Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	2	/	0	1	Signature	

Paper Reference(s)

6102/01

Edexcel GCE

Biology

Advanced Subsidiary

Unit Test 2B

Tuesday 10 January 2006 – Morning

Time: 1 hour

Materials required for examination
Ruler

Items included with question papers
Nil

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL EIGHT questions in the spaces provided in this booklet.
Show all the steps in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and parts of questions are shown in round brackets: e.g. (**2**).
The total mark for this paper is 60.

Advice to Candidates

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.

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Answer ALL questions in the spaces provided.

1. The table below refers to the first and second divisions of meiosis.

If the statement is correct, place a tick (✓) in the appropriate box and if the statement is incorrect, place a cross (✗) in the appropriate box.

Statement	First division of meiosis	Second division of meiosis
Pairing of homologous chromosomes occurs.		
Each chromosome consists of a pair of chromatids during prophase.		
Crossing over occurs and chiasmata are formed.		
Independent assortment of chromosomes occurs.		

Q1

(Total 4 marks)

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2. Humans usually masticate (chew) food before it is swallowed.

(a) Describe the effects that mastication has on food.

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(3)

(b) When a person masticates a piece of bread for a few minutes, it is noticed that it begins to taste sweet. Give an explanation for this observation.

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(3) **Q2**

(Total 6 marks)

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3. The table below shows the percentage saturation with oxygen of human haemoglobin and mouse haemoglobin, at a range of partial pressures of oxygen.

Partial pressure of oxygen / kPa	Percentage saturation of haemoglobin with oxygen	
	Human haemoglobin	Mouse haemoglobin
1	8	3
3	40	10
5	71	25
7	85	50
9	92	75
11	96	90
13	98	97
15	98	98

(a) (i) Describe the relationship between the percentage saturation of **human** haemoglobin with oxygen and the partial pressure of oxygen.

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(2)

Leave blank

(ii) Small mammals have a higher rate of oxygen use per gram of body mass than larger mammals. From the table, it can be seen that at an oxygen partial pressure of 7 kPa, human haemoglobin is 85% saturated, but mouse haemoglobin is only 50% saturated.

Suggest how this difference might be related to the difference in size of a mouse and a human.

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(2)

(b) Haemoglobin combines with oxygen in the lungs. Describe the mechanism by which air is brought into the lungs (inspiration) in humans.

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(4) **Q3**

(Total 8 marks)

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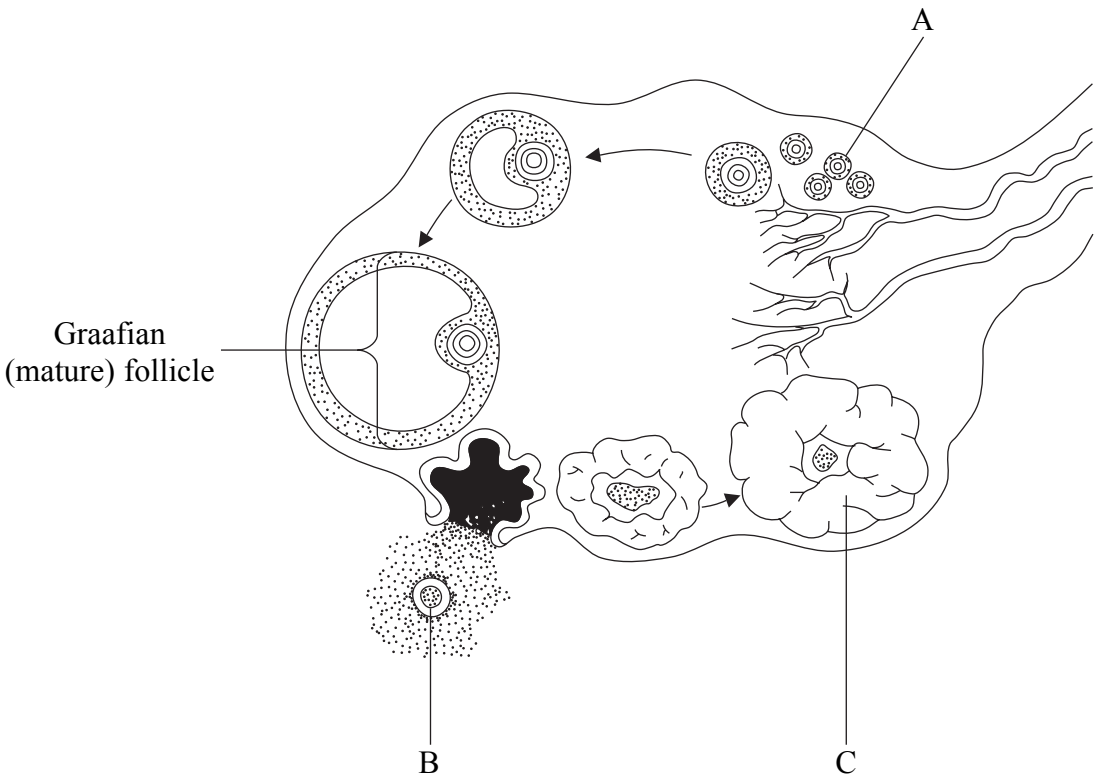
4. The diagram below shows the sequence of changes in a follicle in an ovary during one menstrual cycle.



