

Centre No.						Paper Reference (complete below)	Surname	Initial(s)
Candidate No.							Signature	

Paper Reference(s)  
**1522/4H 1520/3H**

**Edexcel GCSE  
 Science: Double Award A [1522]**  
 Paper 4H

**Biology A [1520]**  
 Paper 3H  
**Higher Tier**

Monday 6 June 2005 – Afternoon  
 Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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**ND001183584**

Materials required for examination  
 Nil

Items included with question papers  
 Nil

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>Total</b>	

**Instructions to Candidates**

In the boxes above, write your centre number, candidate number, the paper reference, your surname, initial(s) and signature.  
 The paper reference is shown above. If more than one paper reference is shown, you should write the one for which you have been entered.  
 Answer ALL questions in the spaces provided in this book.  
 Show all stages 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 the various parts of questions are shown in round brackets, e.g.: (2).  
 This paper has ten questions. There are two blank pages.

**Advice to Candidates**



This symbol shows where the quality of your written answer will also be assessed.

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**N 2 1 2 6 9 A 0 1 2 4**

**Turn over**

**edexcel**

1. (a) (i) Smoking tobacco causes lung disease. Warnings are given on cigarette packets.

**SMOKING KILLS**

**SMOKING CAUSES  
FATAL DISEASES**

**TOBACCO SERIOUSLY DAMAGES HEALTH**

Name **two** lung diseases that can be caused by smoking tobacco.

1 .....

2 .....

(2)

(ii) Some people find it hard to stop smoking, even though they want to.

Explain why.

.....

.....

.....

(2)



(b) Drivers should not drive after drinking alcohol.



Explain the reasons for this warning.



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(4)

(Total 8 marks)

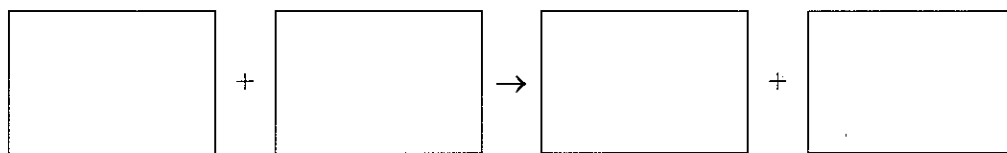
Q1

**TURN OVER FOR QUESTION 2**



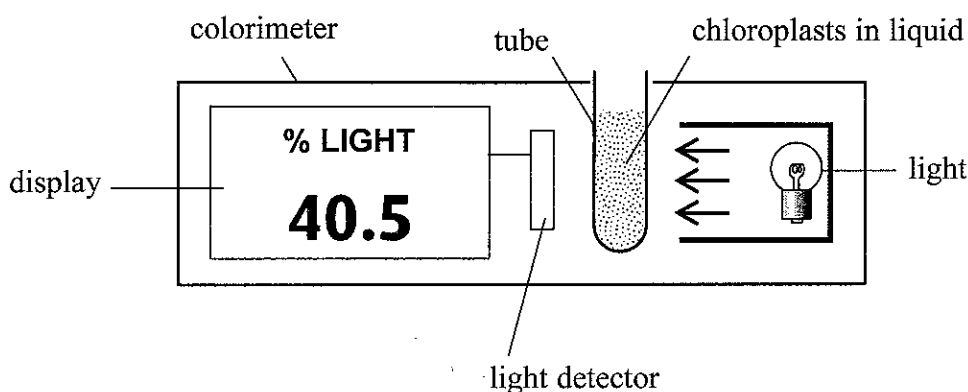
N 2 1 2 6 9 A 0 3 2 4

2. (a) Complete the word equation for photosynthesis by writing the names of the substances in the boxes below.



(2)

(b) Chloroplasts were removed from leaves and placed in a liquid that allows them to photosynthesise normally. The liquid and chloroplasts were placed in a tube then into an instrument known as a colorimeter. The light in the colorimeter was shone on the tube and the amount of light which passed through was measured. The percentage of light which passed through the tube containing chloroplasts was shown on the display.



(i) What percentage of light was absorbed by the chloroplasts and liquid?

..... (1)

(ii) What is the role of chloroplasts during photosynthesis?

