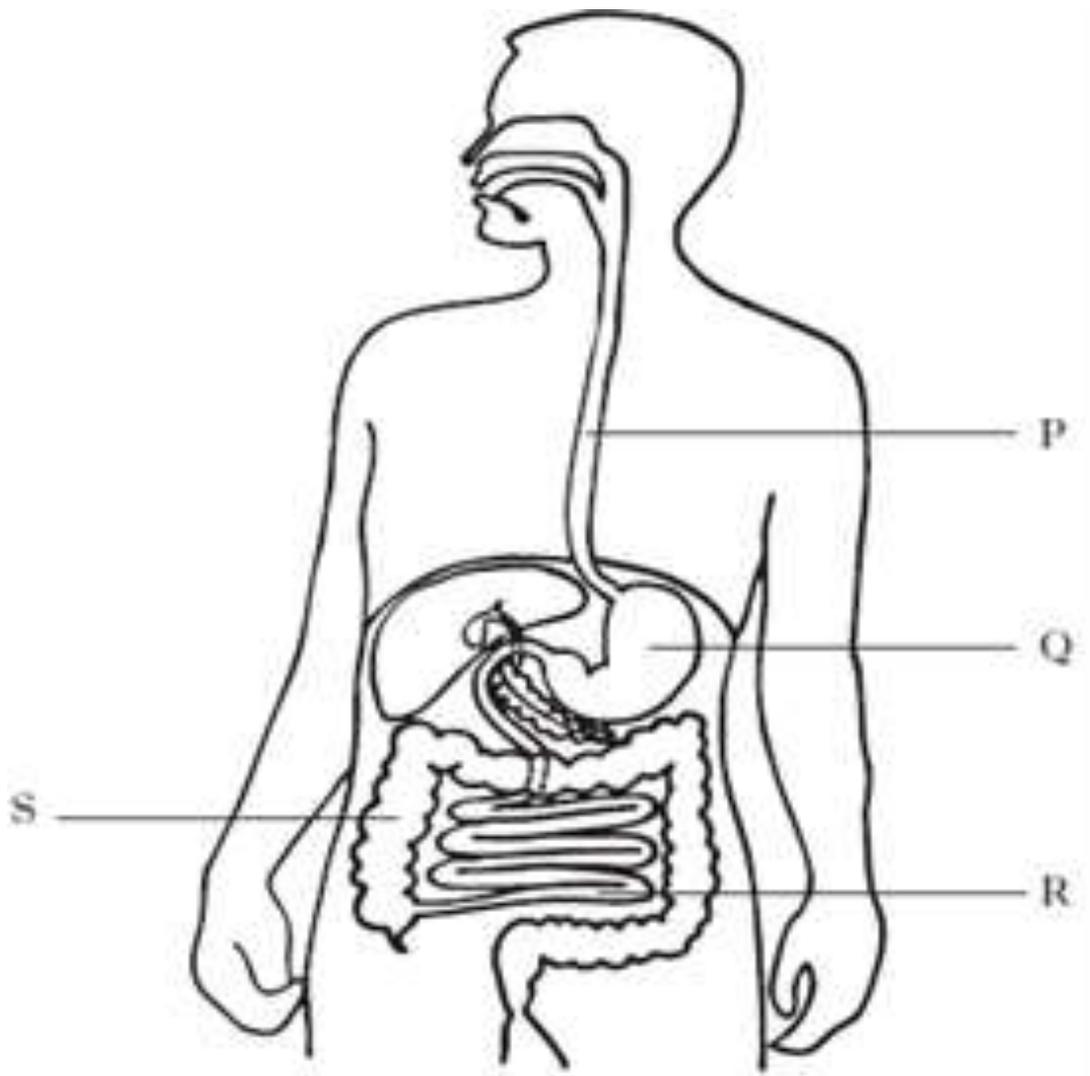


Perth Academy

N5 Biology

Multicellular Organisms

Homework Booklet



HOMEWORK 1

1. (a) Multicellular organisms are composed of different types of cells which are 'specialised'. **Describe** what this means and what process cells undergo to become specialised.

(b) **Complete** the table to describe the function of some specialised cells in plants and animals.

Name of specialised cell	Found in plants or animals?	Function of specialised cell
Red blood cell	(i)	(ii)
(iii)	Plants	Controls gas exchange by opening or closing stomata
(iv)	Animals	Transmit nerve impulses
Root hair cell	(v)	(vi)

(3)

(c) **Complete** the sentences below -

Cells that do the same job are grouped together to form _____.
Examples include _____ in animals and _____ in plants.

(3)

(d) **Which** of the following shows the correct organisation in multicellular organisms?

- A Tissues → Cells → Organs
- B Cells → Tissues → Organs
- C Organs → Cells → Tissues
- D Cells → Organs → Tissues

(1)

HOMEWORK 2

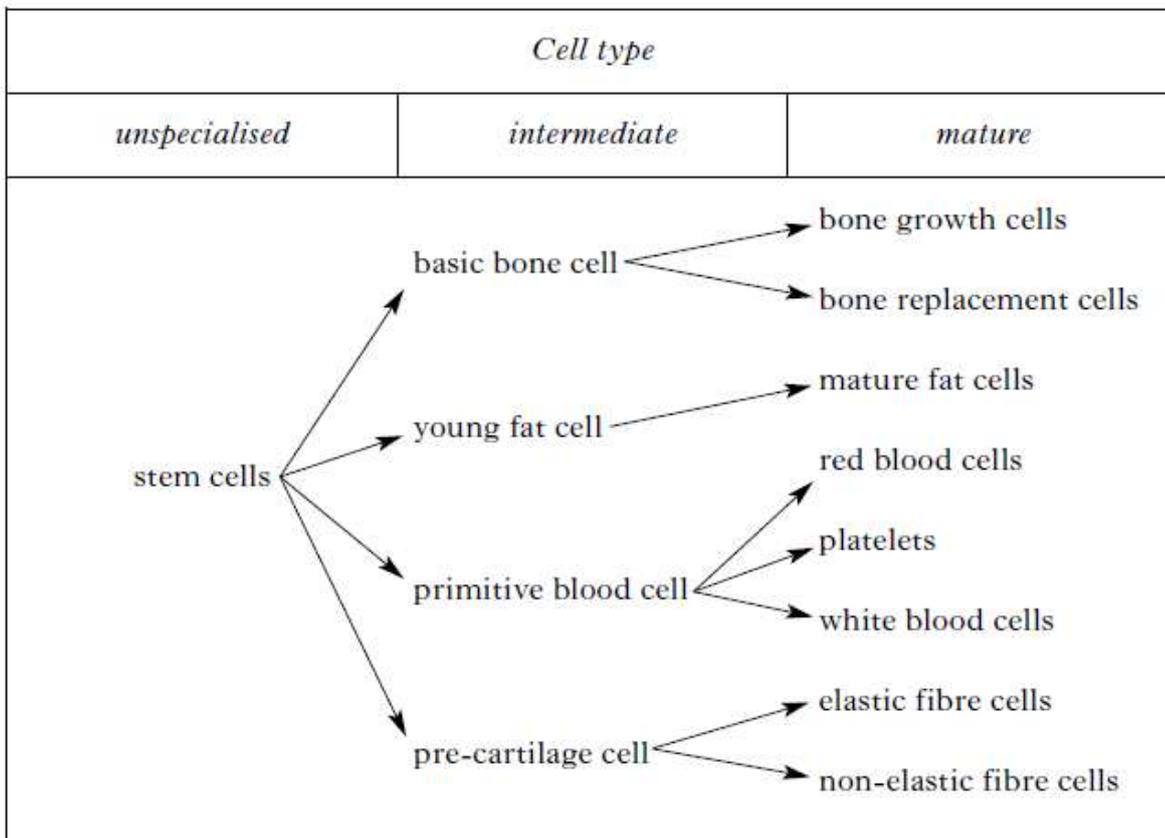
1. (a) **Name** the type of cells which are undifferentiated and have the potential to turn into other cell types in animals. (1)

