









12

# Drug abuse!



Some **drugs** can be good for you but others harm the body.  
Indigenous people have known about drugs from plants for many years

A drug is something that **changes the body's chemical processes**  
**Dependent** people are **addicted** to drugs. They suffer **withdrawal symptoms** without their drugs  
**Heroin** and **cocaine** are very **addictive**

13

- Many people use **recreational drugs**. Some are **legal**, others are **illegal**.
- **Legal drugs** such as **alcohol** and **tobacco** cause more health problems overall than **illegal drugs**.



14

- **Alcohol** affects the nervous system. It **slows reactions** and helps people **relax**.
- Too much can lead to **lack of self-control**, unconsciousness, even **coma**.
- It can also damage the **brain and liver**.
- 



15

- **Tobacco smoke** contains many dangerous substances
- **Nicotine** is the **addictive** substance in tobacco smoke
- **Carcinogens** in tobacco smoke may cause **cancer** of different organs
- The **link between smoking and lung cancer** has been agreed over many years
- **Carbon monoxide** in tobacco smoke makes the blood carry **less oxygen**
- This is dangerous in **pregnant women** as the foetus may not get enough **oxygen**. It may have a **low birth mass**
- Many smokers try to **quit**. There are many **different ways** to do this



16

- **Cannabis** is **illegal** in many countries but smoked by **millions** of people round the world
- There are many **claims** about **cannabis**:
- Some people say it helps treat disease symptoms such as **chronic pain**
- Others say that **smoking cannabis** may lead to **mental illness**
- Some **cannabis users** go on to use **hard drugs** and to become **addicted**

Insert cannabis leaf pic



<p>17</p>	<h2 style="text-align: center;">Controlling Infectious Disease</h2> <ul style="list-style-type: none"> <li>▪ <b>Micro-organisms</b> that cause <b>infectious disease</b> are called <b>pathogens</b></li> <li>▪ The main kinds are <b>bacteria</b> and <b>viruses</b></li> <li>▪ <b>Bacteria</b> are very small cells with <b>no nucleus</b>.</li> <li>▪ Their DNA is free in the cytoplasm</li>   <li>▪ <b>Bacteria</b> and <b>viruses</b> may reproduce <b>rapidly</b> inside the <b>body</b></li> <li>▪ They may make poisons (<b>toxins</b>) which make us feel ill.</li>   <li>▪ <b>Viruses</b> are much much smaller than bacteria; they are <b>not cells</b></li> <li>▪ They are just a <b>protein coat</b> around some <b>genetic material</b></li> <li>▪ <b>Viruses</b> reproduce <b>inside our cells</b> and <b>damage</b> them.</li> </ul> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">                 Insert bacteria &amp; virus pics             </div>
<p>18</p>	<ul style="list-style-type: none"> <li>• <b>Semmelweiss</b> investigated <b>infectious disease</b> in hospitals</li> <li>• He found out how to <b>control infection</b></li> <li>• He told doctors to <b>wash their hands</b></li> <li>• Many of his ideas are still important today</li> </ul> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin-left: auto; margin-right: auto;">                 Can you evaluate his work?             </div>
<p>19</p>	<ul style="list-style-type: none"> <li>• The body can protect itself against many <b>pathogens</b></li> <li>• Our <b>natural defence mechanisms</b> include <b>white blood cells</b> which                 <ul style="list-style-type: none"> <li>• <b>Ingest</b> ('eat' ) <b>pathogens</b></li> <li>• Produce <b>antibodies</b> which kill particular <b>pathogens</b></li> <li>• Produce <b>antitoxins</b> which counteract the <b>toxins</b> made by some <b>pathogens</b></li> <li>• (different white blood cells do different jobs)</li> </ul> </li> </ul>
<p>20</p>	<ul style="list-style-type: none"> <li>• We can use <b>drugs</b> (medicines) to relieve the <b>symptoms</b> of some diseases.</li> <li>• These <b>do not kill</b> the <b>pathogens</b></li> <li>• <b>Painkillers</b> work like this</li> </ul>
<p>21</p>	<ul style="list-style-type: none"> <li>• <b>Antibiotics</b> (eg penicillin) kill <b>bacteria</b> inside the body</li> <li>• <b>Antibiotics</b> can't kill <b>viruses</b> which live and reproduce inside our cells</li> <li>• <b>It is hard to kill viruses without killing our own cells</b></li> <li>• Many <b>bacteria</b> have developed <b>resistance</b> to <b>antibiotics</b>.</li> <li>• This happens when some <b>bacteria mutate</b> to become <b>resistant</b></li> <li>• The <b>resistant bacteria</b> survive and become more common when an <b>antibiotic</b> is used</li> <li>• This is called <b>natural selection</b> (the best-adapted organisms survive &amp; pass on their genes)</li> <li>• <b>MRSA</b> is an example of an <b>antibiotic - resistant bacterium</b></li> <li>• We must <b>avoid over-use of antibiotics</b> to stop more bacteria becoming resistant                 <ul style="list-style-type: none"> <li>• Some <b>mutations</b> make animal or bird pathogens become <b>dangerous to humans</b></li> <li>• New diseases may affect humans (eg <b>bird flu</b>)</li> </ul> </li> </ul>



