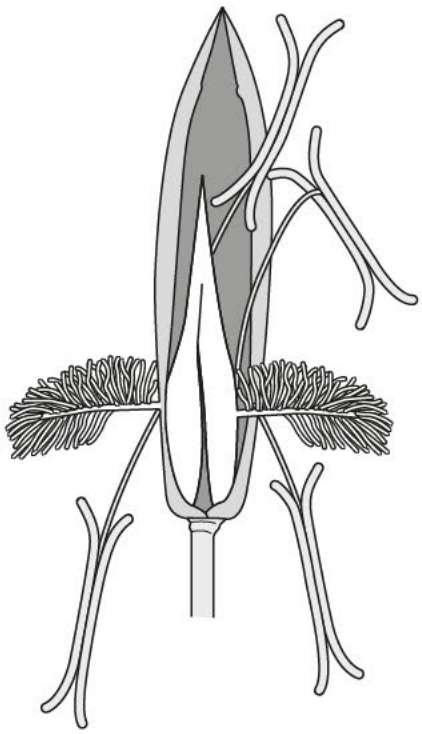
1 Flowers are reproductive organs. They help flowering plants with sexual reproduction.

(a) Suggest how sexual reproduction makes it more likely that a species can adapt to a changing environment.

(2)

(b) Some flowering plants transfer their male gametes (pollen) by using insects and others use wind. The diagram shows a plant that is wind-pollinated.



(i) Give two ways you can tell from the diagram that this plant is wind-pollinated.

(2)

1 .....

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2 .....

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(ii) Suggest why insects rarely visit wind-pollinated flowers.

(2)

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(c) Some people have an allergy to pollen produced by flowering plants. This is known as hay fever.

(i) Suggest why hay fever tends to be caused by wind-pollinated plants rather than insect pollinated plants.

(1)

(ii) Suggest why people only show symptoms of hay fever at certain times of the year.

(1)

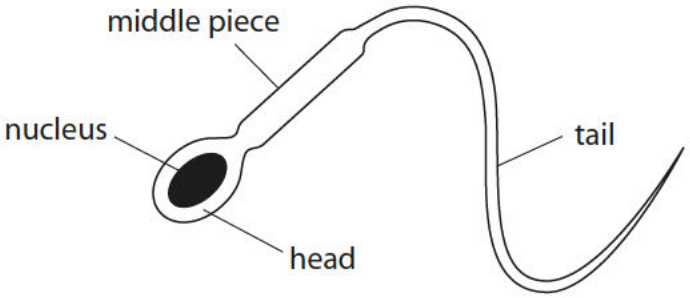
(iii) Allergies are caused by the body cells reacting to the proteins on the surface of the pollen grains.

Explain how the body usually responds to foreign proteins.

(3)

(Total for Question = 11 marks)

2 The diagram shows a human sperm cell.



(a) How many chromosomes are there in the nucleus?

(1)

.....

(b) Respiration takes place in the middle piece of the sperm cell.

Explain why respiration is important to a sperm cell.

(2)

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(c) A sample of semen contains 40 million sperm cells. Only sixty percent of these sperm cells are capable of swimming.

Calculate how many sperm cells in this semen sample are capable of swimming.

Show your working.

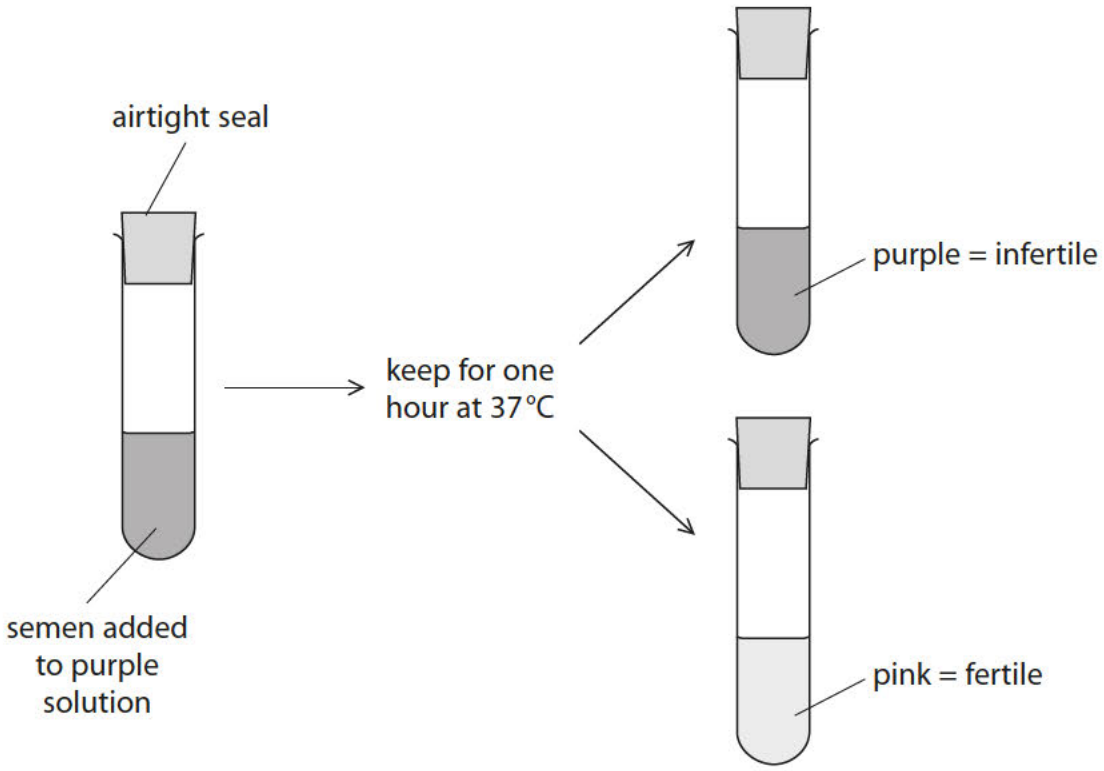
(2)