(b) (i) One source of these cells are from embryos. **Describe one advantage** and **one disadvantage** from using these undifferentiated cells from embryos.

(ii) Apart from embryos, **state one** other source of these types of cells.

(c) **Describe** a potential use for these types of cells. (1)

2. The chart below shows how some specialised cell types are formed from stem cells.



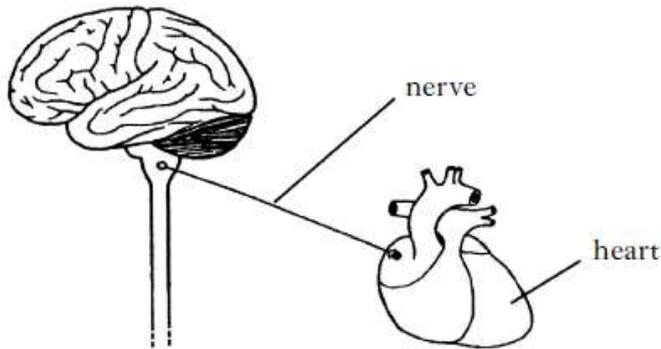
(a) **Which** intermediate cell can develop into the widest range of mature cell types? (1)

(b) **Which** type of intermediate cell forms both elastic and non-elastic fibres? (1)

(c) At **which** stage in an animal's development are stem cells most abundant? (1)

HOMEWORK 3

1. The diagram below shows part of the central nervous system (CNS) and a nerve to the heart.



(a) (i) **Name** the **two** parts, shown in the diagram, which make up the central nervous system (CNS). (2)

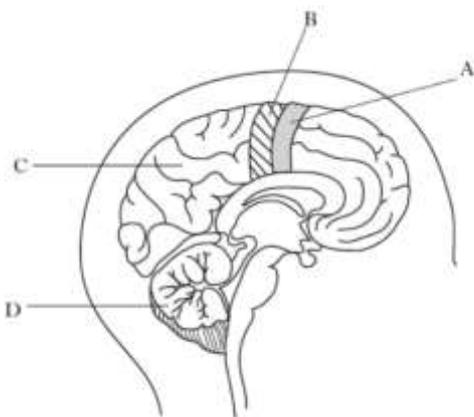
(ii) **Name** the area of the brain which controls heart rate. (1)

(b) Reflex arcs may contain inter neurons.

(i) **Which** structure sends impulses to the inter neuron? (1)

(ii) **What** is the function of inter neurons in a reflex arc? (1)

2. **Which** label identifies correctly the part of the brain which controls balance?



(1)

3. (a) **Complete** the table below to show parts of the brain and their function.

<i>Part of brain</i>	<i>Function</i>
Cerebrum	i
Cerebellum	ii
iii	controls breathing and heart rate

(3)

(b) The following table shows the average brain and body masses of several animals.

<i>Animal</i>	<i>Average brain mass (g)</i>	<i>Average body mass (g)</i>	<i>Ratio of brain : body mass</i>
Monkey	100	7 000	1 : 70
Kangaroo	56	35 000	1 : 625
Cat	30	3 300	1 : 110
Racoon	39	4 290	1 : 110
Squirrel	6	900	1 : 150
Frog	0.1	18	

(i) **Calculate the** ratio of brain : body mass for the frog (1)

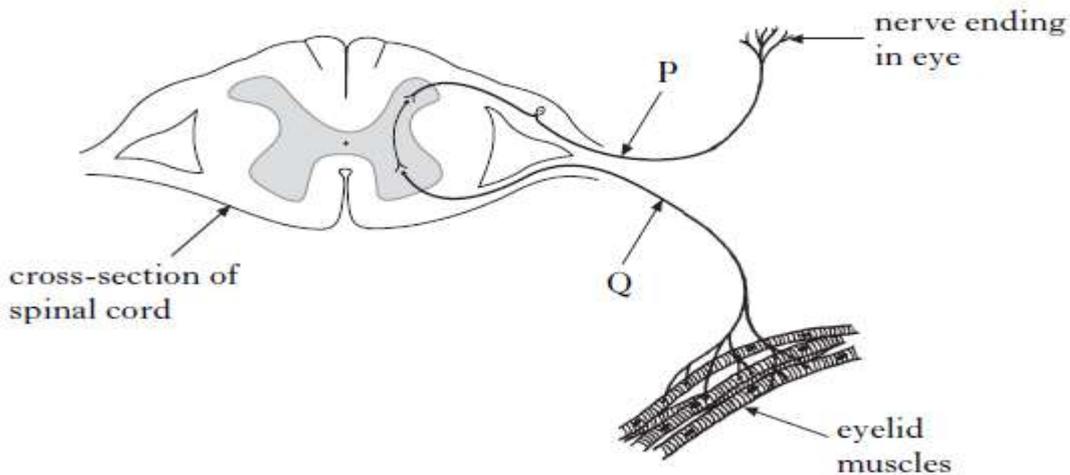
(ii) Of the following animals, **which** has the smallest brain compared to its body mass?

Tick (✓) the correct box.

