2.7 Cancer

Question 05

June 2009 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

There are many support methods that people can use to help them to stop smoking. Some of them are shown in the table.

The figures given for the success rate of each support method show the extra people who stopped smoking using a support method compared with those who succeeded without support of any kind.

Support method	How it works	Success rate
NRT medication	Gum, nasal spray, patch. Reduces the need to smoke. Prescription not necessary.	Approximately 1 in 5 extra people stopped smoking.
Zyban medication	Prescription-only tablets. Can cause side effects, worst is having fits (chance of 1 in 1000).	Approximately 1 in 10 extra people stopped smoking.
Champix medication	Tablets. Reduces the need to smoke. Available on prescription.	Approximately 1 in 7 extra people stopped smoking after one course. More stopped after two courses.
Face-to-face counselling	Works best with a fully trained adviser.	Approximately 1 in 20 extra people stopped smoking.
Smokers' support group meetings	Smokers help each other with problems, and try not to let the group down.	Approximately 1 in 20 extra people stopped smoking.

7A Which of the following support methods is the least likely to cause any undesirable physical side effects?

1 NRT medication

2 Zyban medication

3 Champix medication

4 Support group meetings

7B Which of the following support methods appears to be the most effective on its own?

1 NRT medication

2 Zyban medication

3 Champix medication

4 Face-to-face counselling

4.2.2.7 Cancer

Question 05 · continued

7C Smokers' support group meetings . . .

1 are about as effective at helping people to stop smoking as face-to-face counselling with a trained adviser.

2 are only as effective at helping people to stop smoking as some of the drugs in the table.

3 need to be tried out with non-smoking volunteers before they are made generally available to the public.

4 reduce the physical urge to smoke.

7D Which one of the following is **not** a correct statement about people who have smoked for many years?

1 They are likely to die younger than if they had been a non-smoker.

2 They experience urges to smoke after they have stopped.

3 They have an increased risk of contracting various diseases.

4 They will eventually get lung cancer.

4.2.2.7 Cancer

Question 06

June 2009 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Women under the age of about 40 may take oral contraceptives containing oestrogen. However, there are possible side effects after long-term use of oestrogen.

8A The role of oestrogen in the menstrual cycle is to . . .

1 stimulate FSH production and inhibit LH production.

2 inhibit both FSH production and LH production.

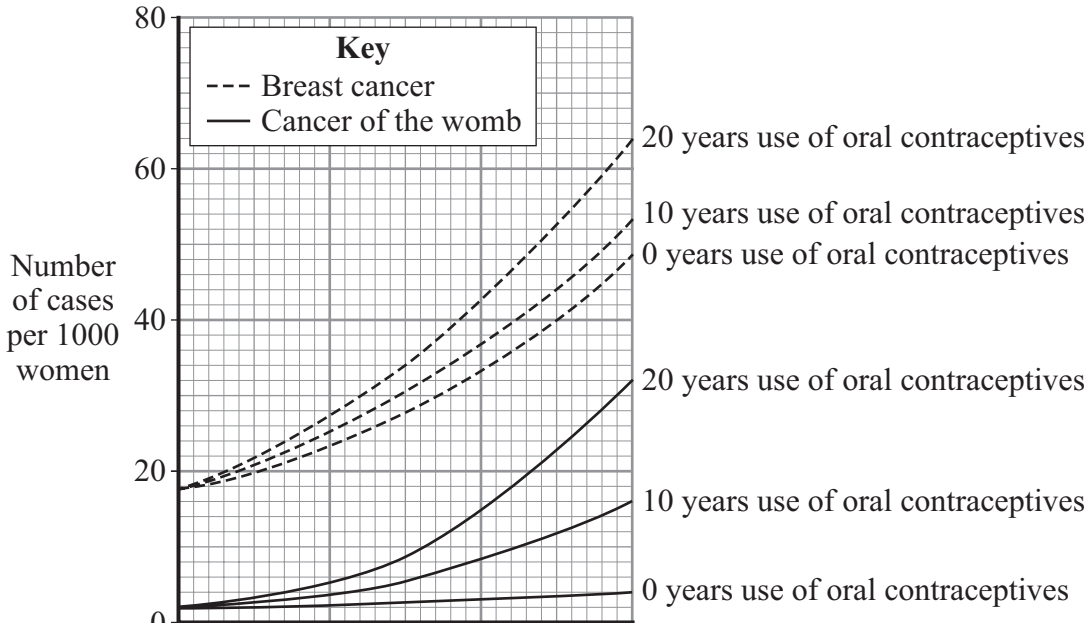
3 inhibit FSH production and stimulate LH production.

4 stimulate both FSH production and LH production.

8B Which row in the table correctly identifies the organs that produce the hormones controlling the menstrual cycle?

	FSH	LH	Oestrogen
1	pituitary gland	ovaries	pituitary gland
2	ovaries	pituitary gland	ovaries
3	pituitary gland	ovaries	ovaries
4	pituitary gland	pituitary gland	ovaries

The graph shows some of the effects of taking oestrogen as an oral contraceptive for different lengths of time between the ages of 16 and 40.



4.2.2.7 Cancer

Question 06 · continued

8C The graph shows that the use of oestrogen as an oral contraceptive for 20 years may . . .

1 cause an eightfold increase in the percentage of women who develop womb cancer by the age of 65.

2 cause a sixteenfold increase in the percentage of women who develop womb cancer by the age of 65.

3 have no effect on the risk of breast cancer until 54 years of age.

4 reduce the number of unwanted pregnancies.

8D Which one of the following statements **cannot** be deduced from the information in the graph?

1 Oestrogen in oral contraceptives causes cancer.

2 The longer a woman takes oral contraceptives, the greater the risk of certain cancers developing.

3 The older a woman is, the greater the risk of breast cancer developing.

4 Women who have never taken oral contraceptives are very unlikely to develop cancer of the womb.

4.2.2.7 Cancer

Question 07

June 2009 | BLY1H | Original Q7 | Legacy

7 Two types of fertility treatment are in-vitro fertilisation (IVF) and in-vitro maturation (IVM).

7 (a) Describe the role of hormones in IVF treatment.

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(3 marks)

(Extra space) .....

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7 (b) Read the passage about fertility treatment.

During normal IVF, a woman undergoes several weeks of hormone injections. The treatment can lead to a condition called ovarian hyperstimulation syndrome resulting in a build-up of fluid in the lungs. Very rarely, it can cause death. The syndrome occurs in about 1 % of standard IVF cycles, but in about 10 % of the IVF cycles of some women. An IVF cycle may cost up to £4300.

In IVM, hormone treatment lasts for less than 7 days. Eggs are then collected from the ovaries while they are still immature. Each egg is then matured in a laboratory for up to 48 hours before being injected with a single sperm. A few days after fertilisation, the embryos are implanted into the mother's womb. The cost of each IVM cycle is £1700.

An IVM expert says: "In IVM treatment there's a small risk of abnormalities in the sex chromosomes and also of birth deformities and cancer in the babies. These risks are not massive but they are greater than in IVF."