Answer .....

(d) Some men are infertile because they do not produce enough sperm cells or the sperm cells they produce are not good swimmers.

There is a test that can be used to find out if a man is infertile. Semen is added to a solution in a test tube. The test tube is then sealed.

The solution stays purple if oxygen is present and changes to pink if oxygen is absent. The diagram shows how the test works.



(i) A man used this test and the solution remained purple. What does this suggest about the man's sperm? Explain your answer.

(2)

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(ii) Suggest two reasons why the results of the test might not be correct.

(2)

1 .....

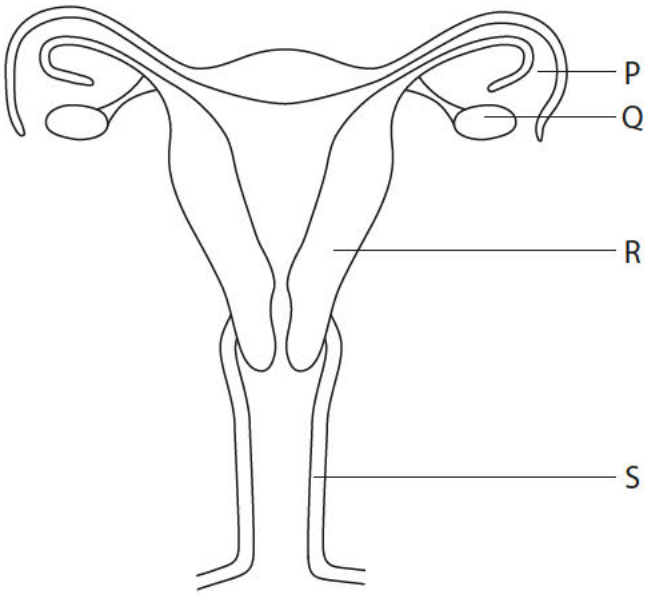
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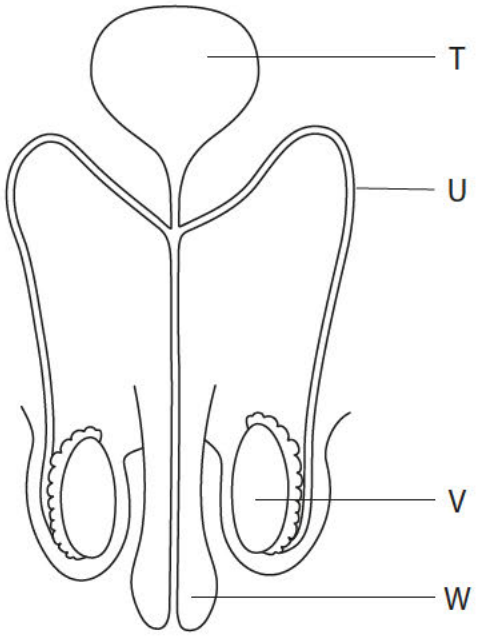
2 .....

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(Total for Question = 9 marks)

3 The diagrams show the female and male reproductive systems.





The table lists some events that take place in the female reproductive system, some that take place in the male reproductive system, and some that take place in both.

Complete the table by giving the letter, or letters, to indicate where each event takes place. The first one has been done for you.

(5)

Event	Letter
fertilisation	P
release of oestrogen	
meiosis	
repair of the uterus lining	
implantation of an embryo	
formation of gametes	

(Total for Question = 5 marks)

4 Plants and animals can reproduce asexually and sexually.

(a) Give an example of a way that plants can reproduce asexually.