- Kangaroo
- Cat
- Racoon
- Squirrel

HOMEWORK 4

1. The three types of neuron involved in the reflex arc for blinking are shown in the diagram below.



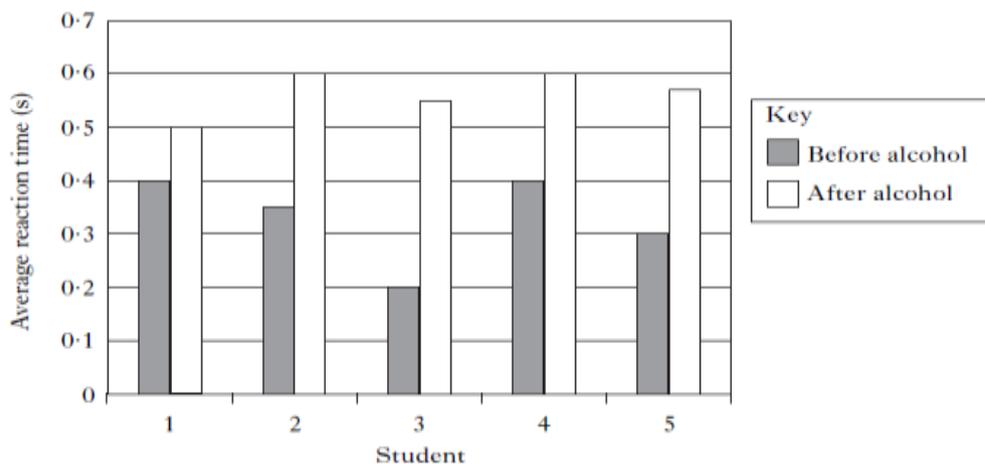
- (a) **Name** neurones P and Q. (2)
- (b) **Which** labelled structure is the effector in this response? (1)
- (c) **What** is the function of a reflex action? (1)
- (d) The following stages occur in a reflex action.
1. The effector produces a response.
 2. A sense organ is stimulated.
 3. An impulse passes along a sensory neurone.
 4. An impulse passes along a motor neurone.

Using the numbers write down the correct order of these stages. (1)

2. A scientist measured the reaction times of five students before and after drinking alcohol.

Average reaction times were calculated for each student.

The graph below shows their average reaction times before and after drinking alcohol.



(a) **What** conclusion can be drawn about the results? (1)

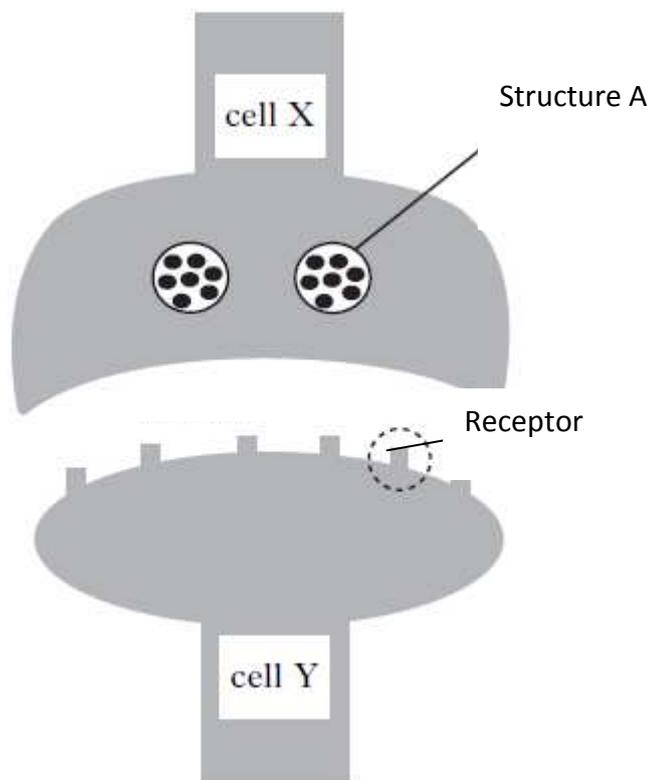
(b) **Why** did the scientist calculate the **average** reaction times? (1)

(c) What was the percentage increase in the average reaction time for student 4 after drinking alcohol? (1)

(d) In this investigation, the students had to press a switch when a light flashed.

Which part of the brain coordinates this movement? (1)

3. The diagram below shows two nerve cells in the brain.

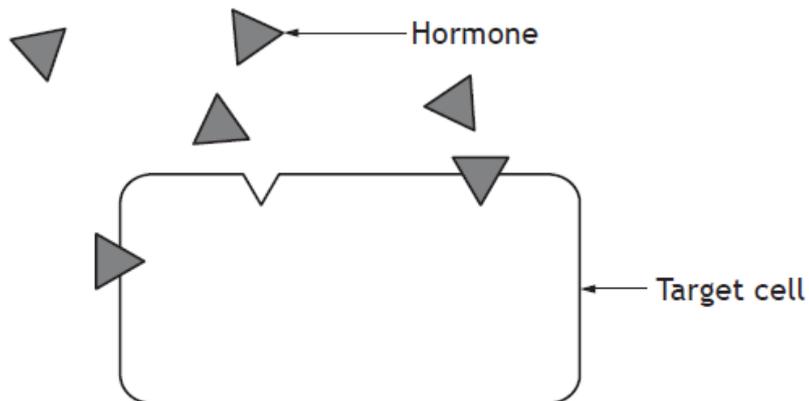


- (a) **What** name is given to the tiny space between cell X and cell Y? (1)
- (b) (i) **What** does structure A contain that will be released across this space to the receptor on Cell Y to trigger an impulse? (1)
- (ii) **What** process is responsible for the movement of the contents of structure A across the space? (1)

HOMWORK 5

1. (a) **What** are 'hormones'? (1)
- (b) **Which** glands in the human body release hormones? (1)
- (c) Hormones stimulate particular target tissues.
- (i) **How** do hormones reach these target tissues? (1)
- (ii) **Why** does the target tissue become stimulated by a hormone while other tissues remain unaffected? (1)

2. The diagram below shows a hormone, such as insulin, binding with its target cell.



- (a) (i) **Explain** why a hormone only works on its target cell. (1)
- (ii) Hormone messages travel slower than nerve messages.
State one other difference between these messages. (1)

(b) Diabetes is a condition in which the blood glucose level is not fully controlled by insulin. There are two types of diabetes. The table below shows information about both types.