## 22. More about Controlling Infectious Disease 1. New drugs

- It costs a lot of money to develop new drugs
- They must be **tested** and **trialled** for many months
- First **they are tested in the laboratory** to see if they are **toxic**
- Then they are **trialled** on **human patients** and checked for **side effects**
- **Thalidomide** was developed as a **sleeping pill**
- It also stopped **pregnant women** suffering from **morning sickness**
- It was given to **many** pregnant women but it **had not been tested** on pregnant women
- Many women gave birth to babies with **severe limb abnormalities**
- The drug was **banned**
- Recently **Thalidomide** has been used successfully to treat **leprosy**



## 23. More about Controlling Infectious Disease 2. Immunity

- When a **pathogen** gets into our body, **white blood cells** produce **antibodies** that kill it
- If that **pathogen** gets in again, we can **respond rapidly (fast)** and **make the correct antibody** We do not **get in** from that pathogen again. We are **immune** to it.
- Some **pathogens** are so dangerous that they may **kill us** before we kill them
- We can **immunise** people against some of these dangerous **pathogens**
- Some **dead** or **weakened pathogen** is introduced into the body (**vaccination**)
- The **white blood cells** produce **antibodies** that destroy this **pathogen**
- Now the body can **respond quickly** if the live pathogen gets in again in the future and we are **im** this pathogen
- **Measles, Mumps** and **Rubella** are dangerous diseases that can kill.
- Most babies have the **MMR vaccination** to make them **immune** to these diseases
- Some diseases no longer happen because of the **vaccination** programmes all over the world
- **Smallpox** is not found anywhere in the world



<http://www.timetabler.com/physics4u/4Ufreepowerpoints.html> has some great stuff on How Science Works (variables etc etc)



**BIOLOGY REVISION 1 : This question is about the nervous system.**

(a) Describe the difference between the function of a receptor and the function of an effector.

In your answer you should give one example of a receptor and one example of an effector.

.....  
 .....(4)

(b) Synapses are important in the nervous system.

(i) What is a synapse?

..... (2)

(ii) Describe how information passes across a synapse.

..... (2)

(c) Reflexes may be co-ordinated by the brain or by the spinal cord.

(i) The reflexes from sense organs in the head are co-ordinated by the brain.

Name a sense organ involved in a reflex co-ordinated by the spinal cord.

.....(1)

(ii) The table shows information about reflexes co-ordinated by the brain and reflexes co-

Organ co-ordinating the reflex	Mean length of neurones involved in cm	Mean time taken for reflex in milliseconds	Mean speed of impulse in cm per millisecond
Brain	12	4	3
Spinal cord	80	50	

ordinated by the spinal cord.

Calculate the mean speed of the impulse for the reflex co-ordinated by the spinal cord.

.....

Mean speed = ..... cm per millisecond (1)

(iii) In reflexes co-ordinated by the brain there are no relay neurones.

Suggest why there is a difference in the mean speed of the impulse for the two reflexes.

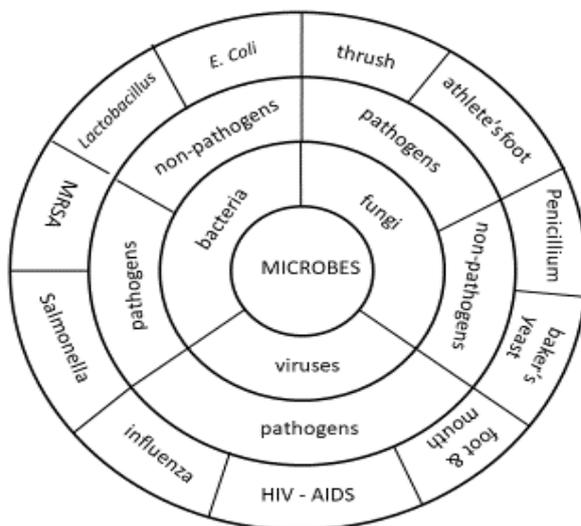
.....  
 .....  
 ..... (2)

(Total 12 marks)



## BIOLOGY REVISION 2

- Pathogens are microorganisms that cause infectious disease. Pathogens may be viruses, bacteria, protists, or fungi. They may infect plants or animals and can be spread by direct contact, by water, or by air.
- Bacteria and viruses may reproduce rapidly inside the body.
- Bacteria may produce poisons (toxins) that damage tissues and make us feel ill.
- Viruses live and reproduce inside cells, causing cell damage.



mosquito. The protists reproduce sexually in the mosquito and asexually in the human body. The mosquitoes act as vectors of the disease. The female mosquito needs two meals of human blood before she can lay her eggs, and this is when the protists are passed into the human bloodstream. The protists travel around the human body in the circulatory system. They affect the liver and damage red blood cells. Malaria causes recurrent episodes of fever and shaking when the protists burst out of the blood cells, and it can be fatal. It weakens the affected person over time even if it does not kill them. Globally several hundred million cases of malaria occur each year, and around 660 000 people die from the disease.



### Defences of the respiratory and digestive systems

Your respiratory system is a weak link in your body defences. Every time you breathe in, you draw air full of pathogens into the airways of the lungs. In the same way, you take food and drink, as well as air, into your digestive system through your mouth. Both systems have good defences to help prevent pathogens constantly causing infections.