4.2.2.7 Cancer

Question 07 · continued

for mark

7 (b) Evaluate the use of IVM rather than IVF in treating infertility.

Remember to give a conclusion to your evaluation.

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(4 marks)

(Extra space) .....

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4.2.2.7 Cancer

Question 08

November 2009 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

Some substances can harm the body.

Match substances, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A alcohol

B carbon monoxide

C carcinogen

D thalidomide

	Effect on body
1	reduces the amount of oxygen carried in the blood
2	may cause liver damage
3	may cause cancer
4	may cause limb abnormalities in babies

4.2.2.7 Cancer

Question 09

November 2009 | BLY1BP | Original Q6 | Legacy

QUESTION SIX

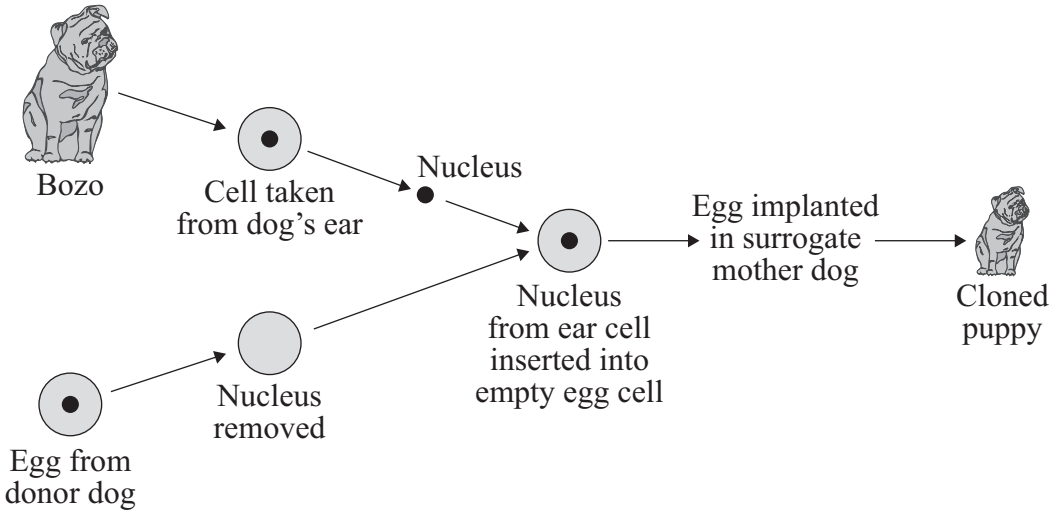
Woman gets 5 cloned puppies of her pet dog

A woman sold her house to raise £25 000 to have her pet dog Bozo cloned before he died of cancer.

The company that cloned the dog said that it could clone 300 dogs a year for pet owners whose dogs have died.

Animal charities condemned the practice as unacceptable.

The diagram shows the cloning process used by the company.



6A The cloned puppy is . . .

1 genetically identical to the surrogate mother dog.

2 genetically identical to the egg donor dog.

3 genetically identical to Bozo.

4 genetically identical to Bozo's parents.

4.2.2.7 Cancer

Question 09 · continued

6B The method used to produce the cloned puppies involves . . .

1 asexual reproduction.

2 fertilisation.

3 genetic engineering.

4 sexual reproduction.

6C Some humans are natural clones.

Which method would produce **natural** human clones?

1 two eggs being fertilised by two sperm at the same time

2 a developing embryo splitting to produce two separate embryos

3 an early embryo being split apart and transplanted into two host mothers

4 replacing the nucleus of an egg with the nucleus of an adult cell

6D Cloning puppies is allowed, but the cloning of humans is banned.

This is because . . .

1 no two humans should ever have the same genetic information.

2 there are ethical objections to cloning humans.

3 it would put too big a strain on NHS resources.

4 cloned children are much more likely to have inherited diseases.

4.2.2.7 Cancer

Question 10

March 2010 | BLY1AP | Original Q5 | Legacy

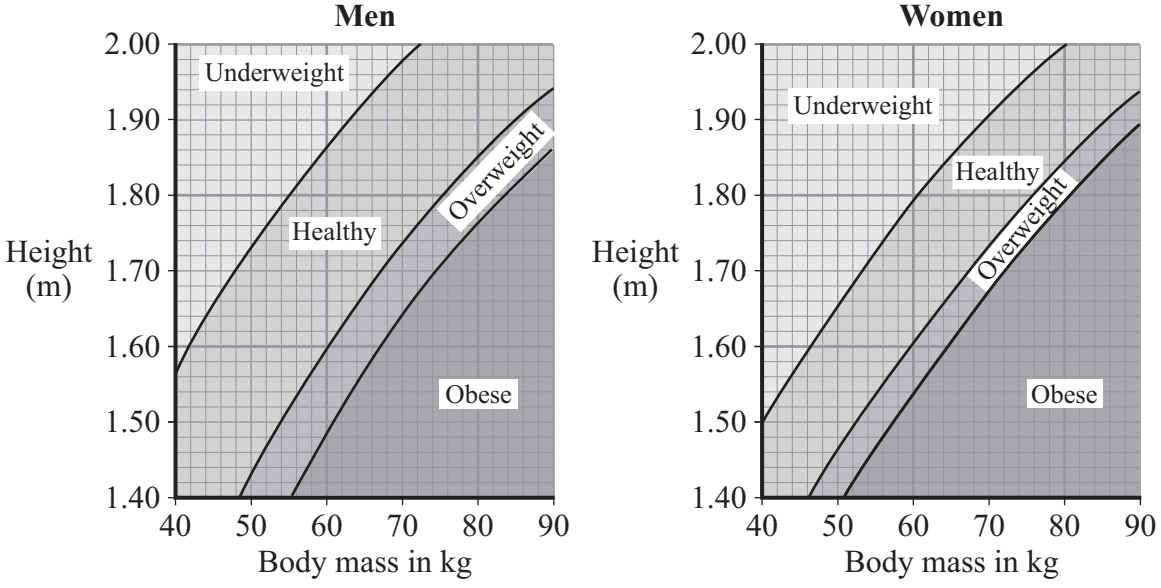
QUESTION FIVE

A combination of a balanced diet and exercise are needed to keep the body healthy.

5A Which row in the table correctly shows a cause and an effect of obesity?

	Cause of obesity		Effect of obesity	
	High salt	**High fat**	**Arthritis**	**Lung cancer**
1	✓		✓	
2		✓		✓
3	✓			✓
4		✓	✓	

The charts are used to find if a person has a healthy mass for his/her height.



5B A woman is 1.6 m tall and has a mass of 66 kg.

From the chart, she is . . .

1 underweight.

2 healthy.

3 overweight.

4 obese.

4.2.2.7 Cancer

Question 10 · continued

5C A man is 1.70 m tall. He is overweight.

His body mass is between . . .

1 48 and 68 kg.

2 66 and 72 kg.

3 67 and 74 kg.