<i>Type 1 diabetes</i>	<i>Type 2 diabetes</i>
Insulin is not produced	Insulin is produced but is not used effectively
Usually starts at a young age	Often associated with being obese
Can be triggered by infection	Can be controlled with diet and exercise
Daily insulin injections	Medication can be given in tablet form

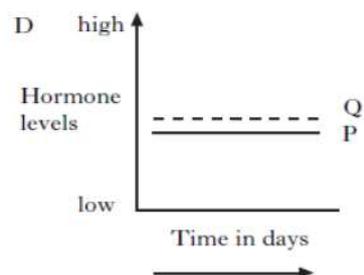
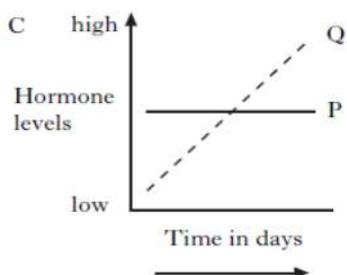
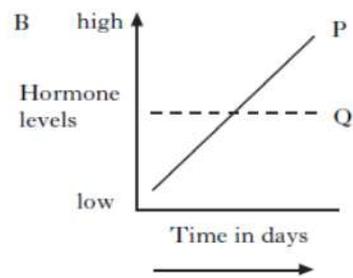
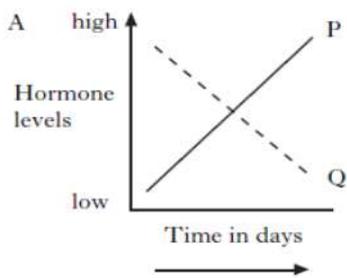
- (i) **Describe** what would happen to this person's blood glucose level if they had not been treated. (1)
- (ii) **Name** the organ which is not functioning properly, causing type 1 diabetes.

3. Sperm production in humans is controlled by two hormones, P and Q.

As levels of P rise, sperm production increases.

As levels of Q rise, sperm production decreases.

Which of the graphs below shows the changes in hormone levels of a man whose sperm production is decreasing?



HOMEWORK 6

1. (a) **Complete** the table below to show how many sets of chromosomes would be found in each cell in the human body.

Cell	Number of sets of chromosomes
Skin cell	i
Liver cell	ii
Egg cell	iii

(3)

- (b) **What** term is used to describe a cell that has a double set of chromosomes?

(1)

- (c) Sex cells are described as being 'haploid'. **Describe** what this means. (1)

2. (a) **Complete** the table below to show the sex cells in animals and plants and their sites of production.

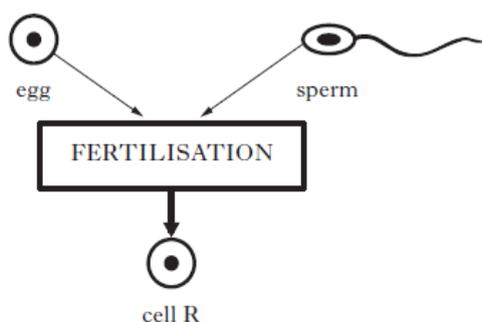
Organism	Sex cell	Male or Female	Site of production
Animals	Egg	i	ii
	iii	Male	iv
Plants	v	Vi	Ovary
	Pollen	Vii	viii

(4)

- (b) **What** term is used to describe sex cells in plants and animals?

(1)

3. The diagram below shows the process of fertilisation.



Cell R is

- A a zygote
- B a gamete
- C an ovule
- D an embryo

(1)

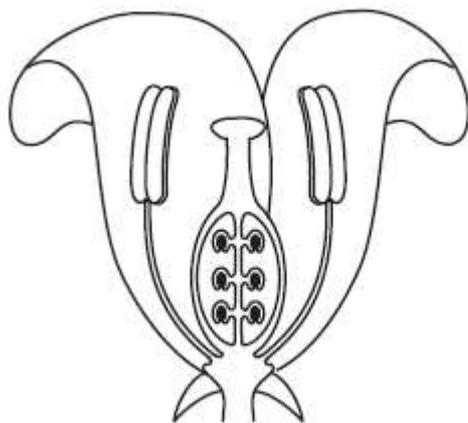
4. The table below shows information on the number of eggs fertilised and the survival of offspring for four different animals.

<i>Animal</i>	<i>Average number of eggs fertilised at one time</i>	<i>Average number of surviving offspring</i>	<i>Percentage survival rate</i>
Dog	5	4	
Human	1	1	100
Bird	4	3	75
Trout	1000	20	2

(a) **Calculate** the percentage survival for the dog and complete the table with the result. (1)

(b) **Draw** a bar graph to show the percentage survival rates of the 4 animals on the grid below. (Must be completed on graph paper)

5. The diagram below shows a section through a flower.



Name the sites of production of pollen grains and ovules in a flower.

Describe how these gametes are formed and describe the process of fertilisation. (5)

HOMEWORK 7

1. Sorghum is an important food crop in some parts of the world. The colour of the seed husk (coat) is controlled by a single gene. Purple husk colour (H) is dominant to tan husk colour (h).



- (i) What name is given to different forms of the same gene? **(1)**
 (ii) A homozygous purple husk plant is crossed with a tan husk plant.

Complete the genotypes of the parental (P) generation below:

P purple X tan

P genotypes _____ _____ **(1)**

- (iii) **State** the phenotype(s) of the F₁ plants. **(1)**

- (b) An individual from the F₁ generation is crossed with a tan husk plant.

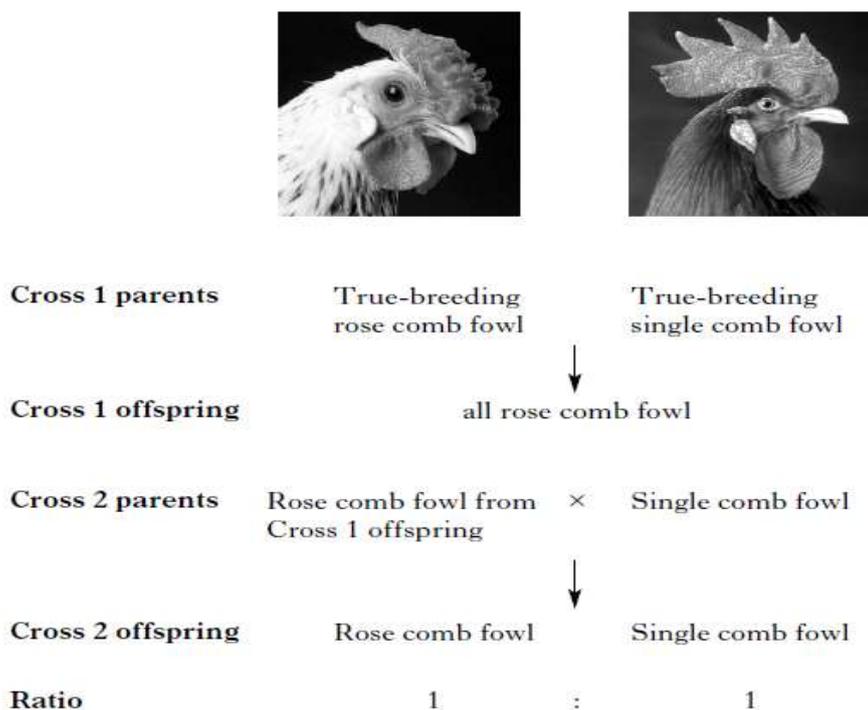
- (i) **Complete** the Punnett square to show the expected results of this cross.