(a) Name the parts labelled A, B and C.

A .....

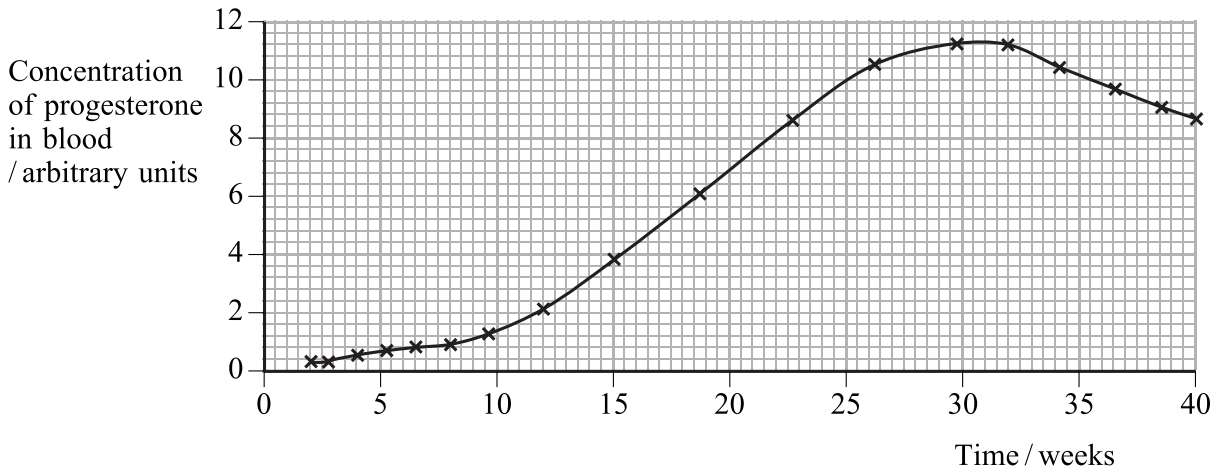
B .....

C .....

(3)

Leave blank

(b) The graph below shows changes in the concentration of the hormone progesterone during pregnancy.



(i) Describe the changes in the concentration of progesterone during pregnancy, as shown by the graph.

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(2)

(ii) State **one** role of progesterone during pregnancy.