4 76 and 84 kg.

5D The metabolic rate of a healthy person eating a balanced diet will **not** be affected by . . .

1 the proportion of muscle to fat in the body.

2 taking vitamin tablets.

3 inherited factors.

4 the amount of exercise taken.

4.2.2.7 Cancer

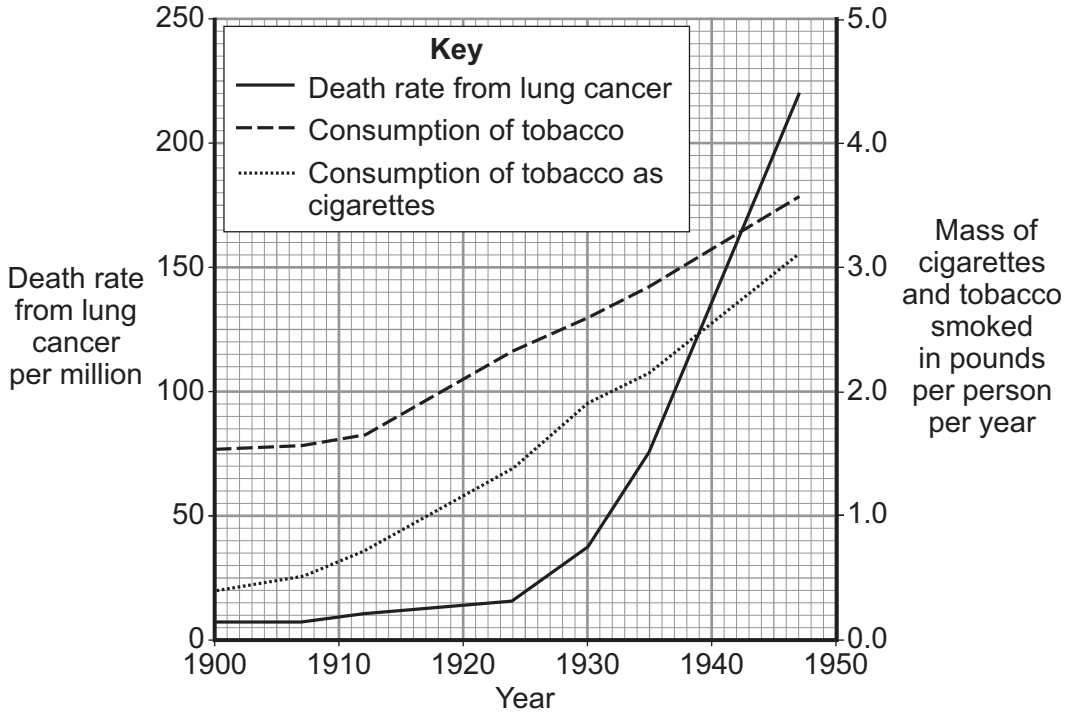
Question 11

June 2010 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

In the 1950s, Richard Doll used surveys to investigate the causes of lung cancer.

The graph shows one set of data that he produced.



7A By how much did the consumption of tobacco as cigarettes increase between 1900 and 1947?

1 2.7 pounds per person per year

2 3.0 pounds per person per year

3 3.5 pounds per person per year

4 5.4 pounds per person per year

7B The death rate from lung cancer between 1900 and 1947 . . .

1 increased at a constant rate.

2 increased slowly at first, then more rapidly.

3 increased rapidly at first, then more slowly.

4 increased rapidly, then levelled off.

4.2.2.7 Cancer

Question 11 · continued

Doll interviewed hospital patients about their smoking habits.

The table shows some of the results.

Numbers of cigarettes smoked each day	0	1–4	5–14	15–24	25 or more
Number of lung cancer patients	2	12	36	27	21
Number of patients with diseases other than lung cancer	9	9	30	19	11

7C This data shows that . . .

1 there is a possible link between smoking and lung cancer.

2 there is no link between smoking and lung cancer.

3 smoking causes lung cancer.

4 smoking causes a wide range of diseases.

7D It took many years for Doll's work to be widely accepted by other doctors.

The main reason for this was that . . .

1 his work mainly involved collecting statistics.

2 large amounts of money were spent on tobacco advertising.

3 interviews about smoking habits produce very unreliable data.

4 many doctors were smokers.

4.2.2.7 Cancer

Question 12

November 2010 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Smoking damages your health.

Match the substances, **A**, **B**, **C** and **D**, with statements **1–4** in the table.

A carbon monoxide

B carcinogen

C nicotine

D oxygen

1	the addictive substance in tobacco smoke
2	a cancer-causing chemical in tobacco smoke
3	reduces the birth mass in babies
4	a fetus needs this substance

4.2.2.7 Cancer

Question 13

November 2010 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

The amount of energy we need depends on age, gender and activity.

9A The table shows the mean energy needed per day by different people.

Person	Mean energy needed per day in kJ	
	Male	Female
6-year old	7 500	7 500
16-year old	13 000	10 000
30-year old office worker	11 000	9 500
30-year old labourer	16 000	13 500
Pregnant woman		10 500

From the data in the table, which of the following has the biggest effect on the amount of energy needed by the body?

1 your gender

2 pregnancy

3 how active you are

4 how fit you are

9B Of the following, who needs least food?

People who . . .

1 exercise little and live in cold climates.

2 exercise a lot and live in warm climates.

3 exercise little and live in warm climates.

4 exercise a lot and live in cold climates.