	Genotypes of gametes from F ₁ plant		
Genotype of gametes from tan husk plant			

(2)

- (ii) **State** the expected phenotypic ratio for the offspring of this cross **(1)**

2. In fowl, the dominant form (R) of one gene determines rose comb shape; single comb shape results from the recessive form (r) of the gene. The diagram below shows the results of two crosses.



(a) (i) Which offspring contains only one phenotype? (1)

(ii) Complete the Punnett square below to show the genotypes of the gametes of the Cross 2 single comb parent and the genotypes of the offspring produced.

		Genotypes of gametes of Cross 2 single comb parent	
Genotypes of gametes of Cross 2 rose comb parent	R		
	r		

(2)

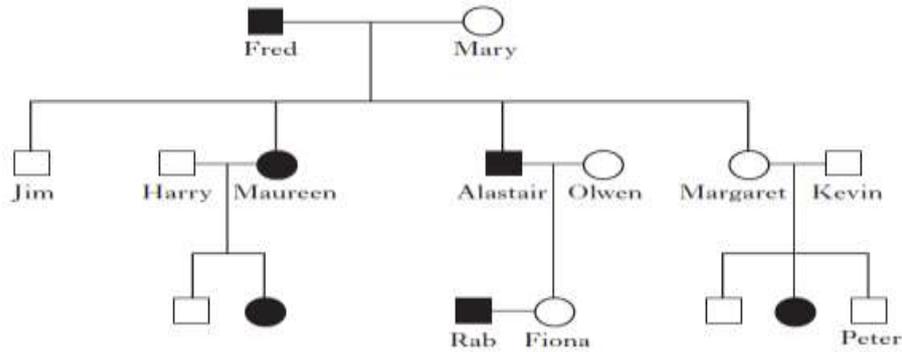
(b) Decide if each of the following statements is True or False, If the statement is False, write the Correction box to replace the word underlined in the statement.

Statement	True	False	Correction
A characteristic controlled by many genes is called <u>co-dominant</u> .			
The <u>gene</u> for comb shape has two different alleles.			

(2)

HOMEWORK 8

1. Tongue-rolling is an inherited characteristic. The diagram below shows the pattern of its inheritance in one family.



(a) (i) Using **R** for the dominant form of the gene and **r** for the recessive form, **state** the genotypes of:

1 Harry _____

2 Jim _____

3 Alastair _____

(3)

(ii) If Rab and Fiona have a child, **what** are the chances of the child being able to roll its tongue? **(1)**

(iii) **Which** of the original parents could be described as Homozygous?

Fred

Mary

(1)

Both

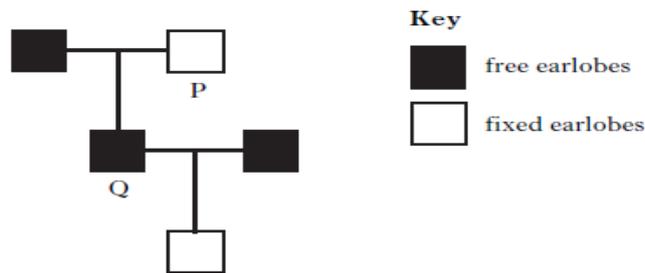
Neither

(iv) **Name** a tongue roller from the F₁ generation.

(1)

2. In humans, the allele for free ear lobes (E) is dominant to the allele for fixed earlobes (e).

The diagram below shows the inheritance of this characteristic.



Which line in the table identifies correctly the genotypes of persons P and Q?

<i>Genotype</i>		
	<i>P</i>	<i>Q</i>
A	ee	EE
B	ee	Ee
C	EE	Ee
D	Ee	Ee

(1)

3. A hairy stemmed pea plant is crossed with a smooth stemmed pea plant. All the F₁ plants had hairy stems.

The genotype of the F₁ plants was

- A heterzygous
- B homozygous
- C dominant
- D recessive

(1)

4. Differences in the mass of sunflower seeds are due to the interaction of the alleles of several genes.

This type of inheritance is called

- A dominant
- B monohybrid
- C polygenic
- D co-dominant

5. In gerbils, agouti coat colour is dominant to white.

Some heterozygous gerbils were allowed to interbreed and 56 offspring were produced.

What would be the expected number of agouti gerbils?

- A 14
- B 28
- C 42
- D 56

(1)

6. A hairy stemmed pea plant was crossed with a smooth stemmed pea plant and all of the F_1 had hairy stems.

The genotype of the hairy stemmed parent plant is

- A heterozygous dominant
- B heterozygous recessive
- C homozygous recessive
- D homozygous dominant

(1)

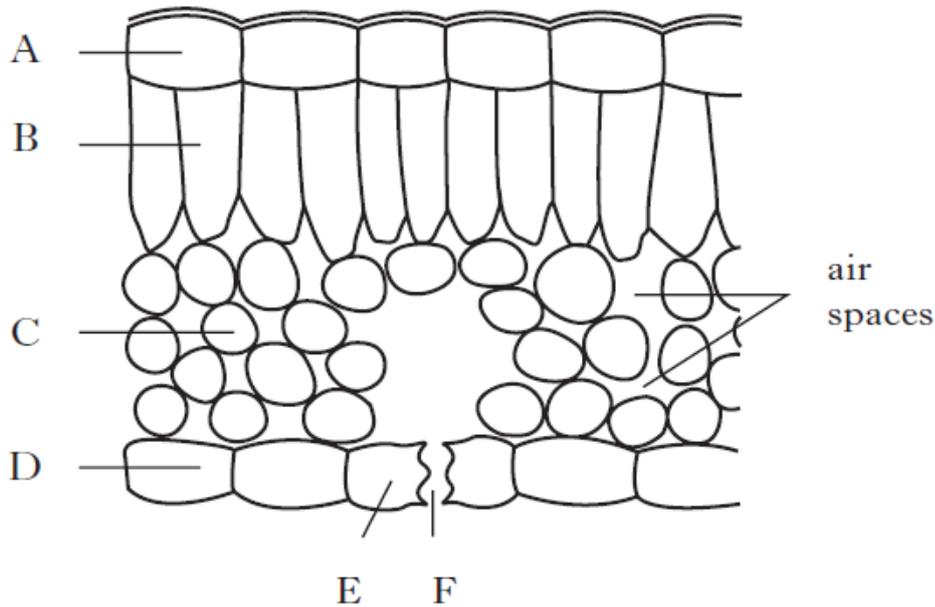
7. Skin colour in humans is an example of

- A discrete variation
- B co-dominance
- C polygenic inheritance
- D single gene inheritance

(1)

HOMEWORK 9

1.. The diagram represents part of a cross section through a leaf.