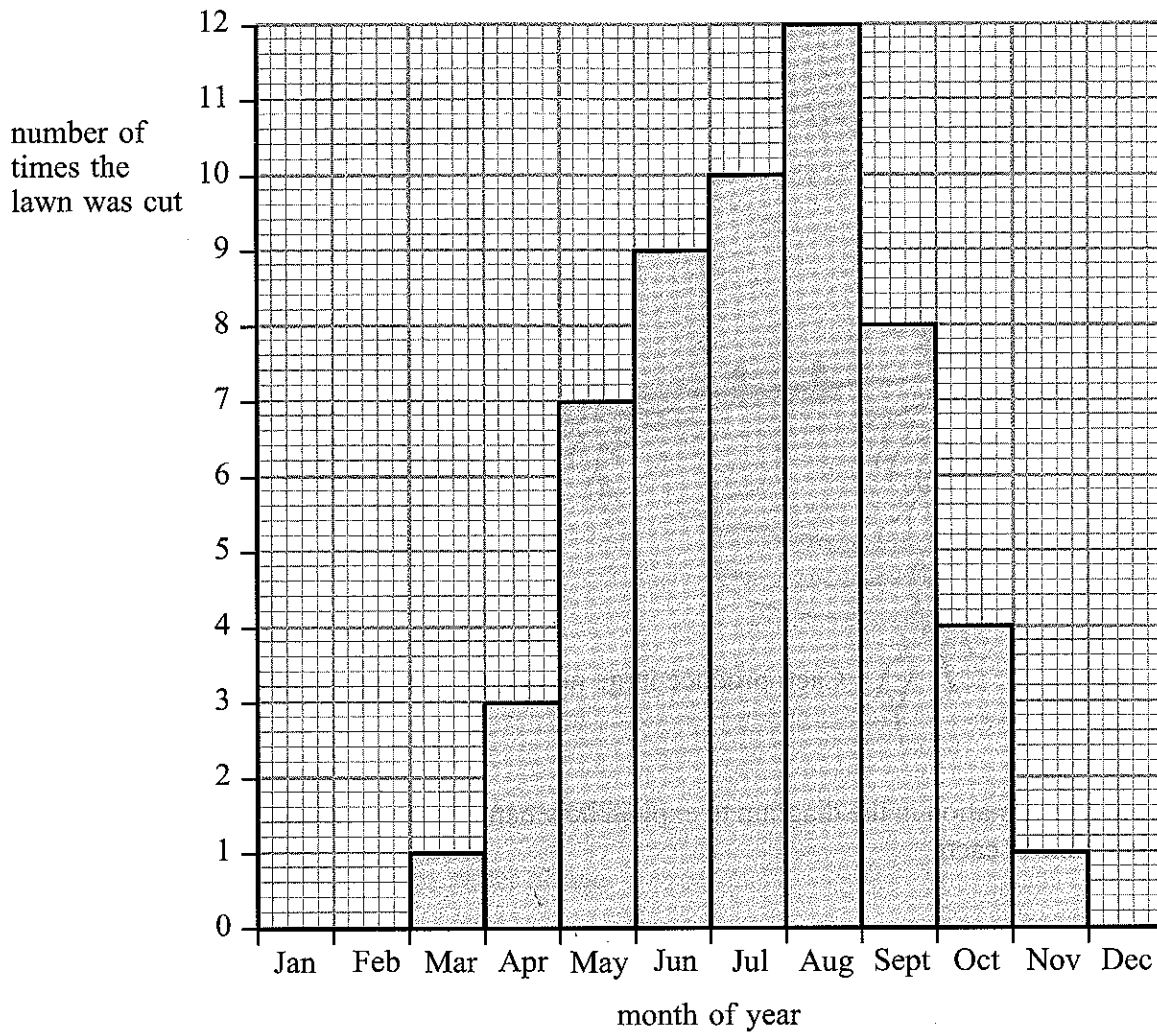
..... (1)

(c) Name **one** mineral needed for the plant to make chlorophyll.

..... (1)



(d) The bar graph shows the number of times a lawn in Britain was cut during one year.



(i) How many times was the lawn cut during the year?

.....  
(1)

(ii) Explain why it was not necessary to cut the grass in January, February and December.

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

(iii) Explain why the grass was cut most often during July and August.

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

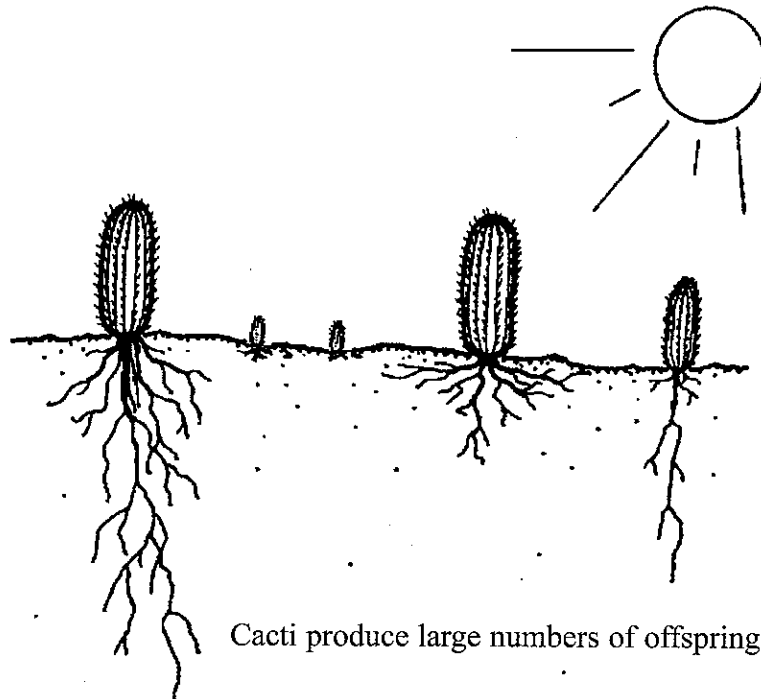
(Total 10 marks)