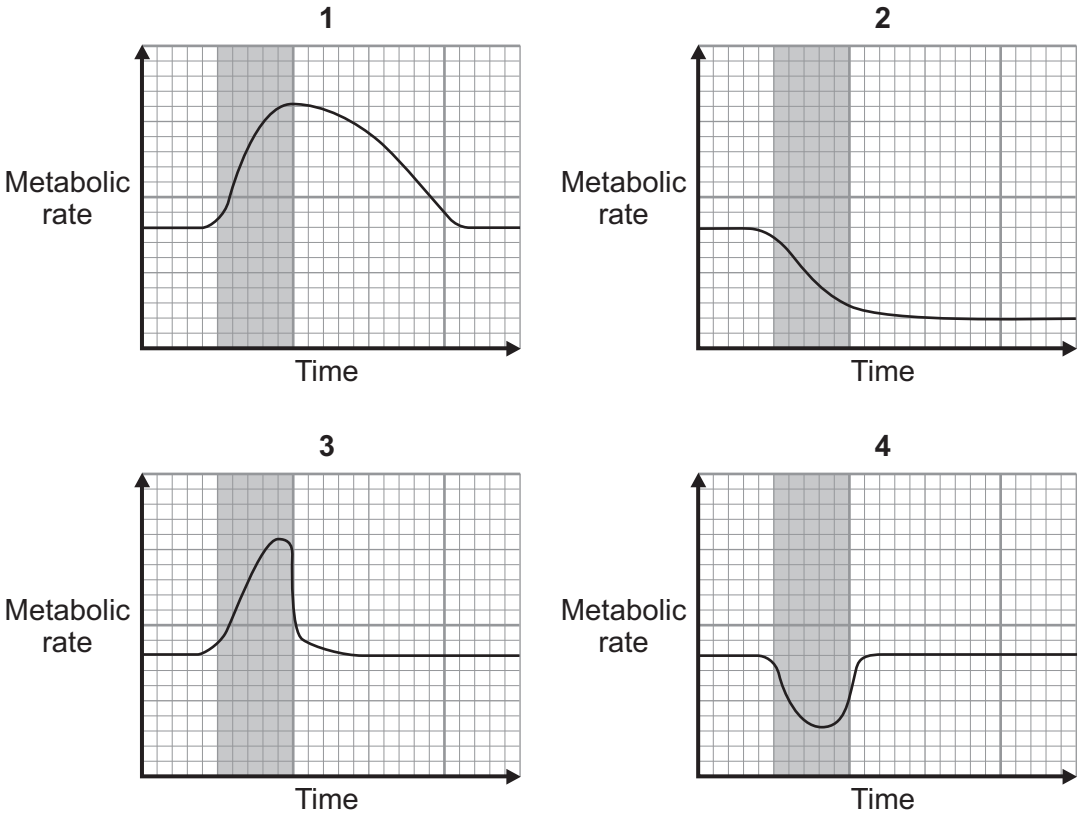
4.2.2.7 Cancer

9C Some people take more energy into their body than they use.

Which row in the table shows diseases linked with this?

	Arthritis	Cancer	Diabetes	Rubella	Deficiency diseases
1	✓	✓		✓	
2			✓		✓
3	✓		✓		
4		✓		✓	✓

9D Which graph shows a person's metabolic rate, before, during and after a 20-minute period of exercise?



Key: 20-minute period of exercise

END OF TEST

4.2.2.7 Cancer

Question 14

5 Scientists estimate that about one third of cancers in the UK may be linked to obesity.

5 (a) Name **two** diseases linked to obesity.

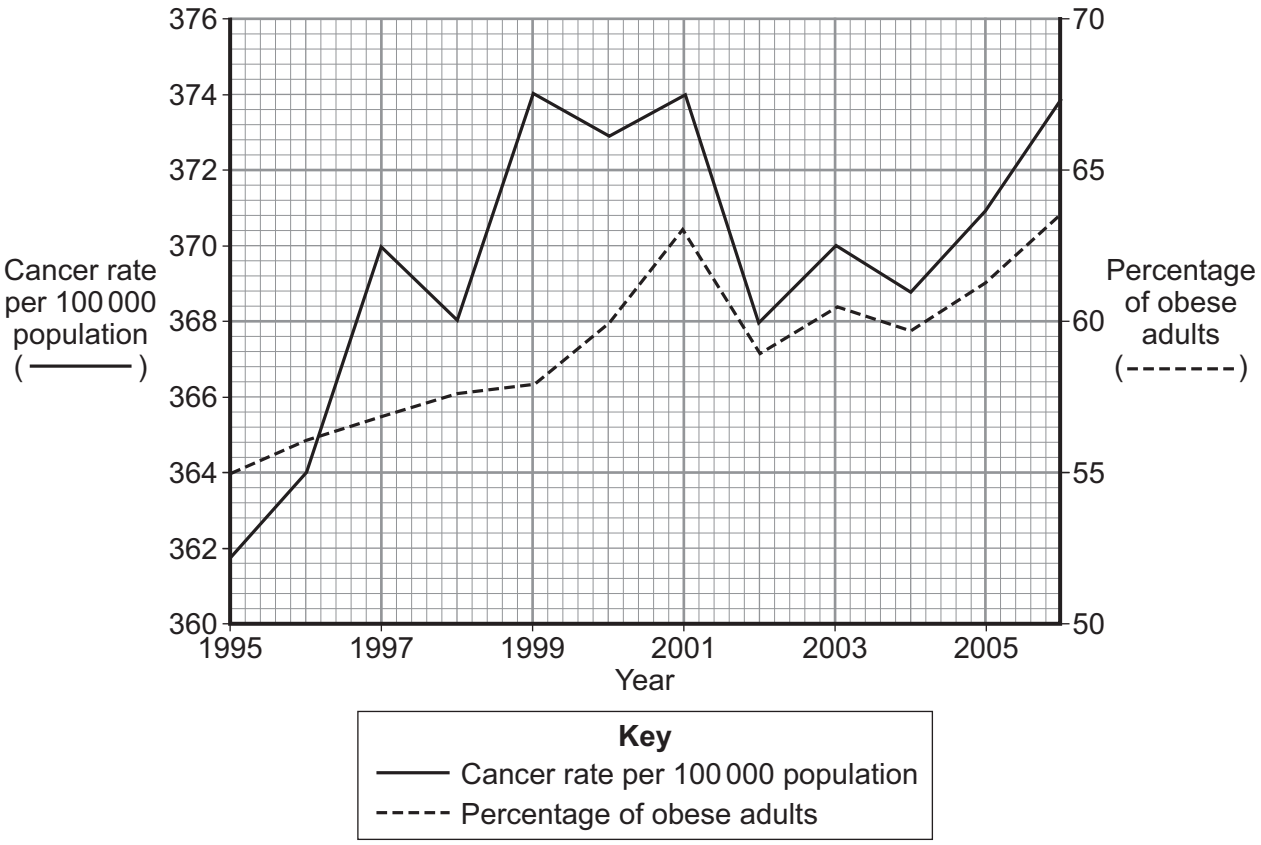
Do **not** give cancer as one of your answers.

1 .....

2 .....

(2 marks)

The graph shows the changes in the cancer rate and the changes in the percentage of obese adults in the UK from 1995 to 2006.



4.2.2.7 Cancer

Question 14 · continued

5 (b) Does the data in the graph prove that obesity causes cancer?

Draw a ring round your answer. **Yes** / **No**

Explain the reason for your answer.

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(2 marks)

5 (c) Exercise helps a person to lose weight.

Explain why.

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(2 marks)

6

4.2.2.7 Cancer

Question 15

January 2011 | BLY2H | Original Q4 | Legacy

4 A certain allele increases the chance of women developing one type of breast cancer.

A woman has this allele. She wants to be sure that she will not have daughters who also have the allele.

Doctors:

- collect several eggs from her ovaries
- fertilise the eggs with sperm, in dishes.

4 (a) The doctors expect half the embryos produced to be female.

Explain why.

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(2 marks)

4 (b) The embryos grow to around 100 cells.

Doctors:

- remove one cell from each embryo
- check the cell for the allele.

Complete the sentence.

This process is known as embryo ..... .

(1 mark)

4.2.2.7 Cancer

Question 15 · continued

4 (c) One of the female embryos did not have the allele.
This female embryo was implanted into the woman's uterus.

Evaluate the advantages and disadvantages of the whole procedure.

Use information from all parts of this question and your own knowledge.

Remember to give a conclusion to your evaluation.