(a) **Identify one** example of each of the cells described below by using letters from the diagram to complete the boxes.

Each letter may be used **once, more than once or not at all**.

Transparent cells

Cells which carry out photosynthesis

Mesophyll cells

Guard cells

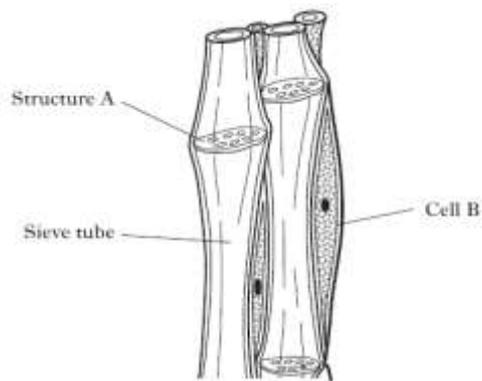
(4)

(b) **Complete** the sentences below by underlining the correct word in each set of brackets to make the sentences correct.

When water enters the guard cells they become (flaccid/turgid).

This change brings about the (opening/closing) of stomata . (2)

2. (a) The diagram represents phloem tissue from the stem of a plant.



(i) **Name** Structure A and Cell B. (2)

(ii) **State** the function of phloem. (1)

(b) **Name** the leaf tissue where stomata are found (1)

(c) **Name** the cells which control the opening and closing of stomata (1)

(d) Xylem tissue, like phloem tissue, is involved in transporting substances in plants.

(i) **Describe one** difference between xylem and phloem. (1)

(ii) **Name** the substance used to strengthen xylem vessels (1)

3. Water evaporates from the leaves of plants, mainly through the stomata.

This process is known as transpiration.

(a) **Complete** the sentences below to show how environmental factors can influence the rate at which this process occurs.

(i) As temperature increases, transpiration rate _____

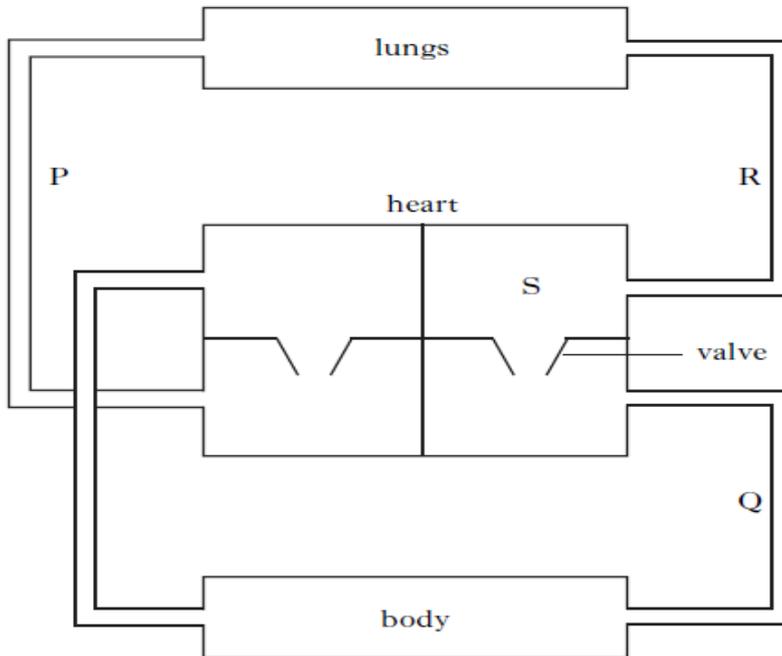
(ii) As wind speed increases, transpiration rate _____

(iii) As humidity increases, transpiration rate _____ (3)

(b) **Describe** the importance of water to plants. (1)

HOMEWORK 10

1. The diagram below represents the human circulatory system.



(a) (i) Use the terms **away from the heart** or **to the heart** to describe the direction of blood flow in vessels P, Q and R. (1)

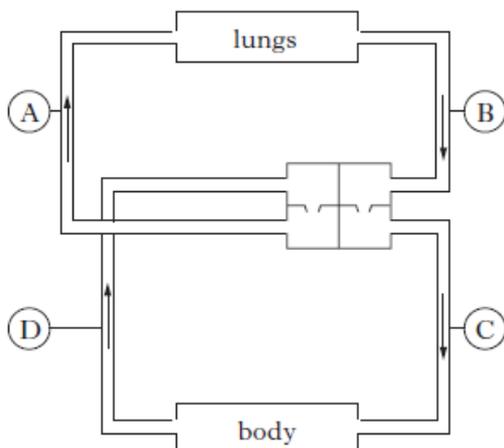
(ii) **State** whether the blood is oxygenated or deoxygenated in vessels P and Q. (1)

(b) **Name** heart chamber S and blood vessel R. (2)

(c) **What** is the function of the heart valves? (1)

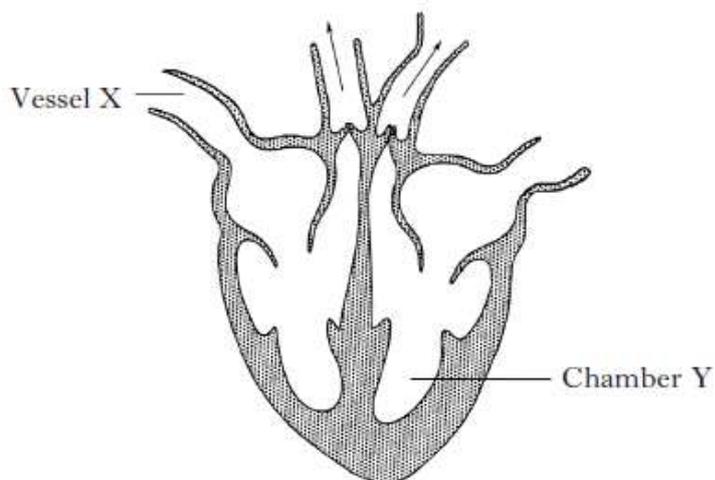
(d) **Explain** why a blocked coronary artery damages heart muscle. (2)

2. The diagram below shows the heart and circulation.



Which labelled structure is the pulmonary artery?

