**Y11 Biology 1**

**PPE 2 – Higher**

**For each topic, complete the questions that are in the Revision Guide.**

**The page numbers you need are listed below.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Topic** | **Questions**  Page Title | | **Support**  Pages | **☺** | **😐** | **☹** |
| RPA – culturing microorganisms | 26 | Culturing Microorganisms | 17-18 |  |  |  |
| Cell division – cell cycle | 26 | Differentiation and division | 14-16 |  |  |  |
| RPA – Enzymes | 45 | The Role of Enzymes | 28-32 |  |  |  |
| Heart and blood vessels / blood components | 45 | The Lungs and Circulatory System | 33-36 |  |  |  |
| Cancer | 45 | Diseases and Risk Factors | 37-41 |  |  |  |
| Plant tissue | 45 | Plant Cell Organisation | 42-44 |  |  |  |
| Viral diseases | 56 | Types of Disease | 46-48 |  |  |  |
| Vaccination | 56 | Fighting Disease | 49-52 |  |  |  |
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**Exam Practice**

The following pages contain past exam questions that should attempt.

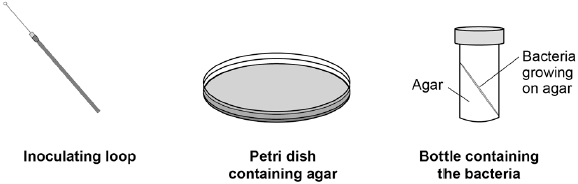
The grade for each question is indicated by:



Remember: to get Grade 7, 8 or 9 you still have to be able to answer the 4-5 questions!

***RPA – Culturing micro-organisms*   
  
Q1.** (a)     A student tried to grow some bacteria in the laboratory. The diagram shows some of the apparatus used.

**Week 1: Cell biology**



This is the method used.

1.   Remove the lid of the Petri dish.

2.   Remove the lid of the bottle containing the bacteria.

3.   Use the inoculating loop to remove some of the bacteria from the bottle.

4.   Spread the bacteria over the agar using the inoculating loop.

5.   Put the lid back on the Petri dish.

6.   Put the Petri dish into an incubator at 25 °C for 24 hours.

Steps 1−5 could cause the sample of the bacteria on the petri dish to be contaminated.

Give **three** improvements to the method to prevent contamination.

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**(3)**

(b)     Why did the student grow the bacteria at 25 °C rather than at 40 °C?

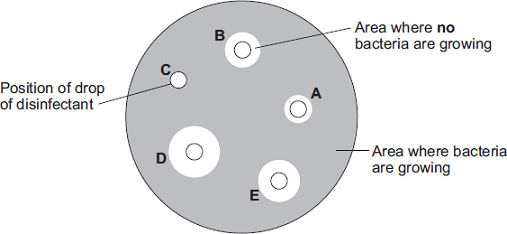
Tick **one** box.

|  |  |
| --- | --- |
| So the bacteria grew more quickly |  |
| So the bacteria grew more slowly |  |
| To prevent the growth of a harmful pathogen |  |
| To save money |  |

**(1)**

(c)     After the culture had been prepared, the student added one drop of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



(i)      There are areas on the agar jelly where **no** bacteria are growing.

Why?

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**(1)**

(ii)     The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

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Give **one** reason why the student might **not** be correct.

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**(2)**

**(Total 7 marks)**

***Cell division – cell cycle***

**Q2.** This question is about the cell cycle.

(a)  Chromosomes are copied during the cell cycle.

Where are chromosomes found?

Tick **one** box.

|  |  |
| --- | --- |
| Cytoplasm |  |
| Nucleus |  |
| Ribosomes |  |
| Vacuole |  |

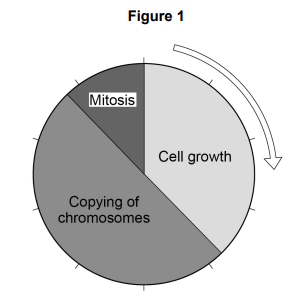
**(1)**

(b)  What is the name of a section of a chromosome that controls a characteristic?

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**(1)**

**Figure 1** shows information about the cell cycle.



(c)  Which stage of the cell cycle in **Figure 1** takes the most time?