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(4 marks)

7

4.2.2.7 Cancer

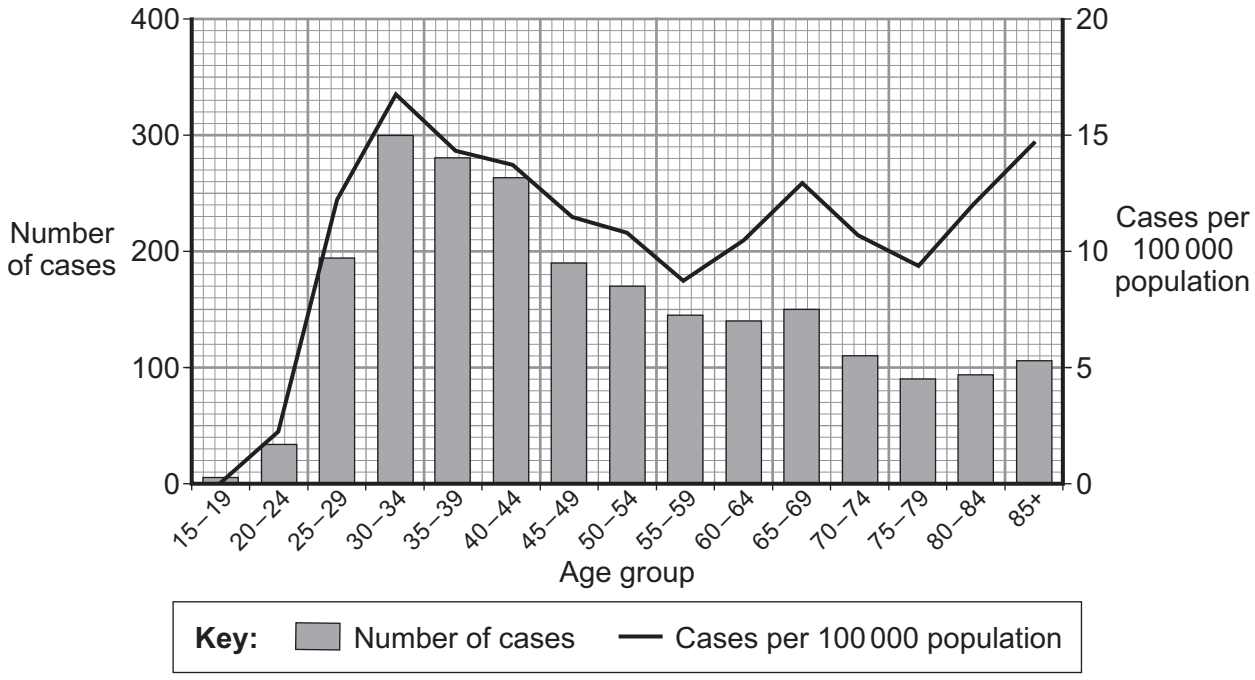
Question 16

June 2011 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

A virus causes cervical cancer. Sexual intercourse transmits the virus.

The graph shows the number of cases of cervical cancer diagnosed in England in 2005.



4A Which age group had the highest number of cases of cervical cancer?

1 15–19

2 30–34

3 40–44

4 85+

4B A city has 500 000 inhabitants.

How many women aged 65–69 would have been diagnosed with cervical cancer in 2005?

1 13

2 65

3 150

4 260

4.2.2.7 Cancer

Question 16 · continued

4C The government has started a programme of vaccination against the cervical cancer virus. The programme starts with the vaccination of 14-year-old girls.

From the information in the graph, what is the reason for starting with this age group?

The girls in this age group . . .

1 are used to being vaccinated.

2 get booster doses of other vaccines at school.

3 have mainly not yet started their menstrual cycles.

4 have mainly not yet been infected with the virus.

4D Many parents do not agree with girls of 14 being vaccinated against the cervical cancer virus.

An ethical reason for this would be that the parents . . .

1 think vaccination might encourage the girl to have underage sex.

2 do not know how the vaccine works.

3 are afraid of side-effects.

4 cannot afford vaccination.

4.2.2.7 Cancer

Question 17

June 2018 | 8461/1H | Original Q6

0 6 Cystic fibrosis (CF) is a genetic disorder caused by a change in a gene.

0 6 . 1 What molecule are genes made of?

[1 mark]

0 6 . 2 CF affects the cell membranes of cells in the lungs and digestive system.

What is the function of the cell membrane?

[1 mark]

0 6 . 3 In a person with CF, cells lining the lungs and digestive system create too much mucus.

The mucus can:

- block the duct leading from the pancreas to the small intestine
- block the tubes leading to the alveoli in the lungs.

Explain why children with CF grow more slowly than children without CF.

[6 marks]

4.2.2.7 Cancer

Question 17 · continued

Table 6 shows information about people in the UK in 2015.

Table 6

	Median age in years
People with CF	19
Whole population	40

0 6 . 4 Describe how the median age of a group of people can be determined.

[2 marks]

0 6 . 5 Suggest **one** reason why the median age for people with CF is lower than the median age for the whole population.

[1 mark]

Question 17 · continued

0 6 . 6 People with a lung function below 30% may need a lung transplant.

Table 7 gives information about people with CF in 2015.

Table 7

Lung Function (%)	Percentage of people with CF
>75	22
51 – 75	72
30 – 50	4
<30	2

In 2015, the total number of people with CF in the UK was 10 800.

Calculate how many people with CF in the UK in 2015 would **not** need a lung transplant.

[2 marks]

Number of people = _____

4.2.2.7 Cancer

Question 17 · continued

0 6 . 7 Lung transplants from donors have risks. One risk is organ rejection.

Scientists are researching how to solve the problem of organ rejection and hope to use stem cells to create healthy lungs.

The healthy lungs can then be transplanted into CF patients without the risk of organ rejection.

Describe how scientists may use stem cells to create healthy lungs that are **not** rejected by the CF patient.

[4 marks]

0 6 . 8 Some people disagree with the use of stem cells because of the risk of cancer.

Give **one** other reason why some people disagree with the use of stem cells to create new organs for transplants.

[1 mark]

18

4.2.2.7 Cancer

Question 18

June 2019 | 8461/1H | Original Q8

0 8 Pancreatic cancer develops when a malignant tumour grows inside the pancreas.

0 8 . 1 The pancreas produces digestive enzymes.

What is an enzyme?

[2 marks]

0 8 . 2 Carbohydrase is an enzyme produced by the pancreas.

Name **two** other organs in the digestive system that produce carbohydrase.

[2 marks]

1 _____

2 _____

0 8 . 3 One symptom of pancreatic cancer is weight loss.

Explain how pancreatic cancer may cause a person to lose weight.