(1)

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.....

.....

(b) Complete the table showing features of sexual reproduction in plants and animals.

(3)

Feature	Sexual reproduction in plants	Sexual reproduction in animals
male gametes	pollen nucleus	
site of fertilisation		

(c) Suggest why the number and size of human male gametes differs from the number and size of human female gametes.

(2)

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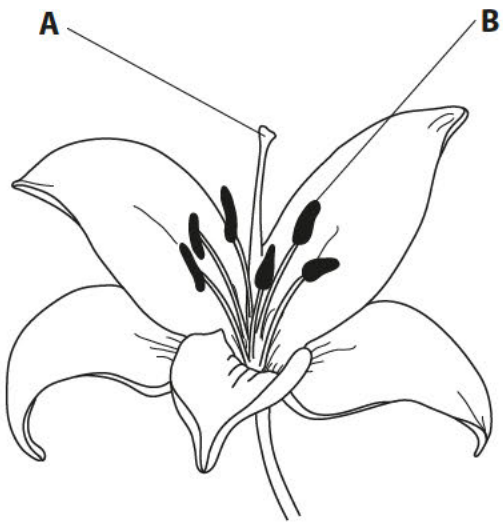
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(Total for Question = 6 marks)

5 The diagram shows part of a lily. A lily is an insect-pollinated flower.



(a) Name the structures labelled **A** and **B**.

(2)

A .....

B .....

(b) Describe what is meant by the term **insect-pollination**.

(2)

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(c) Give **two** ways in which the structure of a wind-pollinated flower would differ from the lily flower shown in the diagram.

(2)

1 .....

.....

2 .....

.....

(d) Describe the events that follow pollination and how they lead to seed formation.

(6)

(Total for Question = 12 marks)

6 FH (familial hypercholesterolaemia) is an inherited condition. People with FH have high levels of blood cholesterol and an increased risk of heart disease.

A dominant allele (**D**) results in high levels of blood cholesterol. A recessive allele (**d**) esults in low levels of blood cholesterol. This means that people who inherit the dominant allele are most at risk of FH.

(a) (i) What is meant by the term **recessive**?

(1)

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(ii) What are the **two** different genotypes of people who are at risk of FH?

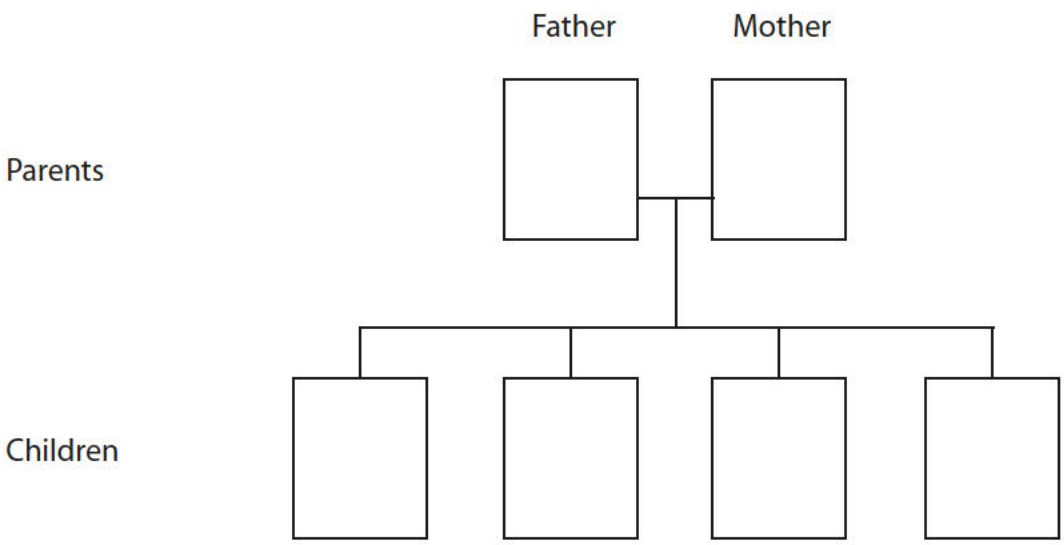
(2)

1 .....

2 .....

(b) (i) In the boxes below give the genotypes of the parents, and the genotypes of all the possible children, for a cross between a heterozygous father and a heterozygous mother. You should use the symbols **D** for the dominant allele and **d** for the recessive allele in your answer.

(2)



(ii) What is the probability of these parents producing a child with FH?

(1)

(iii) What is the phenotype ratio of the children produced?

(1)

(c) High levels of blood cholesterol can lead to narrowing of arteries. Suggest how this might affect the ability of the heart to function.

(5)

(Total for Question = 12 marks)