Tick **one** box.

|  |  |
| --- | --- |
| Cell growth |  |
| Copying of chromosomes |  |
| Mitosis |  |

**(1)**

(d)  During mitosis cells need extra energy.

Which cell structures provide most of this energy?

Tick **one** box.

|  |  |
| --- | --- |
| Chromosomes |  |
| Cytoplasm |  |
| Mitochondria |  |
| Ribosomes |  |

**(1)**

(e)  The cell cycle in **Figure 1** takes two hours in total.

The cell growth stage takes 45 minutes.

Calculate the time taken for mitosis.

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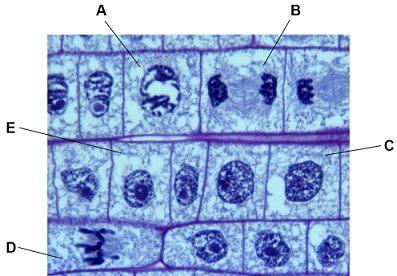
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Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes

**(2)**

**Figure 2** shows some cells in different stages of the cell cycle.



(f)   Which cell is **not** dividing by mitosis

Tick **one** box.



**(1)**

(g)  Cell **E** in **Figure 2** contains 8 chromosomes.

Cell **E** divides by mitosis.

How many chromosomes will each new cell contain?

Tick **one** box.

|  |  |
| --- | --- |
| 2 |  |
| 4 |  |
| 8 |  |
| 16 |  |

**(1)**

(h)  Why is mitosis important in living organisms?

Tick **one** box.

|  |  |
| --- | --- |
| To produce gametes |  |
| To produce variation |  |
| To release energy |  |
| To repair tissues |  |

**(1)**

**(Total 9 marks)**

***RPA – Enzymes*  
Q3.** Amylase is an enzyme found in the human body.

**Week 2: Organisation**

Amylase breaks down starch into sugars.

(a)     Where is amylase produced in the human body?

Tick **one** box.

|  |  |
| --- | --- |
| Liver and pancreas |  |
| Liver and stomach |  |
| Salivary glands and pancreas |  |
| Salivary glands and stomach |  |

**(1)**

(b)     Enzymes speed up chemical reactions.

Explain how amylase breaks down starch.

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**(3)**

(c)     One sugar in the body is glucose.

Glucose is used for respiration.

Give **one** other use for glucose in the body.

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**(1)**

(d)     A student investigated the effect of temperature on the activity of human amylase.

This is the method used.

1.   Put 2 cm3 of 1% starch solution into a boiling tube.

2.   Put 2 cm3 of amylase solution into a second boiling tube.

3.   Put both boiling tubes into a water bath at 20 °C.

4.   After 5 minutes, mix the amylase and the starch together in one boiling tube.

5.   After 30 seconds, add a drop of the starch and amylase mixture to a drop of iodine solution in one well of a spotting tile.

6.   Repeat step 5 until the iodine solution no longer changes colour.

7.   Repeat steps 1 – 6 at 40 °C and at 60 °C and at 80 °C

Why did the student leave the starch and amylase solutions in the water bath for 5 minutes in step **3**?

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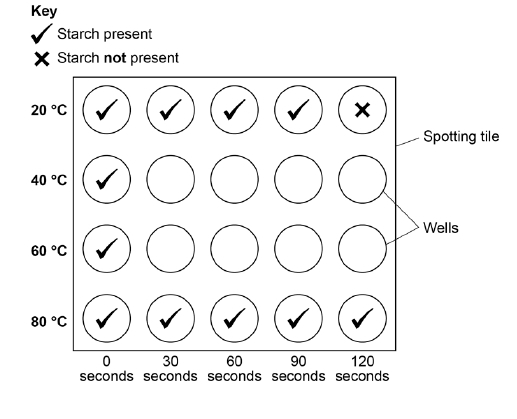
**(1)**

(e)     The temperature of the human body is 37 °C

The diagram below shows the results of the investigation at 20 °C and at 80 °C

Complete the diagram to show the results you would expect at 40 °C and at 60 °C

You should write a tick or a cross in each well of the spotting tile.



**(2)**

(f)      There are different ways to investigate the breakdown of starch by amylase.