- Your nose is full of hairs and produces a sticky liquid, called mucus. The hairs and mucus trap particles in the air that may contain pathogens or irritate your lungs. If you spend time in an environment with lots of air pollution, the mucus you produce when you blow your nose is blackened, showing that the system works.
- The trachea and bronchi also secrete mucus that traps pathogens from the air. The lining of the tubes is covered in cilia – tiny hair-like projections from the cells. The cilia beat to waft the mucus up to the back of the throat where it is swallowed.
- The stomach produces acid and this destroys the microorganisms in the mucus you swallow, as well as the majority of the pathogens you take in through your mouth in your food and drink.



**BIOLOGY REVISION 2 QUESTIONS**

**1 Pathogens cause infectious diseases in animals and plants.**

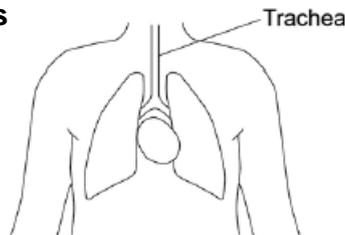
**(a) Draw one line from each disease to the type of pathogen that causes the disease.**

Disease		Type of pathogen
		Bacterium
Gonorrhoea		
		Fungus
Malaria		
		Protist
Measles		
		Virus

**(3)**

**(b) Some parts of the human body have adaptations to reduce the entry of live pathogens**

**Look at Figure 1.**



**Explain how the trachea is adapted to reduce the entry of live pathogens.**

.....

.....

.....

.....

.....

**(4)**

**(c) Malaria is a serious disease that can be fatal.**

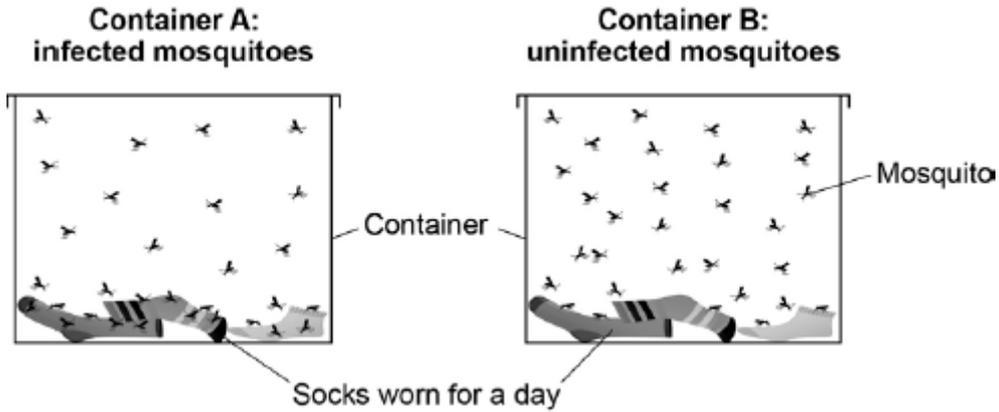
**Malaria is spread to humans by infected mosquitoes.**

**Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.**



Figure 2 shows the equipment the scientists used.

Figure 2



This is the method used.

1. 30 mosquitoes infected with malaria were placed in Container A.
2. 30 uninfected mosquitoes were placed in Container B.
3. The total number of times the mosquitoes landed on the socks was recorded.

Name the dependent variable and suggest one control variable in this investigation.

Dependent variable

.....

Control variable

.....

(2)

- (d) Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

.....

.....

.....(2)



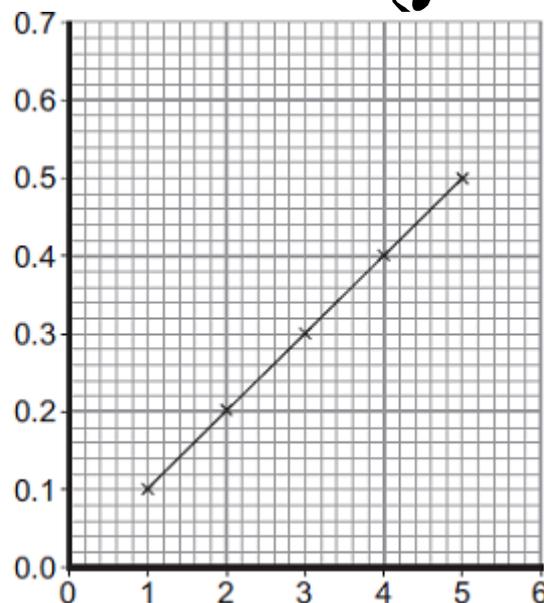


## BIOLOGY 3 REVISION QUESTIONS

### Use of enzymes

Trypsin is a protease enzyme. Trypsin will digest a protein called gelatine which covers the surface of photographic film. Some students investigated the time taken to digest the gelatin with trypsin. The students used five different concentrations of trypsin. The rate of reaction was calculated from the time taken for the gelatine to be digested.

Rate of reaction in arbitrary units



concentration

Percentage of trypsin

The graph shows the students' results.

(a) (i) Describe the relationship between the concentration of trypsin and the rate of reaction. (2)

(ii) Use the graph to predict the rate of reaction with 6% trypsin. (1)

(b) In industry, trypsin is used to pre-treat some baby foods. In their experiment, the students used 1–5% trypsin at 20°C. The baby food manufacturers make most profit if they use 0.5% trypsin at 35°C. Suggest why the manufacturers make most profit with these conditions. (4)

(c) (i) Describe the effect trypsin would have on the baby food. (2)

(ii) Apart from protease enzymes, give **one** other use of a **named** enzyme in industry. (2)

**(Total 11 marks)**



## **BIOLOGY REVISION 4 INFORMATION**

### **Asexual reproduction**

Asexual reproduction only involves one parent. The cells divide by mitosis. There is no joining (fusion) of special sex cells (gametes) and so there is no mixing of genetic information. As a result there is no variation in the offspring. Asexual reproduction gives rise to genetically identical offspring known as clones. Their genetic material is identical both to the parent and to each other. Only mitosis is involved in asexual reproduction.