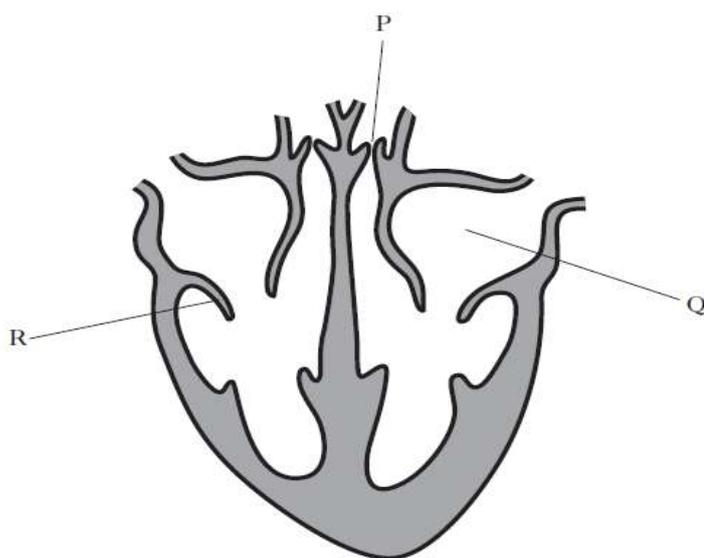
3. The diagram below shows a cross section of a human heart.



Which line in the table correctly identifies the parts of the heart correctly?

	<i>Vessel X</i>	<i>Chamber Y</i>
A	aorta	left ventricle
B	vena cava	left ventricle
C	vena cava	right ventricle
D	aorta	right ventricle

4. The following diagram shows the human heart.



(a) (i) **Name** chamber Q and **state** whether it is carrying oxygenated blood or deoxygenated blood. (2)

(ii) **State** the function of valve P. (2)

(b) **Name** the blood vessel that carries blood from the rest of the body back to the heart. (1)

5.. (a) Decide if each of the following statements about blood vessels is True or False, If the statement is **False**, write the correct word to replace the word(s) underlined in the statement.

<i>Statement</i>	<i>True</i>	<i>False</i>	<i>Correction</i>
<u>Capillaries</u> contain valves.			
<u>Veins</u> allow gas exchange.			
Blood leaves the heart in <u>arteries</u> .			

(3)

(b) The sentences below describe some of the functions of blood cells.

Oxygen is carried by (red/white) cells.

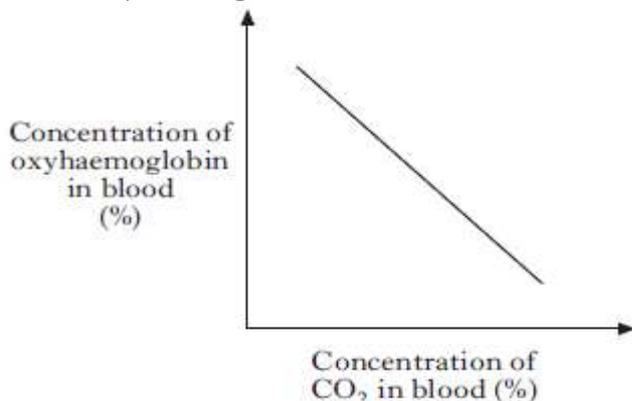
It combines with haemoglobin to form oxyhaemoglobin at (low/high) oxygen levels. (2)

6. The table below shows how altitude affects the percentage oxygen carried in blood.

<i>Altitude (metres)</i>	<i>Percentage oxygen carried in blood (%)</i>
(sea level) 0	97
2800	91
3700	85
4700	80

Use the data in the table to **explain** why a runner who lives at an altitude of 2800 metres would fatigue more quickly if racing in an event at 4700 metres. (2)

7. The graph below shows the relationship between the concentration of carbon dioxide and oxyhaemoglobin in the blood.

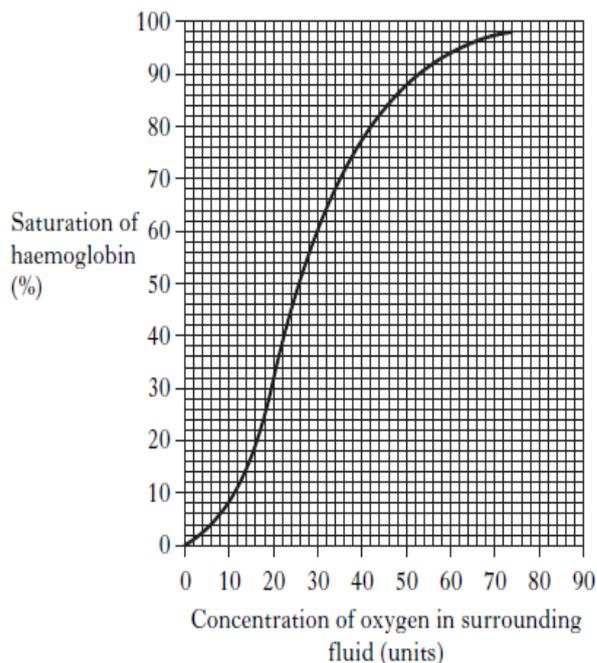


Which of the following best describes this relationship

- A As the carbon dioxide concentration decreases, the concentration of oxyhaemoglobin decreases.
- B As the carbon dioxide concentration increases, the concentration of oxyhaemoglobin decreases.
- C As the carbon dioxide concentration increases, the concentration of oxyhaemoglobin increases.
- D As the carbon dioxide concentration increases, it has no effect upon the concentration of oxyhaemoglobin.