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

[4 marks]

4.2.2.7 Cancer

Question 18 · continued

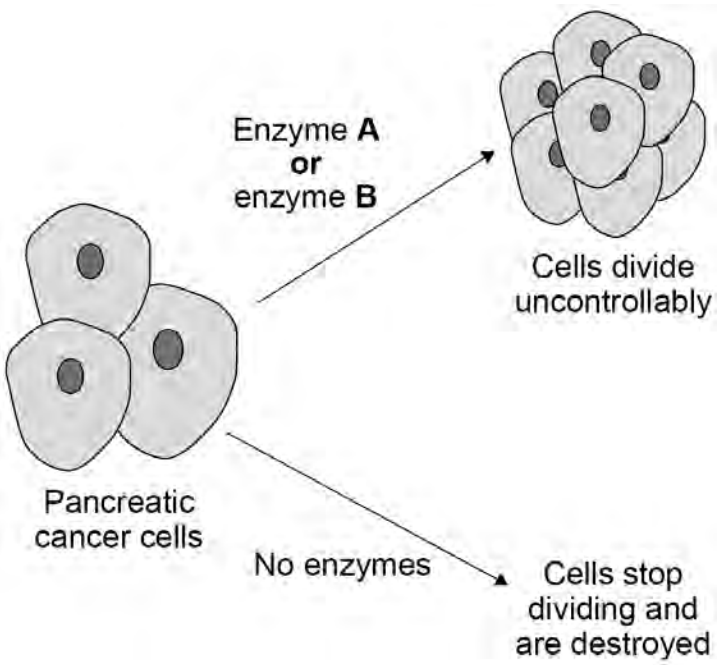
Enzyme **A** and enzyme **B** are involved in controlling cell division in pancreatic cancer cells.

Most cancer cells produce both enzyme **A** and enzyme **B**.

Some people have a gene mutation that stops cancer cells producing enzyme **B**.

Figure 9 shows how cell division is controlled in pancreatic cancer cells.

Figure 9



4.2.2.7 Cancer

Question 18 · continued

Scientists have developed a drug that inhibits enzyme **A**.

The drug is given to pancreatic cancer patients who have the gene mutation that stops cancer cells producing enzyme **B**.

The drug only targets cancer cells.

0 8 . 4 Explain why the drug can be used to treat pancreatic cancer in patients with the gene mutation.

Use information from **Figure 9**.

[3 marks]

0 8 . 5 Explain why the drug could **not** be used to treat pancreatic cancer in a patient that produces both enzyme **A** and enzyme **B**.

[2 marks]

Question 8 continues on the next page

Question 18 · continued

0 8 . 6 The drug was trialled before it was licensed for use.

To improve validity of the results in the trial:

- some patients were given a placebo
- a double-blind trial was used.

Give reasons why a placebo and a double-blind trial were used.

[2 marks]

A placebo _____

_____

_____

A double-blind trial _____

_____

_____

0 8 . 7 One stage in a drug trial is to test the drug on healthy volunteers.

What is the next stage in the drug trial?

[1 mark]

Tick (✓) **one** box.

Testing on all patients with the disease ☐

Testing on human tissue ☐

Testing on live animals ☐

Testing on volunteers with the disease ☐

4.2.2.7 Cancer

Question 18 · continued

0 8 . 8 A monoclonal antibody has been produced to treat pancreatic cancer.

Explain how the monoclonal antibody works to treat pancreatic cancer.

[3 marks]

19

4.2.2.7 Cancer

Question 19

November 2020 | 8461/1H | Original Q7

0 7 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.

0 7 . 1 *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]

4.2.2.7 Cancer

Question 19 · continued

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.*

0 7 . 2 Explain how increased phagocytosis of the *Candida albicans* pathogen will help the patient.

[2 marks]

Question 7 continues on the next page

4.2.2.7 Cancer

Question 19 · continued

0 7 . 3 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]

4.2.2.7 Cancer

Question 19 · continued

November 2020 | 8461/1H | Original Q7

0 7 . 4 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]

12

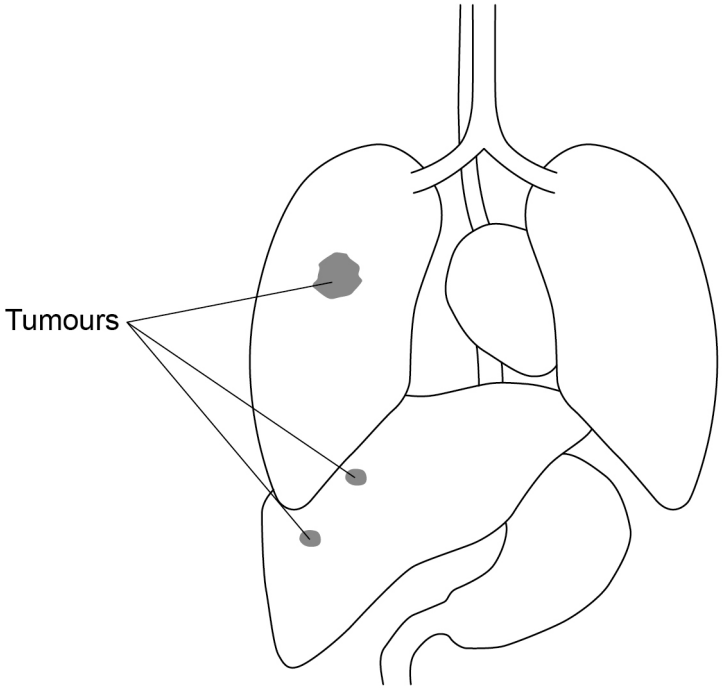
4.2.2.7 Cancer

Question 20

November 2021 | 8461/1H | Original Q7

0 7 **Figure 11** shows where three of the same type of tumour were found in a patient.

Figure 11



Malignant tumours are cancers.

0 7 . 1 Describe what happens to cells when a tumour forms.

[1 mark]

0 7 . 2 What evidence is there in **Figure 11** to suggest that the tumour in the lung is malignant?

[1 mark]

4.2.2.7 Cancer

Question 20 · continued

0 7 . 3 Some types of cancer can cause the numbers of blood components in a person's body to fall to a dangerously low level.

A person with one of these types of cancer may experience symptoms such as:

- tiredness
- frequent infections
- bleeding that will not stop after the skin is cut.

Explain how a very low number of blood components in the body can cause these symptoms.

[6 marks]

Question 7 continues on the next page

4.2.2.7 Cancer

Question 20 · continued

Some patients with a very low number of blood cells may be given a blood transfusion.