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(1)

Q4

(Total 6 marks)

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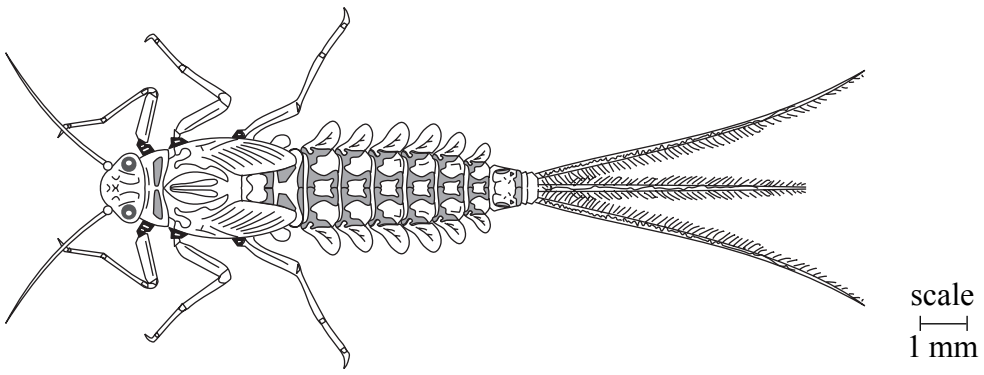
5. The diagram below shows a mayfly nymph, an invertebrate which lives in freshwater streams.



(a) Give **two** features, visible in the diagram, which show how mayfly nymphs are adapted for living in an aquatic habitat. In each case, explain how the feature helps the mayfly nymphs to live in water.

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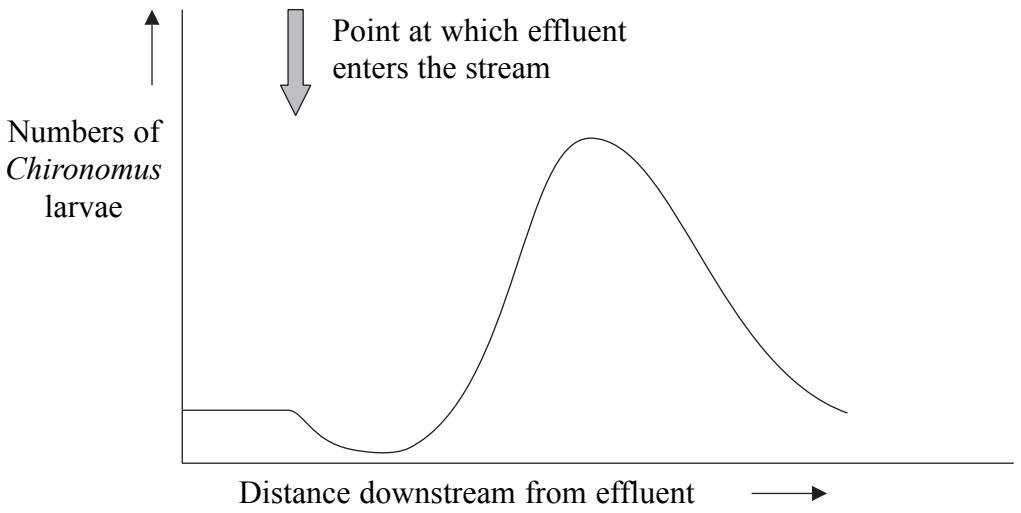
(4)

(b) Freshwater streams may be polluted with organic effluents. One of the effects of an organic effluent is to reduce the concentration of dissolved oxygen in the water. The graph below shows the distribution of larvae of *Chironomus*, a freshwater invertebrate, at increasing distances downstream from the source of an organic effluent.



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(i) Suggest and explain **two** ways in which *Chironomus* larvae could be adapted to living in water with a low concentration of dissolved oxygen.

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2 .....

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(4)

(ii) Immediately after the point at which the effluent enters the stream, numbers of *Chironomus* larvae decrease and then increase.

Suggest an explanation for this **increase** in the numbers of *Chironomus* larvae.