(1)

8. The graph shows the percentage saturation of haemoglobin at different oxygen concentrations.

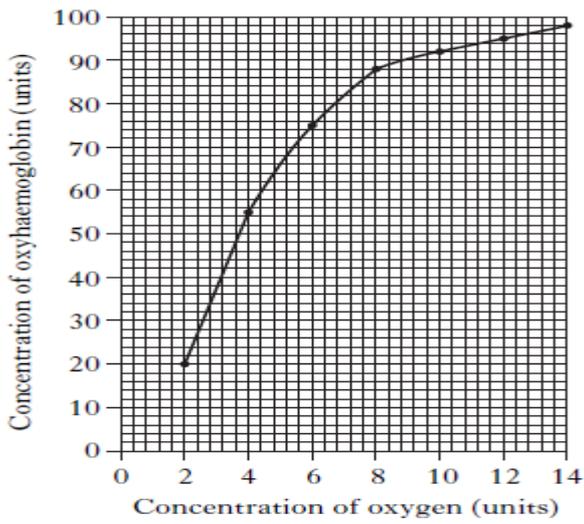


What is the percentage saturation of haemoglobin with oxygen when the oxygen concentration of the surroundings is 60 units?

- A 30
- B 90
- C 92
- D 94

(1)

9. The graph below shows the relationship between oxygen concentration and the concentration of haemoglobin.



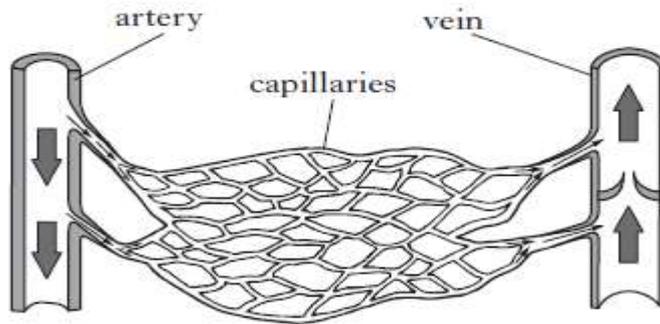
What is the percentage increase in the concentration of oxyhaemoglobin when the concentration of oxygen increases from 2 units to 4 units?

- A 2
- B 35
- C 55
- D 175

(1)

Homework 11

1. The diagram shows three types of blood vessel in the human body.



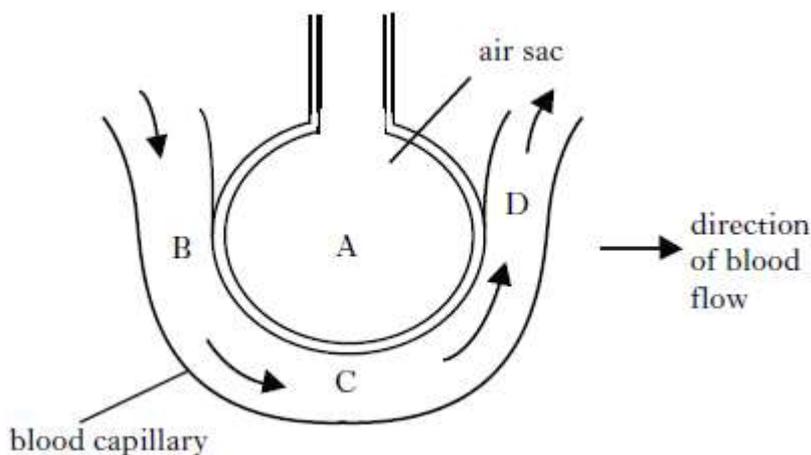
(a) For each type of blood vessel, **describe** their **structure**. (3)

(b) For each type of blood vessel, **describe** their **function**. (3)

2. (a) (i) **Name** the process by which oxygen moves from the lungs into the Blood, (1)

(ii) **State two** features of alveoli which allow efficient gas exchange. (2)

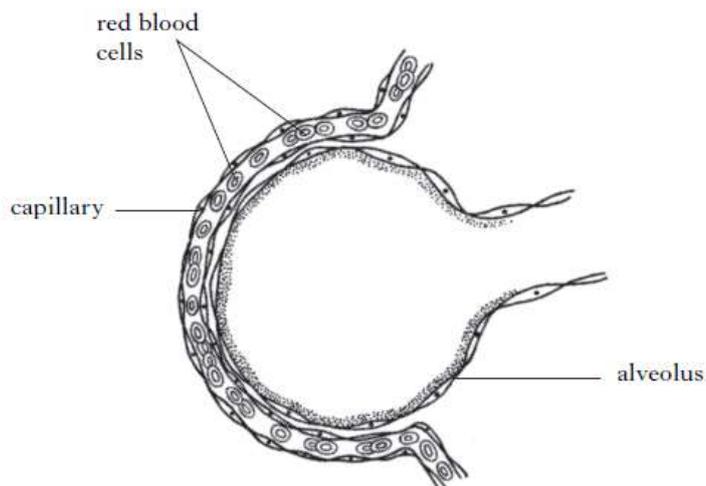
3. The diagram below shows an air sac with part of its capillary network.



At **which** position would blood with the highest concentration of oxygen be found?

(1)

4. The diagram below shows an alveolus and a capillary in the lungs where gas exchange takes place.



(a) Decide if each of the following statements about gas exchange is **True** or

False. If the statement is **False**, write the correct word(s) to replace to word underlined in the statement.

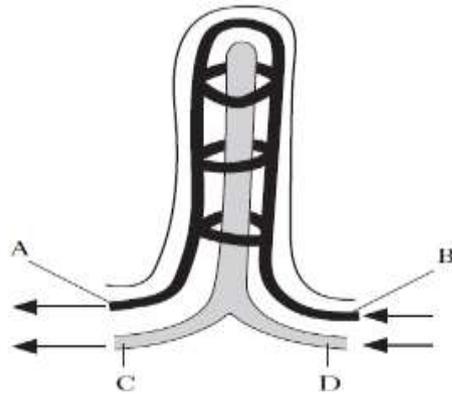
Statement	<i>True</i>	<i>False</i>	<i>Correction</i>
Lungs have a <u>large</u> surface area for efficient gas exchange.			
The thin walls of alveoli <u>slow down</u> gas exchange.			
There is a lower <u>oxygen</u> concentration in the alveoli than in the blood.			

(3)

(b) **How** is oxygen carried in the red blood cells?

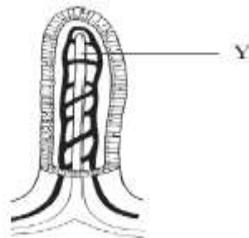
(1)

5. The diagram below represents a structure found in the small intestine.



- (a) **What** is the name of this structure? (1)
- (b) **Which** letter identifies the position of the fluid with the highest glucose content, after the absorption of digested food? (1)
- (c) **Which** letter identifies the position of the fluid with the highest fat content, after the absorption of digested food? (1)

6.



(a) **Which** food molecules are absorbed by structure Y?

- A Amino acids
- B Fatty acids
- C Glucose
- D Glycogen

(b) **Name** structure Y. (1)