One other method is to measure the **concentration** of starch present in the solution every 30 seconds.

Why is this method better than the method the student used?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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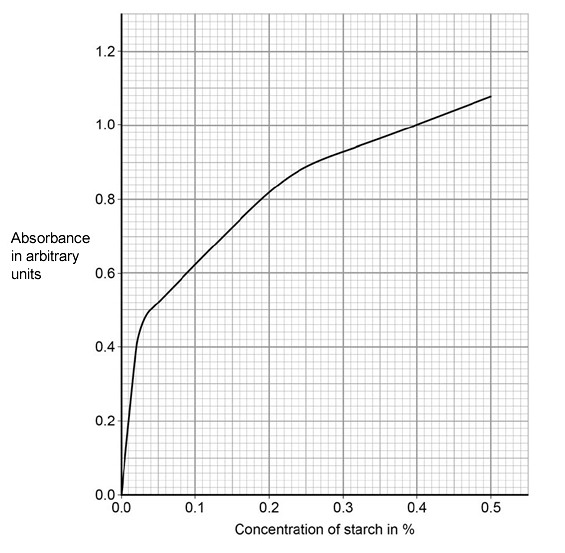
**(2)**

A colorimeter can be used to measure the concentration of starch present in the solution every 30 seconds.

A colorimeter measures the amount of light that **cannot** pass through a solution.

This is known as absorbance.

Below shows a graph of absorbance against concentration of starch.



(g)     The absorbance of the solution at 40 °C was 0.56 arbitrary units after 30 seconds.

What was the concentration of starch in this solution?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Concentration of starch = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ %

**(1)**

(h)     The concentration of starch in the solution at 20 °C after 1 minute is different from the concentration at 40 °C after 1 minute.

Explain why.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

(i)      Predict the absorbance for the solution at 80 °C after 30 seconds.

Give a reason for your answer.

Absorbance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ arbitrary units

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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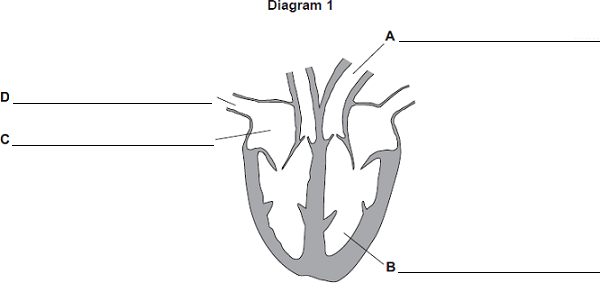
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**(3)**

**(Total 16 marks)**

***Heart and blood vessels / blood components***

**Q4. Diagram 1** shows a section through the heart.

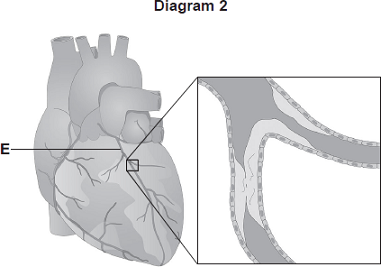


(a)     On the diagram, name the parts labelled **A**, **B**, **C** and **D**.

**(4)**

(b)     **Diagram 2** shows the blood vessels that supply the heart muscle.

Part of one of the blood vessels has become narrower.

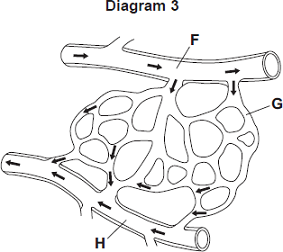


(i)      Name blood vessel **E**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(c)     **Diagram 3** shows part of the blood supply in the lungs.



(i)      Name the types of blood vessel labelled **F**, **G** and **H**.

**F** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**G** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**H** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(3)**

(ii)     Give **one** way in which the composition of the blood in vessel **F** is different from the composition of the blood in vessel **H**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(d)  Urea is transported in the blood plasma.

Name **two** other substances transported in the blood plasma.