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(2)

Q5

(Total 10 marks)

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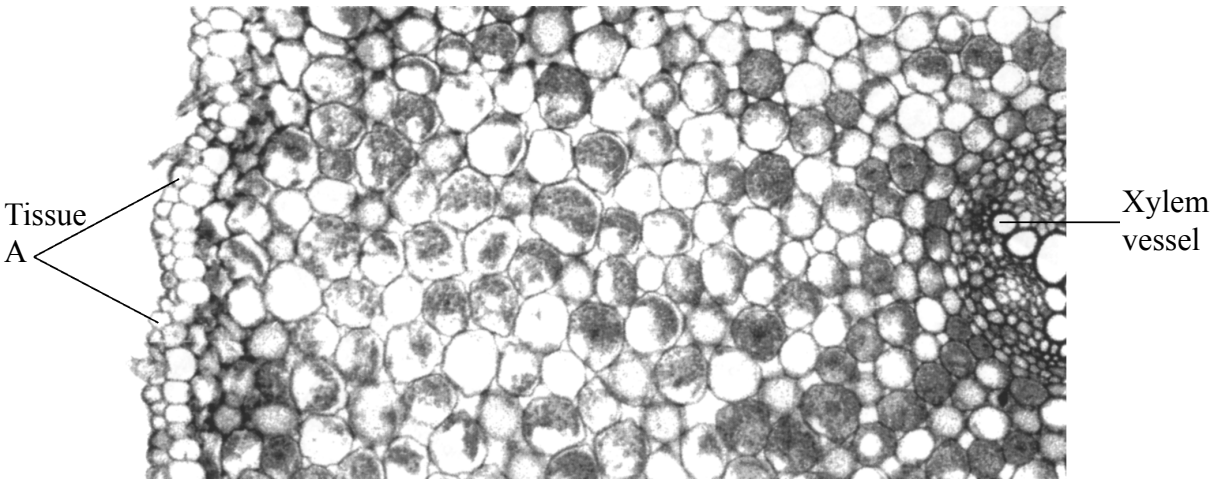
6. (a) The photograph below shows a transverse section through part of a plant root, as seen using a light microscope.



Magnification ×40

(i) Name tissue A.

Tissue A .....

(1)

(ii) Describe the pathways taken by water as it moves from tissue A to a xylem vessel.

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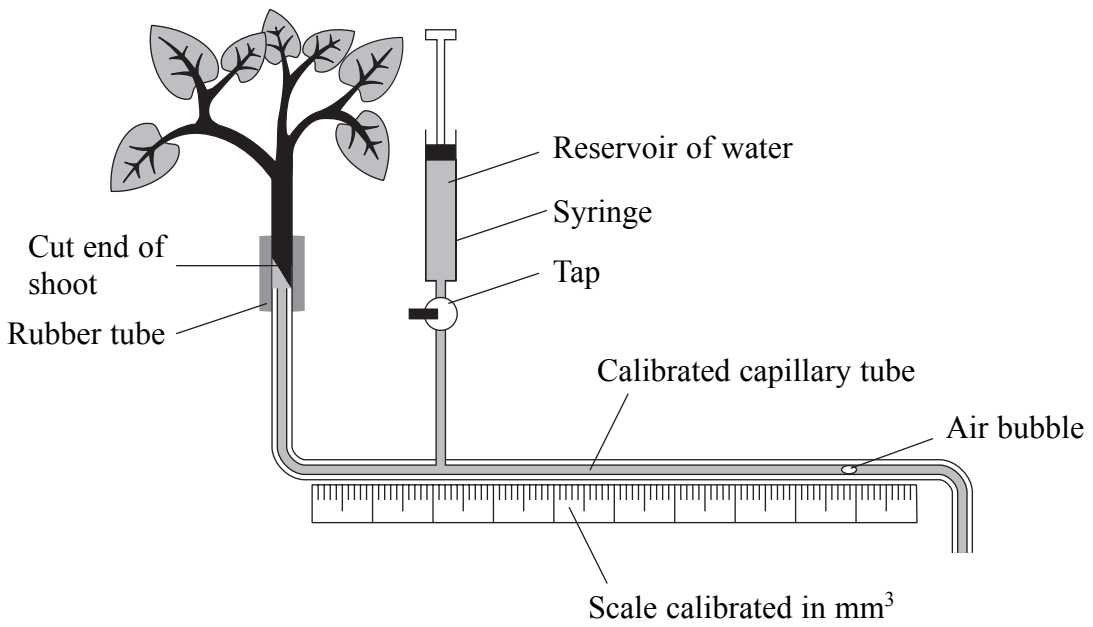
(b) The diagram below shows a potometer, set up to measure the uptake of water by a leafy shoot.