Asexual reproduction is very common in the smallest animals and plants,

### **Sexual reproduction**

Sexual reproduction involves a male sex cell and a female sex cell from two parents. These two special sex cells (gametes) fuse together to form a zygote, which goes on to develop into a new individual. Gametes are formed in a special form of cell division known as **meiosis**. The chromosome number of the original cell is halved, so that when gametes join together, the new cell has the right number of chromosomes. You will find out more about meiosis in Topic B12.2.

**HUMAN BEINGS HAVE 46 CHROMOSOMES IN THE NUCLEUS OF THEIR CELLS**

**(IN 23 PAIRS)**

In males the last pair of chromosomes are XY and in females they are XX

Eggs and sperm cells only have 23 chromosomes (as they will fuse together to make the 46 chromosomes in the new baby)

### **Mutations**

Sometimes when the DNA is making a copy of itself before the cell divides to make new cells a mistake is made. When there is a change in a gene like this it is called a **MUTATION**.

Mutations can be caused by exposure to certain chemicals, UV light or radiation.



**BIOLOGY 4**

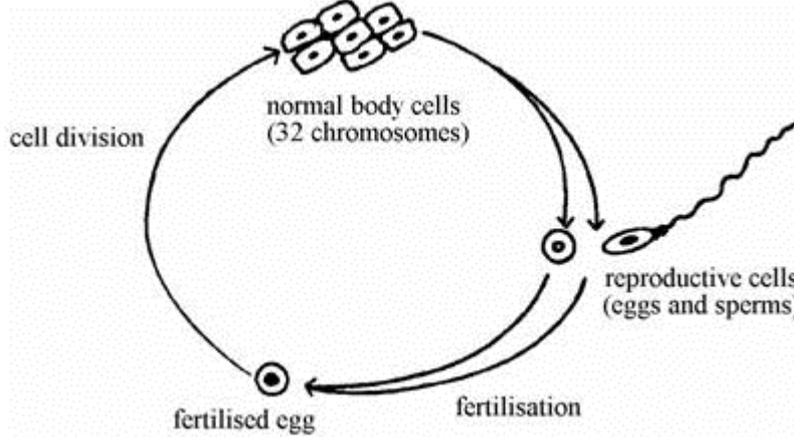
**Q1.** In humans, one of the pairs of chromosomes in each cell carries the genes which determine sex.

What is the difference between the sex chromosomes of a man and a woman?

.....  
.....  
.....

**(Total 2 marks)**

**Q2.** The diagram shows three types of cells in a life history of a simple animal.



(a) How do the chromosomes of the body cells compare with the chromosomes in the fertilised egg from which they came?

.....

**(1)**

(b) Describe what happens to chromosomes in the nucleus of a body cell when it forms reproductive cells.

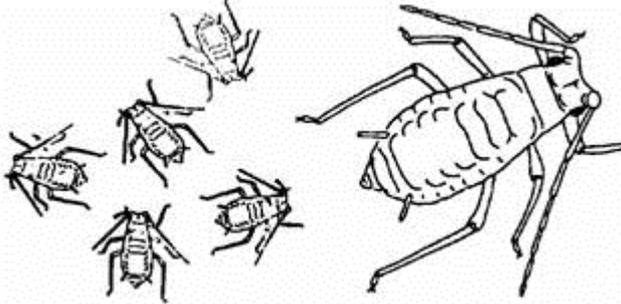
.....  
.....  
.....  
.....

**(4)**

**(Total 5 marks)**



**Q3.** The bean aphid is a type of black-fly which lives on broad bean plants in summer.  
In the autumn, males and females mate and produce eggs.



(a) Name the type of reproduction which produces the eggs.  
.....(1)

(b) In spring these eggs hatch. The young aphids are all female.  
Explain why they are all similar but not identical to each other.  
.....(1)

(c) These females are then able to produce offspring without needing any males.