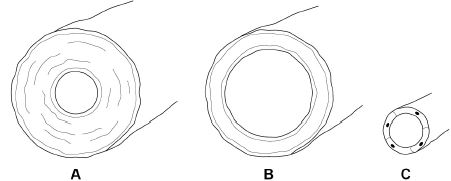
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**(2)**

**Figure 1** shows the three types of blood vessel.

**Figure 1**

****

(e)  Which type of blood vessel carries blood into the right atrium?

Tick **one** box.



**(1)**

(f)  Compare the structure of an artery with the structure of a vein.

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**(3)**

(g)  A patient may be fitted with an artificial pacemaker.

What condition may be treated using an artificial pacemaker?

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**(1)**

**(Total 16 marks)**

***Cancer***

**Week 3: Organisation**

**Q5.** The number of people in the UK with tumours is increasing.

(a)     (i)      Describe how tumours form.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(ii)     Tumours can be malignant or benign.

What is the difference between a malignant tumour and a benign tumour?

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**(1)**

(b)     Describe how some tumours may spread to other parts of the body.

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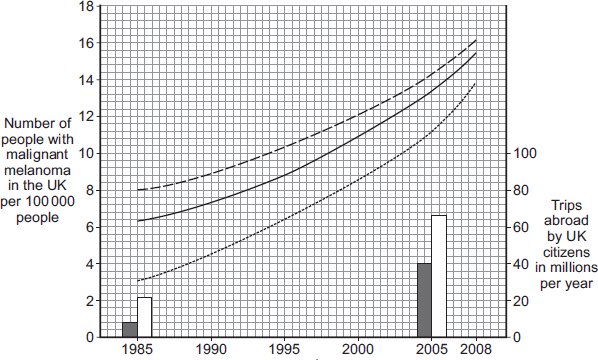
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**(1)**

(c)     People from Northern Europe have fair skin and many people have malignant melanoma skin cancer.

The graph shows how the number of people in the UK with malignant melanoma changed between 1985 and 2008.

The bars on the graph show the number of people in the UK who travelled abroad and the number who took cheap holidays in the sun in 1985 and 2005.

  
Years

|  |  |
| --- | --- |
| **Key** | |
| Mean for all areas Mean for people from rich areas Mean for people from poor areas | Total number of trips abroad Number of cheap holidays in        the sun |

 (i)      Describe the trends in the number of people with malignant melanoma skin cancer between 1985 and 2008.

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**(3)**

(ii)     Use the data about the number of trips abroad to suggest an explanation for the trends you have described in part **(c)(i)**.

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**(2)**

 (d)   Describe how stomach cancer can spread to the liver.

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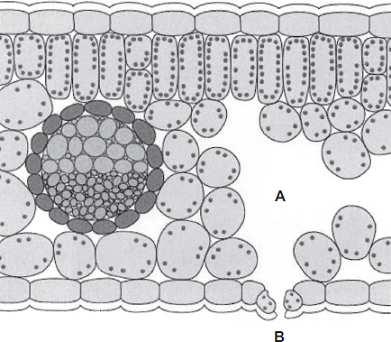
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**(3)**

**(Total 12 marks)**

***Plant tissue***

**Q6.** The diagram shows a section through a plant leaf.

(a)     Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

|  |  |  |  |
| --- | --- | --- | --- |
| **epidermis** | **mesophyll** | **phloem** | **xylem** |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     Gases *diffuse* between the leaf and the surrounding air.

(i)      What is *diffusion*?

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**(2)**

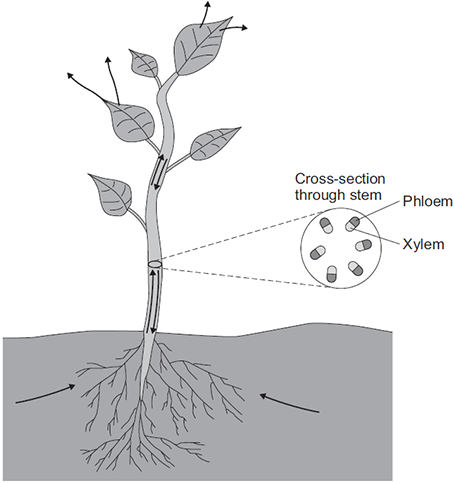
(ii)     Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

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**(1)**

 (c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants transport many substances between their leaves and roots. The diagram below shows the direction of movement of substances through a plant.



Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

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**(6) (Total 10 marks)**

***Viral diseases***

**Week 4: Infectious diseases**

**Q7.** Viruses and bacteria cause diseases in humans.

(a)     Draw a ring around the correct word to complete the sentence.

|  |  |  |
| --- | --- | --- |
|  |  | algae. |
|  | Organisms that cause disease are called | pathogens. |
|  |  | vaccines. |

**(1)**

(b)     In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

(i)      What is a *pandemic*?

Tick () **one** box.

|  |  |
| --- | --- |
| A disease affecting the people all over one country. |  |
| A disease affecting hundreds of people |  |
| A disease affecting people in many countries. |  |

**(1)**

(ii)     The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

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**(1)**

                            This notice is from a doctor’s surgery.

|  |  |
| --- | --- |
|  | **Unfortunately, antibiotics will NOT get rid of your flu.** |

(c)     (i)      Why will antibiotics **not** get rid of flu?

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**(1)**

(ii)     The symptoms of flu include a sore throat and aching muscles.

What would a doctor give to a patient to relieve the symptoms of flu?

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**(1)**

(iii)    It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **antibody** | **bacteria** | **immune** | **resistant** | **viruses** |

Overuse of antibiotics might speed up the development

of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strains of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(2)**

**(Total 7 marks)**

***Vaccination***

**Q8.** White blood cells protect the body against pathogens such as bacteria and viruses.

(a)     (i)      Pathogens make us feel ill.

Give **one** reason why.

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**(1)**

(b)     Vaccination can protect us from the diseases pathogens cause.

(i)      One type of virus causes measles.

A doctor vaccinates a child against measles.

What does the doctor inject into the child to make the child immune to measles?

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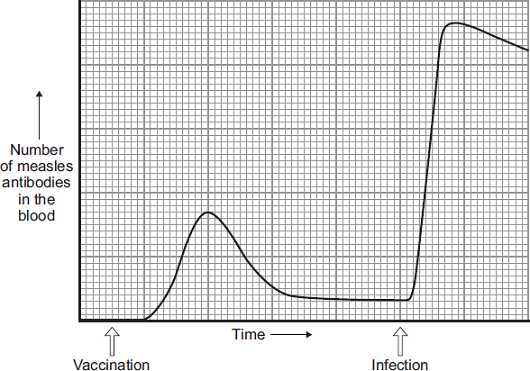
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**(2)**

(ii)     A few weeks after the vaccination, the child becomes infected with measles viruses from another person.

The graph shows the number of measles antibodies in the child’s blood from before the vaccination until after the infection.



More measles antibodies are produced after the infection than after the vaccination.

Describe other differences in antibody production after infection compared with after vaccination.

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**(3)**

(iii)    Vaccination against the measles virus will **not** protect the child against the rubella virus.

Why?

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**(1)**

(c)     What is the advantage of vaccinating a large proportion of the population against measles?

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**(1)**

(d)       Explain how vaccination makes a person immune to a disease.

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**(4) (Total 14 marks)**

***Producing monoclonal antibodies*Q9.** A virus called RSV causes severe respiratory disease.

**Week 5: Infectious diseases**

(a)     One treatment for RSV uses monoclonal antibodies which can be injected into the patient.

Scientists can produce monoclonal antibodies using mice.

The first step is to inject the virus into a mouse.

Describe the remaining steps in the procedure to produce monoclonal antibodies.

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**(3)**

(c)     Describe how injecting a monoclonal antibody for RSV helps to treat a patient suffering with the disease.

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**(2)**

A trial was carried out to assess the effectiveness of using monoclonal antibodies to treat patients with RSV.

Some patients were given a placebo.

(d)     Why were some patients given a placebo?

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**(1)**

A number of patients had to be admitted to hospital as they became so ill with RSV.

The results are shown in the table below.

|  |  |
| --- | --- |
| **Treatment received by patient** | **% of patients within each group admitted to hospital with RSV** |
| Group **A**: Monoclonal antibody for RSV | 4.8 |
| Group **B**: Placebo | 10.4 |

The trial involved 1 500 patients.

•   Half of the patients (group **A**) were given the monoclonal antibodies.