(i) State **one** precaution that should be taken when **setting up** a potometer, to ensure reliable results.

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(1)

(ii) Suggest **one** function of the syringe in this potometer.

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(1)

(iii) In an investigation, the air bubble in the capillary tube moved from 3.8 mm^3 to 9.2 mm^3 in 8 minutes.

Calculate the rate of uptake of water. Show your working.

Answer = ... mm^3 per minute

(2)

Q6

(Total 9 marks)

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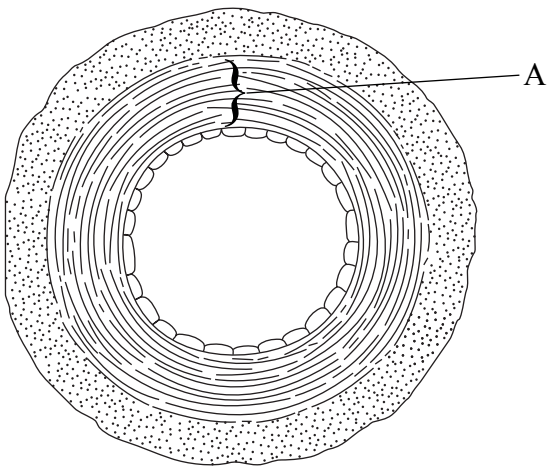
7. The diagram below shows a transverse section of a blood vessel, as seen using low magnification of a light microscope.



(a) Name the type of blood vessel shown in the diagram.

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(1)

(b) The layer labelled A contains smooth muscle fibres, collagen and elastic fibres.

(i) Name layer A.

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(1)

(ii) Describe the function of the collagen fibres.

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(2)

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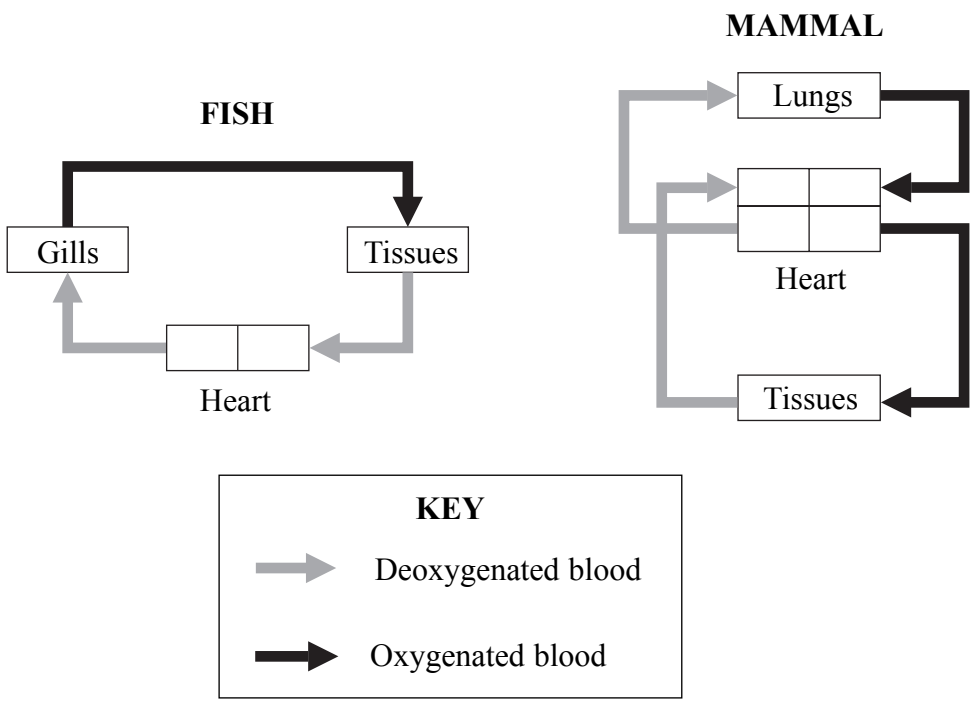
(c) The diagrams below show the single blood circulatory system of a fish and the double circulatory system of a mammal.