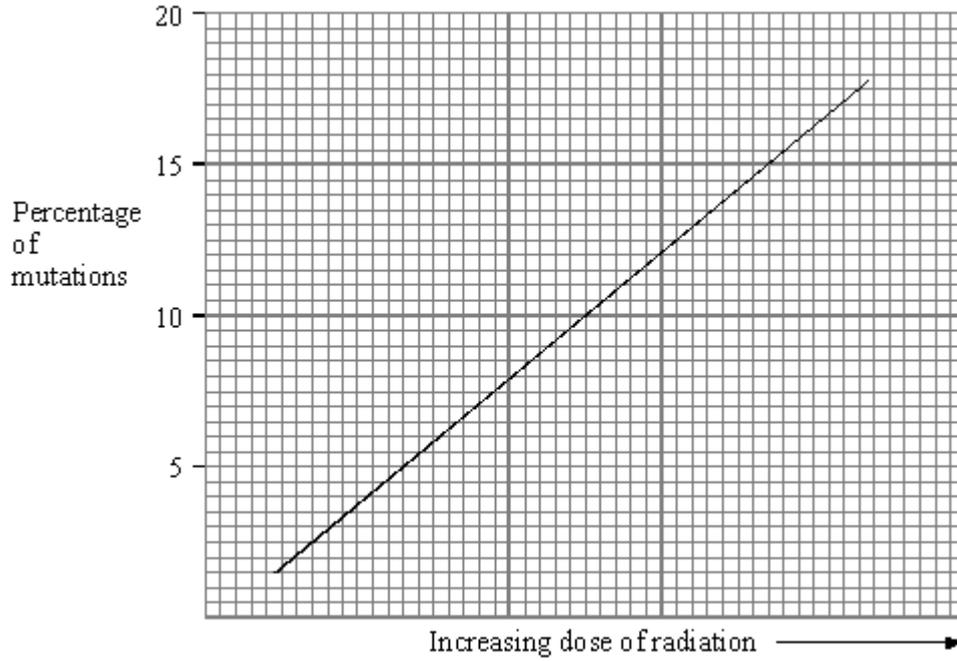
(i) Name the type of reproduction where females do **not** need males to produce offspring.  
.....(1)

(ii) How will the offspring from one of these females:  
A compare with each other  
.....  
B compare with the offspring from other females?  
.....

(2)



- (d) Some scientists investigated mutations in these aphids. They exposed the aphids to X-rays. They plotted their results.



- (i) What was the connection between the dose of X-rays and the percentage of mutations?

.....

(1)

- (ii) Name **one** other possible cause of mutations.

..... (1)

(Total 7 marks)



## FURTHER PRACTICE EXAM QUESTIONS

### Disease.

1(a) **List A** gives the names of three stages in trialling a new drug. **List B** gives information about the three stages. Draw a line from each stage in **List A** to the correct information in **List B**.

#### List A Stage

Tests on humans  
including a placebo

Tests on humans using  
very small quantities of  
the drug

Tests on animals

#### List B Information

Used to find if the drug is toxic

The first stage in the clinical trials  
of the drug

Used to find the optimum dose  
of the drug

Used to prove that the drug is  
effective on humans

(3)



(b) Read the passage

### Daily coffee dose delays development of Alzheimer's in humans.

Alzheimer's is a brain disease that causes memory loss in elderly people. Scientists studied 56 mice that had been genetically engineered to develop Alzheimer's.

Before treatment all the mice did badly in memory tests.

Half the mice were given a daily dose of caffeine in their drinking water. The dose was equivalent to the amount of caffeine in six cups of coffee for a human.

The other mice were given ordinary water.

After two months, the caffeine-drinking mice did better in memory tests than the mice drinking ordinary water.

The headline for the passage is not justified.

Explain why as fully as possible. (3)

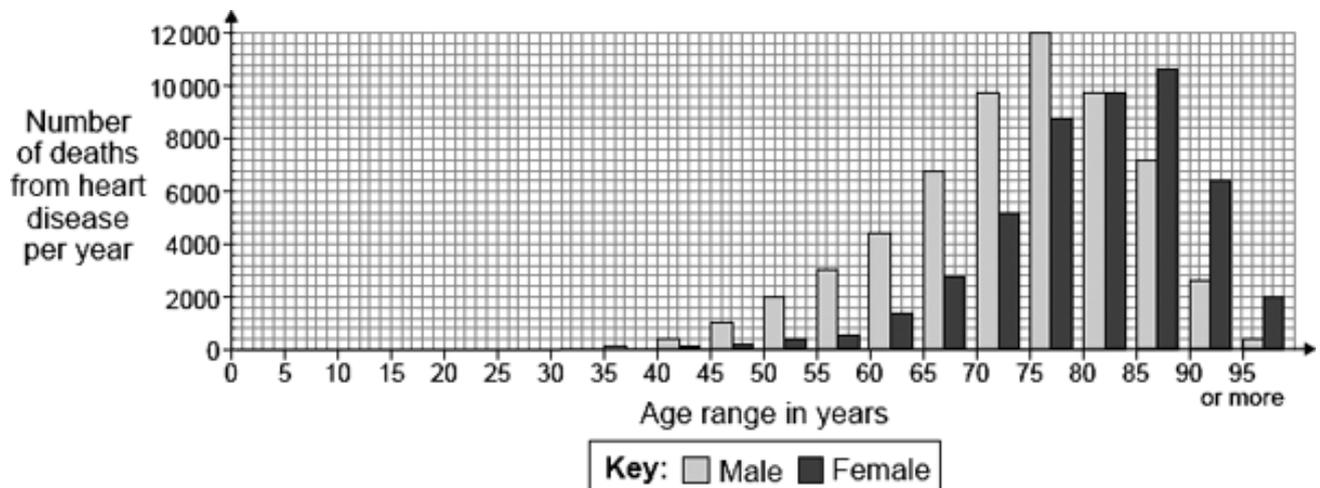
**Total 6 marks**

2. Diet and exercise affect health.

- (a) Many people are obese (very overweight). Obesity can lead to heart disease.

Other than heart disease, name **two** conditions which are linked to obesity (2)

- (b) The graph shows the number of deaths from heart disease each year in the UK.



The pattern for deaths from heart disease in men is different from the pattern in women.