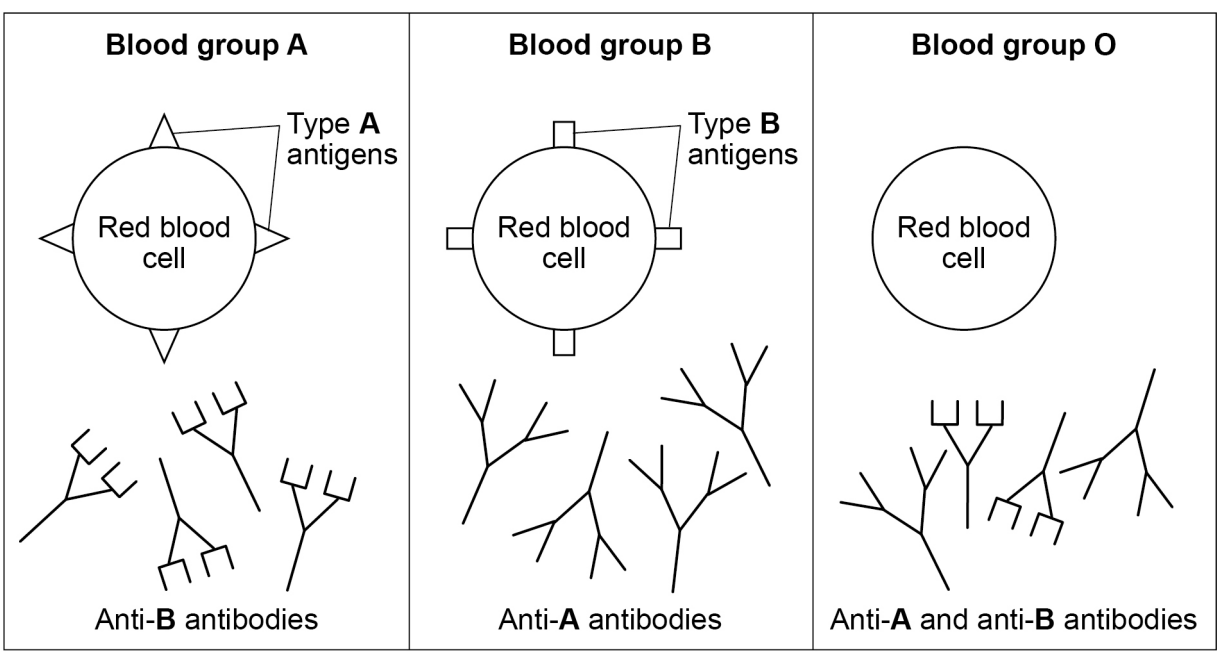
A blood transfusion is where a patient receives blood from a donor.

Different people have different blood groups.

Figure 12 shows:

- the red blood cells found in people with different blood groups
- the antibodies that can be made by people with different blood groups.

Figure 12



Antibodies can bind to antigens that have complementary shapes.

When antibodies bind to the antigens on red blood cells, many red blood cells begin to clump together.

Each red blood cell is about 8 μm in diameter.

Many capillaries have an internal diameter of about 10 μm.

4.2.2.7 Cancer

Question 20 · continued

In one type of blood transfusion, **only** red blood cells from a donor are transferred to the patient.

0 7 . 4 It is dangerous for a patient with blood group **A** to receive red blood cells from a donor with blood group **B**.

Explain why.

[3 marks]

0 7 . 5 Explain why blood group **O** red blood cells can be given to patients with any blood group.

[2 marks]

Question 7 continues on the next page

Question 20 · continued

0 7 . 6 **Table 4** shows some of the risks associated with blood transfusions.

Table 4

Risk	Probability of risk occurring
Allergic reaction	0.9 %
Hepatitis B infection	1 in (3×10^5)
Hepatitis C infection	6.7×10^{-7}
Kidney damage	1 in 70 000

Which risk has the **lowest** probability of occurring?

[1 mark]

Tick (✓) **one** box.

- Allergic reaction ☐
- Hepatitis B infection ☐
- Hepatitis C infection ☐
- Kidney damage ☐

4.2.2.7 Cancer

Question 20 · continued

0 7 . 7 A person has a tumour blocking the tube leading from the gall bladder to the small intestine.

Explain why this person would have difficulty digesting fat.

[5 marks]

19

4.2.2.7 Cancer

Question 21

June 2023 | 8461/1H | Original Q4

0 4 This question is about exercise.

0 4 . 1 During vigorous exercise, anaerobic respiration occurs in a person's body.

Explain **two** effects of anaerobic respiration on the person's body.

[4 marks]

1 _____

2 _____

4.2.2.7 Cancer

Question 21 · continued

0 4 . 2 Design an investigation to show the effect of different types of exercise on the heart rate of athletes.

[6 marks]

Question 4 continues on the next page

Question 21 · continued

Anabolic steroids are drugs.

Anabolic steroids:

- increase muscle mass in humans
- are banned in most competitive sports.

Some athletes take anabolic steroids to improve their performance in sport.

0 4 . 3 Explain how taking anabolic steroids could improve an athlete's performance.

[2 marks]

Scientists use monoclonal antibodies to test for the presence of anabolic steroids in an athlete's urine.

To produce monoclonal antibodies, a mouse lymphocyte is combined with a tumour cell.

0 4 . 4 What type of cell is created when a mouse lymphocyte and a tumour cell combine?

[1 mark]

Tick (✓) **one** box.

- Embryo ☐
- Hybridoma ☐
- Phagocyte ☐
- Stem cell ☐

4.2.2.7 Cancer

Question 21 · continued

0 4 . 5 Describe how scientists make monoclonal antibodies using the cell created when a mouse lymphocyte and a tumour cell combine.

[3 marks]

0 4 . 6 What property makes a monoclonal antibody useful in detecting the presence of an anabolic steroid in urine?

[1 mark]

Tick (✓) **one** box.

A monoclonal antibody is quick and easy to produce. ☐

A monoclonal antibody is specific to only one person's urine. ☐

A monoclonal antibody only binds to the anabolic steroid. ☐

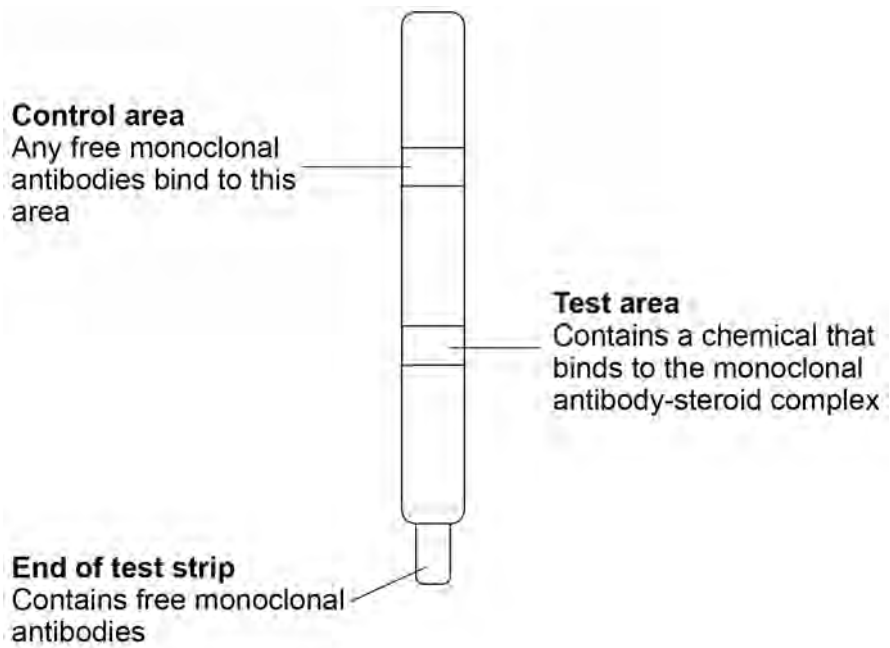
A monoclonal antibody can identify many different drugs at the same time. ☐

Question 4 continues on the next page

Question 21 · continued

Figure 5 shows a test strip that can detect the presence of an anabolic steroid in an athlete's urine.