Suggest why a double circulatory system is an advantage to a mammal.

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(2) **Q7**

(Total 6 marks)

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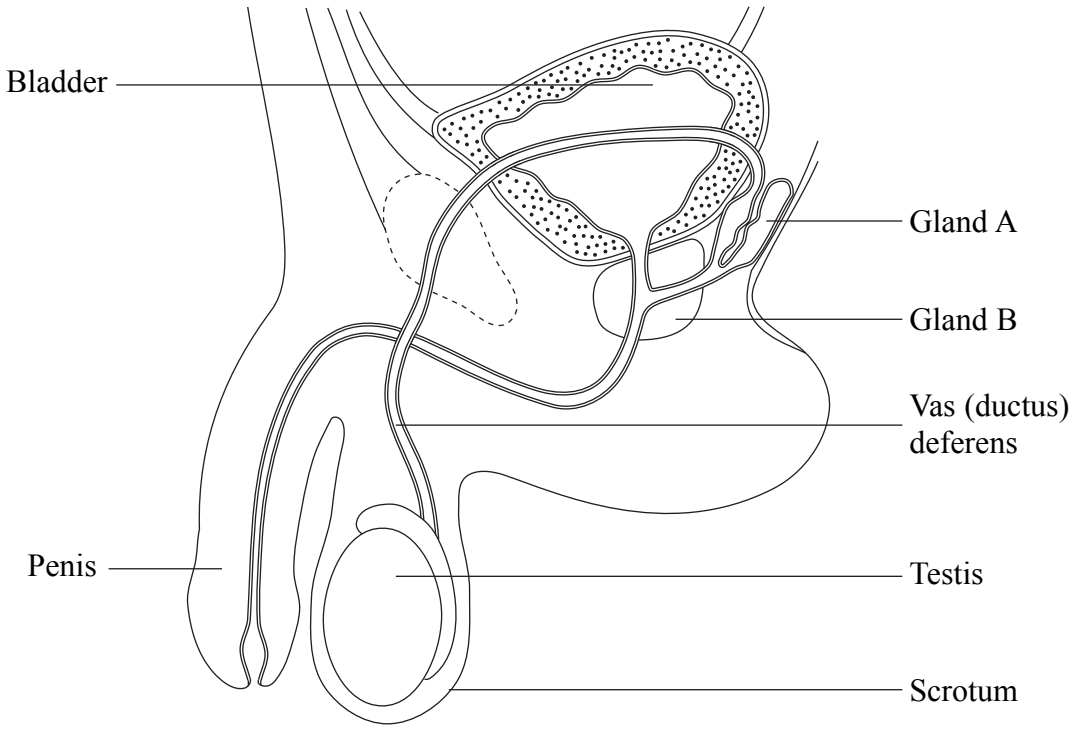
8. The diagram below shows the structure of the reproductive system of a human male, as seen in side view.



(a) Name the glands labelled A and B.

A .....

B .....

(2)

(b) The secretions from glands A and B both contribute to the formation of semen.

Give **two** roles of these secretions in semen.

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(2)

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(c) Semen contains the male gametes (sperm). Describe how these gametes are transferred into the female.

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(4)

(d) In men, an average sperm count is about 100 million sperm per cm^3 of semen. The table below gives the percentage of men with higher and lower than average sperm counts in 1950 and 1990.

Year	Percentage of men with higher sperm counts (%)	Percentage of men with lower sperm counts (%)
1950	50	5
1990	15	18

(i) Suggest explanations for the changes shown in the table.

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(2)

(ii) Suggest **one** possible consequence of these changes.

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(1)

Q8

(Total 11 marks)

TOTAL FOR PAPER: 60 MARKS

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