- (i) Give **two** differences between the patterns for men and women (2)
- (ii) Suggest **two** reasons for the difference in the number of deaths from heart disease in men and women between the ages of 40 and 60. (2)



- (c) Scientists have developed drugs to reduce the concentration of cholesterol in the blood.

Give the **three** main stages in testing a new drug before it is sold to the public. (3)

(Total 9 marks)

## Infection and response

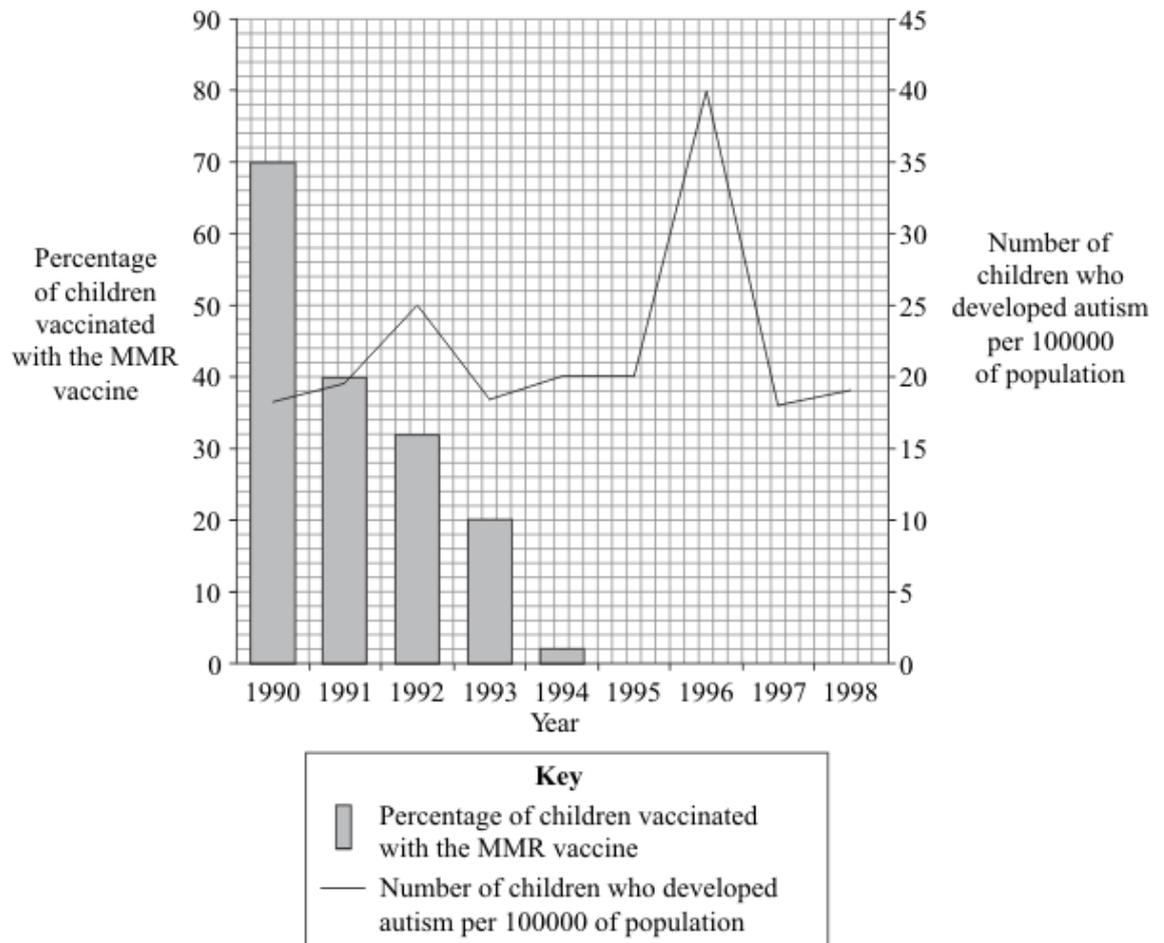
1. The MMR vaccine is used to protect children against measles, mumps and rubella.

- (a) Copy and complete the sentences about vaccination.

Vaccines stimulate white blood cells to produce .....This makes children ..... to the pathogen.(2)

- (b) In the 1990s, many people thought that the MMR vaccine caused autism in some children. As a result, the Japanese government stopped using the MMR vaccine.

The graph gives information about the percentage of children in Japan vaccinated with the MMR vaccine and the number of children who developed autism during the 1990s.





- (i) Describe how the percentage of children vaccinated with the MMR vaccine changed between 1990 and 1995. (2)
- (ii) Does the data in the graph support a link between MMR vaccination and autism? **Yes / No** Explain the reason for your answer. (2)

(Total 6 marks)

2 Some infections are caused by bacteria.

- (a) The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells. Describe **two** differences (2)
- (b) Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