Figure 5



The end of the test strip is dipped in urine.

The urine moves up through the test strip.

The test area and the control area contain a dye.
The dye turns blue when monoclonal antibodies bind to it.

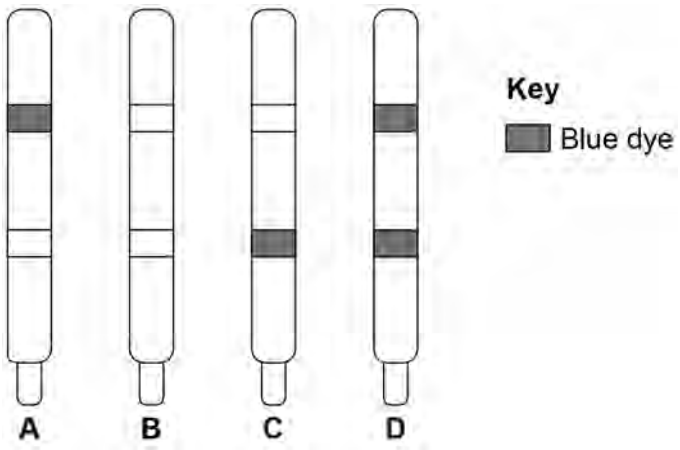
0 4 . 7 Suggest the purpose of the control area in the test strip.

[1 mark]

Question 21 · continued

Figure 6 shows the urine test results of four athletes.

Figure 6



0 4 . 8 Describe the evidence in **Figure 6** that shows the test for athlete **B** has **not** worked.

Suggest **one** reason why the test did **not** work.

[2 marks]

Evidence _____

_____

Reason _____

_____

0 4 . 9 Which athlete has tested positive for anabolic steroids in their urine?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

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4.2.2.7 Cancer

Question 22

June 2024 | 8461/1H | Original Q8

0 8 Cancer is caused by changes in cells that result in uncontrolled cell division.

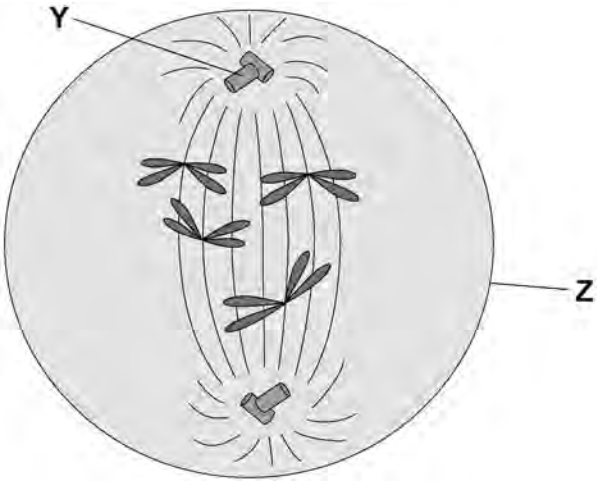
0 8 . 1 Before a cell begins to divide, its DNA replicates to form two copies of each chromosome.

Describe **one other** change that occurs in a cell **before** the cell begins to divide.

[1 mark]

Figure 8 shows a cell during one of the stages of cell division.

Figure 8



0 8 . 2 Name structure **Z** in **Figure 8**.

[1 mark]

4.2.2.7 Cancer

Question 22 · continued

0 8 . 3 Structure **Y** in **Figure 8** is a cylinder.

For structure **Y**:

- real volume = 24 500 000 nm^3
- real radius = 125 nm.

The length of a cylinder is calculated using the equation:

$$\text{length} = \frac{\text{volume}}{\pi \times \text{radius}^2}$$

The length of the image of structure **Y** in **Figure 8** is 4 mm.

Calculate the magnification of structure **Y** in **Figure 8**.

Use $\pi = 3.14$

[6 marks]

Magnification = × _____

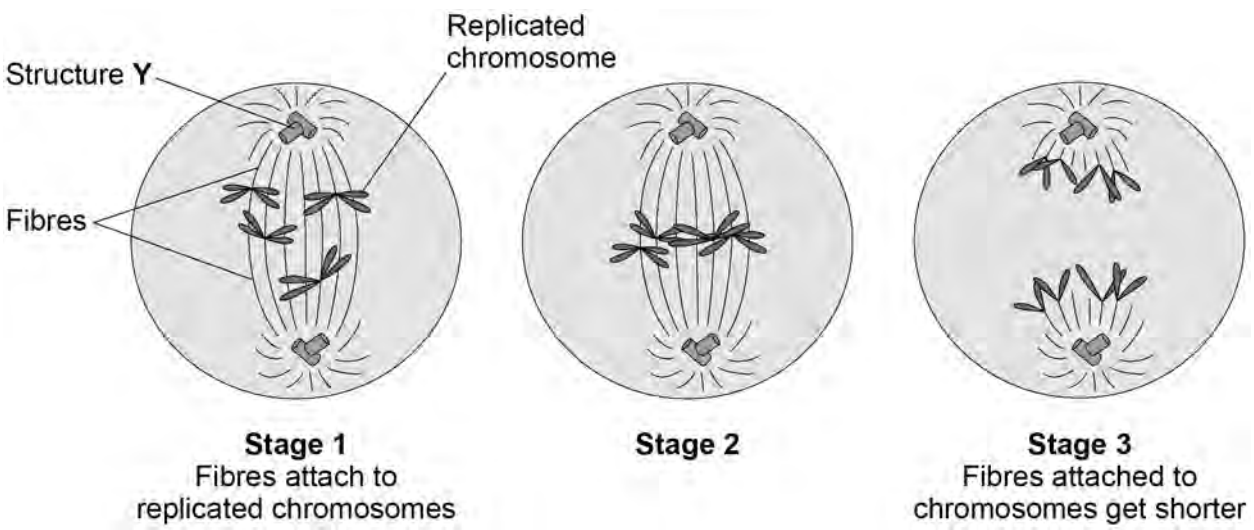
Question 8 continues on the next page

4.2.2.7 Cancer

Question 22 · continued

Figure 9 shows some of the stages of cell division.

Figure 9



Some cancer drugs prevent cell division.

Drug **X** prevents the fibres from attaching to the replicated chromosomes in **stage 1**.

0 8 . 4 Explain why a cell **cannot** complete division when affected by drug **X**.

[2 marks]

4.2.2.7 Cancer

Question 22 · continued

0 8 . 5 Give the reason why a drug that stops cell division helps to treat cancer.

[1 mark]

0 8 . 6 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 ☐

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