•   Half of the patients (group **B**) were given the placebo.

(e)      Evaluate how well the data in the table above supports the conclusion:

‘monoclonal antibodies are more effective at treating RSV than a placebo’.

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**(2)**

**(Total 8 marks)**

***Diagnosis and identification of plant diseases***

**Q10.** To be healthy, plants need the right amount of mineral ions from the soil.

The diagram below shows four plants.

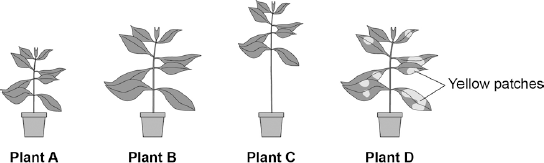
The plants were grown in four different growing conditions:

•        sunny area, with nitrate and magnesium added to the soil

•        sunny area, with magnesium but **no** nitrate added to the soil

•        sunny area, with nitrate but **no** magnesium added to the soil

•        dark area, with nitrate and magnesium added to the soil.



(a)     Which plant was grown with no **nitrate?**

|  |  |
| --- | --- |
| Tick **one** box. |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |  |  | **B** |  |  | **C** |  |  | **D** |  |

**(1)**

(b)     Which plant was grown with no **magnesium?**

|  |  |
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| Tick **one** box. |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |  |  | **B** |  |  | **C** |  |  | **D** |  |

**(1)**

(c)     Give **one** variable that was kept constant in this experiment.

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**(1)**

(d)     Plants need other minerals for healthy growth such as potassium ions and phosphate ions.

A farmer wanted to compare the percentage of minerals in two types of manure.

•        Cow manure from her own farm.

•        Chicken manure pellets she could buy.

The table below shows data for each type of manure.

|  |  |  |
| --- | --- | --- |
|  | **Phosphate ions in %** | **Potassium ions in %** |
| Cow manure | 0.4 | 0.5 |
| Chicken manure pellets | 2.5 | 2.3 |

Suggest **one** advantage and **one** disadvantage of using the chicken manure pellets compared to the cow manure.

Advantage \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Disadvantage \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 5 marks)**

***Uses of glucose***

**Week 6: Bioenergetics**

**Q11.** Green plants can make glucose.

(a)     Plants need energy to make glucose.

How do plants get this energy?

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**(2)**

(b)     Plants can use the glucose they have made to supply them with energy.

Give **four** other ways in which plants use the glucose they have made.

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**(4)**

**(Total 6 marks)**

***Respiration***

**Q12.** Glucose is broken down in respiration.

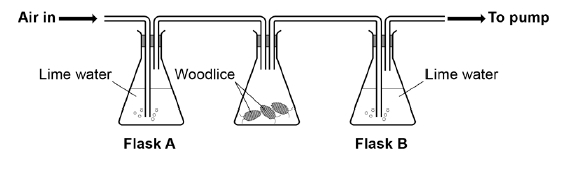
 (a)     What is the chemical formula for glucose?

Tick **one** box.

|  |  |
| --- | --- |
| C6H6O6 |  |
| C3H6O3 |  |
| C6H12O6 |  |
| C6H10O6 |  |

**(1)**

The diagram shows the apparatus a student used to investigate aerobic respiration.



Limewater goes cloudy when carbon dioxide is added to it.

(b)     After 10 minutes the limewater in flask **B** was cloudy, but the limewater in flask **A** remained colourless.

Explain why.

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**(2)**

(c)     Flask **A** acts as a control in this investigation.

What is the purpose of a control?

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**(1)**

(d)     The student repeated the investigation with no woodlice.

Describe the appearance of the limewater in flask **A** and flask **B** after 10 minutes.

Flask **A** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Flask **B** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

Anaerobic respiration is another form of respiration in living organisms.

(e)     What is produced during anaerobic respiration in humans?

Tick **one** box.

|  |  |
| --- | --- |
| Carbon dioxide |  |
| Carbon dioxide and lactic acid |  |
| Lactic acid |  |
| Oxygen and water |  |

**(1)**

(f)      Complete the equation for anaerobic respiration in yeast.

glucose   ⟶   carbon dioxide   +   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

**(Total 8 marks)**