**Number of cases of TB per 100 000 people**

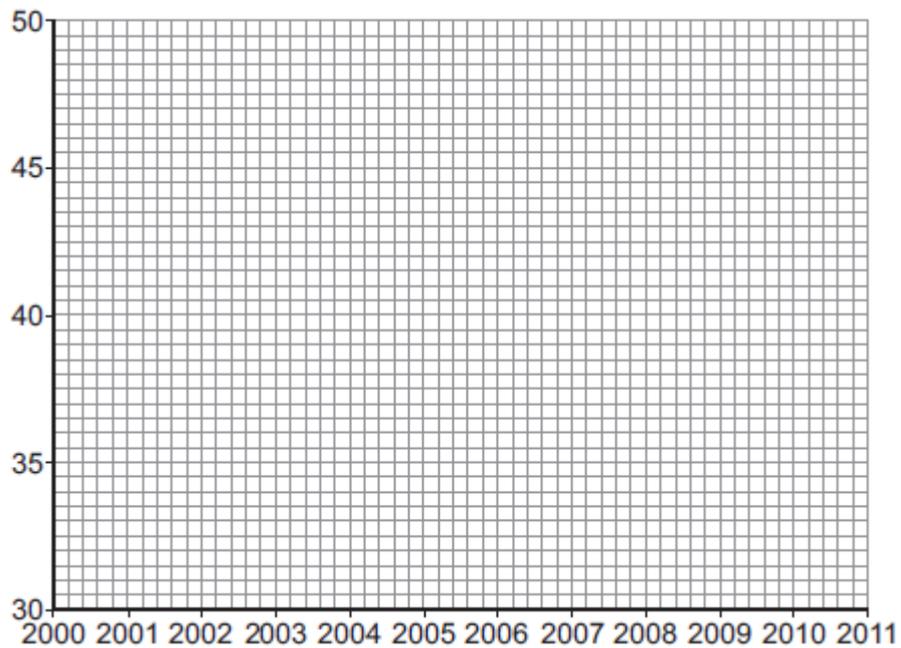
Year	London	South East	South West
2000	37	5	3
2001	36	6	4
2002	42	6	6
2003	42	7	4
2004	42	7	5
2005	49	8	5
2006	44	8	3
2007	43	8	5
2008	44	8	5
2009	44	9	6
2010	42	9	5
2011	45	10	5

- (i) How does the number of cases of TB for London compare with the rest of southern England? (1)



- (ii) Describe the pattern in the data for cases of TB in the South East. (1)
- (iii) Describe the pattern in the data for cases of TB in the South West. (2)

- (c) (i) On the graph paper below:
  - plot the number of cases of TB in **London**
  - label both the axes on the graph
  - draw a line of best fit.



(4)

- (ii) Suggest why a student thought the value for 2005 in London was anomalous.

.....  
 .....

(1)

- (d) People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

.....  
 .....

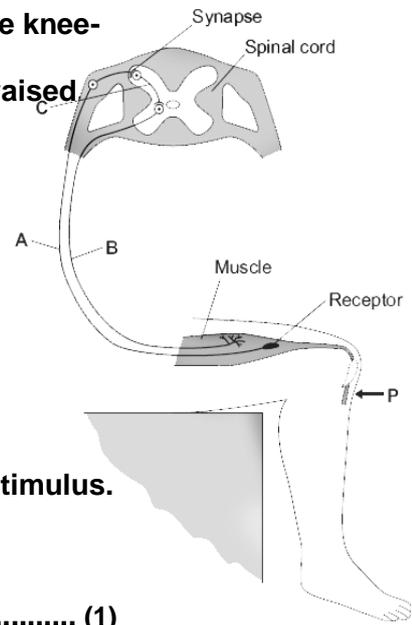


.....  
.....

(2)  
(Total 13 marks)

**NERVOUS SYSTEM**

**1** The diagram shows the nervous pathway used to coordinate the knee-jerk reflex.  
When the person is hit at point P, the lower leg is suddenly raised.



(a) Name neurones A, B and C.

A .....

B .....

C .....(3)

(b) The receptor in the muscle in the leg is sensitive to a stimulus.

Suggest the stimulus.

..... (1)

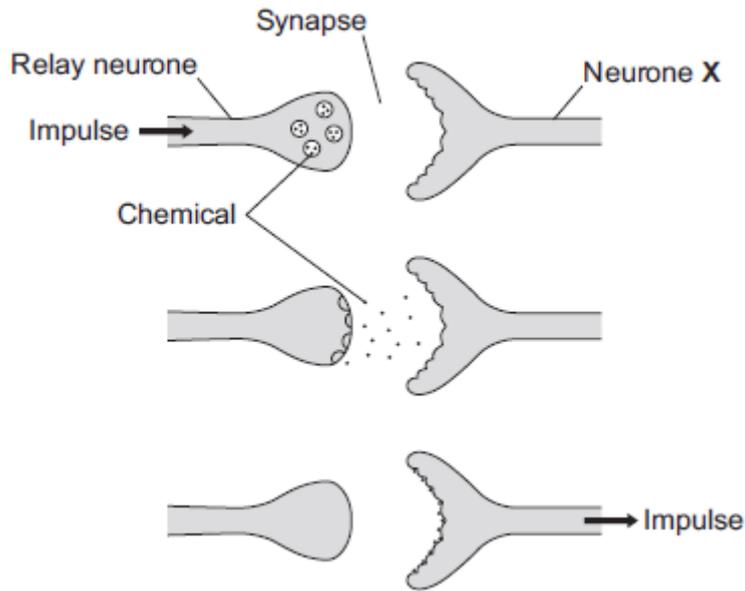
(c) Describe what happens at the synapse during this reflex.

.....  
.....  
.....  
.....  
.....  
.....  
.....

(3)  
(Total 7 marks)



**2.** The diagram below shows how a nerve impulse passing along a relay neurone causes an impulse to be sent along another type of neurone, neurone X.



(a) What type of neurone is neurone X?

..... (1)

(b) Describe how information passes from the relay neurone to neurone X.  
Use the diagram to help you.

.....  
 .....  
 ..... (3)

(c) Scientists investigated the effect of two toxins on the way in which information passes across synapses. The table below shows the results.

Toxin	Effect at the synapse
Curare	Decreases the effect of the chemical on neurone X
Strychnine	Increases the amount of the chemical made in the relay neurone



**Describe the effect of each of the toxins on the response by muscles.**

**Curare**

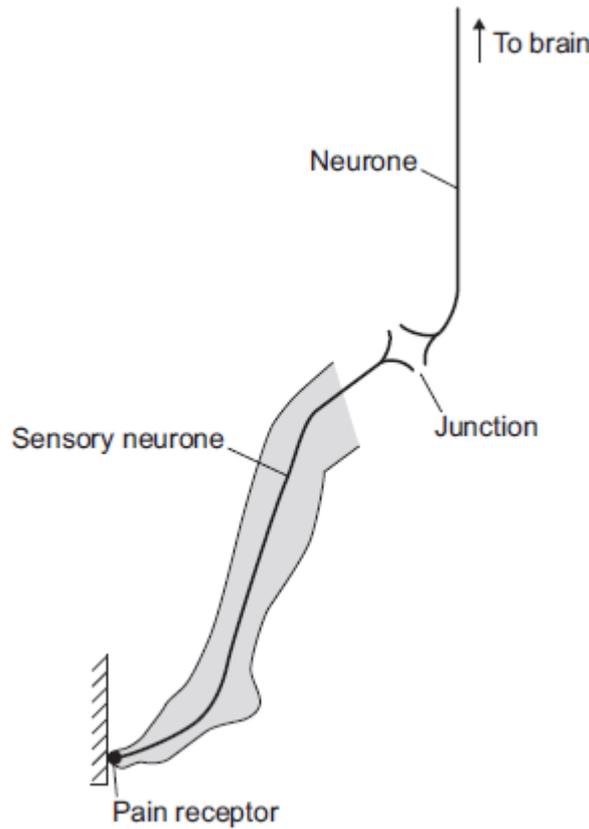
.....  
.....  
.....

**Strychnine**

.....  
.....  
.....

(2)  
(Total 6 marks)

**3. The diagram shows the pathway of an impulse from a pain receptor when someone bangs their toe on a hard surface.**



**(a) (i) What is the junction between neurones called?**

..... (1)

**(ii) How does information cross the junction between neurones?**

.....( 1)



LEARN, LEARN,

**(b) If you bang your toe you feel the pressure of the impact before you feel the pain. This is because the impulse from a touch receptor travels faster than the impulse from a pain receptor.**

**The speed of transmission of the impulse from a touch receptor is 76.2 m / s.**

**The speed of transmission of the impulse from a pain receptor is 0.60 m / s.**

**The following equation can be used to calculate how long it takes for each impulse to reach the brain:**

$$\text{Speed of transmission} = \frac{\text{distance}}{\text{time}}$$

**If the distance each impulse has to travel from the toe to the brain is 1.920 metres, it will take 0.025 seconds for the impulse from the touch receptor to reach the brain.**

**Calculate how much longer it will take the impulse from the pain receptor to reach the brain.**

**You must show your working.**

.....

.....

.....

.....

.....

..... seconds

**(3)**  
**(Total 5 marks)**

**ROUND UP QUIZ**

1. State how many micrometers are in a mm
2. If the objective lens is x4 and the eyepiece lens is x10 what would be the total magnification on the microscope?
3. Using the AIM triangle how would you calculate magnification?
4. Give three differences between light microscopes and electron microscopes
5. Name two parts of the cell that you cannot see with a light microscope but can with an electron microscope
6. Give three differences between prokaryotic and eukaryotic cells
7. Name three parts of a plant cell that an animal cell does not have
8. What do mitochondria and ribosomes do?
9. What is a stem cell?
10. What is mitosis and where does it happen?



LEARN, LEARN,

11. How many chromosomes are in a) a normal cell b) a gamete c) a red blood cell?
12. Give the definition of a tissue
13. Give two differences between benign and malignant tumours
14. Explain how malignant tumours spread around the body
15. What is a carcinogen?
16. Give an ethical issue surrounding using embryonic stem cells
17. What is therapeutic cloning and why does it make using stem cells more ethical?
18. What is active transport?
19. What is diffusion?
20. What is osmosis?
21. Give the symbol equation for aerobic respiration
22. Give the word equation for anaerobic respiration
23. What is oxygen debt?
24. What is binary fission?
25. Why must we not incubate bacteria plates above 25°C in school?
26. Give the symbol equation for photosynthesis
27. Why do plants make starch and how can we test for it?
28. List 5 ways plants use glucose
29. Give three adaptations of leaves to help them photosynthesise
30. What is a limiting factor and give three examples
31. What is transpiration?
32. How do stomata open and close?
33. Why are stomata on the bottom of the leaf and not the top?
34. What travels in the xylem and phloem?
35. What is translocation??
36. What factors increase the rate of transpiration?
37. Give three differences between the xylem and phloem
38. How are root hair cells adapted to absorb water and nutrients?
39. Why do root hair cells have a lot of mitochondria in them?
40. Give three features of a good greenhouse to increase the rate of photosynthesis