Q2



N 2 1 2 6 9 A 0 5 2 4

3. Cacti are plants which live in dry conditions where water is only found deep down in the soil.



- (a) Use the information in the diagram to explain how natural selection might change this population of cacti.

.....

.....

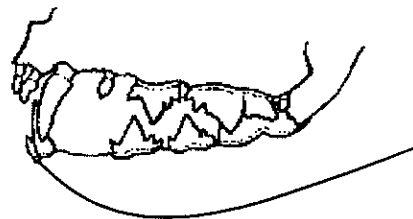
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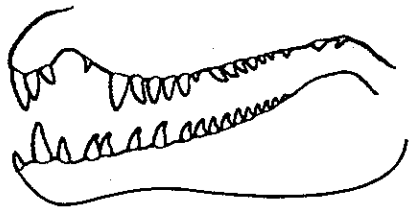
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(4)

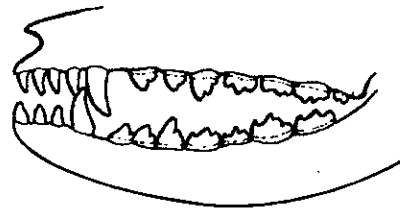
- (b) The diagram shows the jaws of a modern cat.



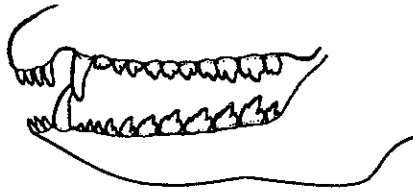
The diagrams below show jaws from four fossil skulls of extinct animals thought to be ancestors of the modern cat.



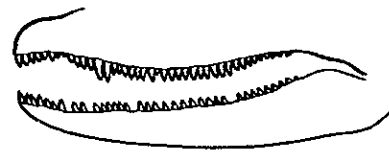
A



B



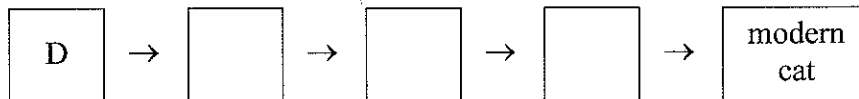
C



D

(i) D is the jaw of the oldest cat ancestor.

Put the other jaws in order of age.



(2)

(ii) Explain your answer to part (i).

.....

.....

.....

(2)

(Total 8 marks)

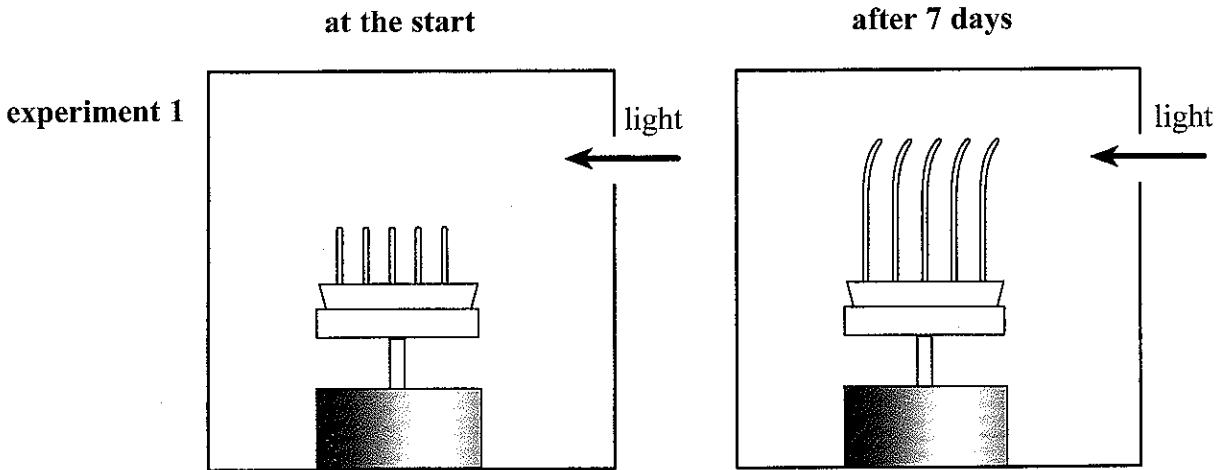
Q3

TURN OVER FOR QUESTION 4

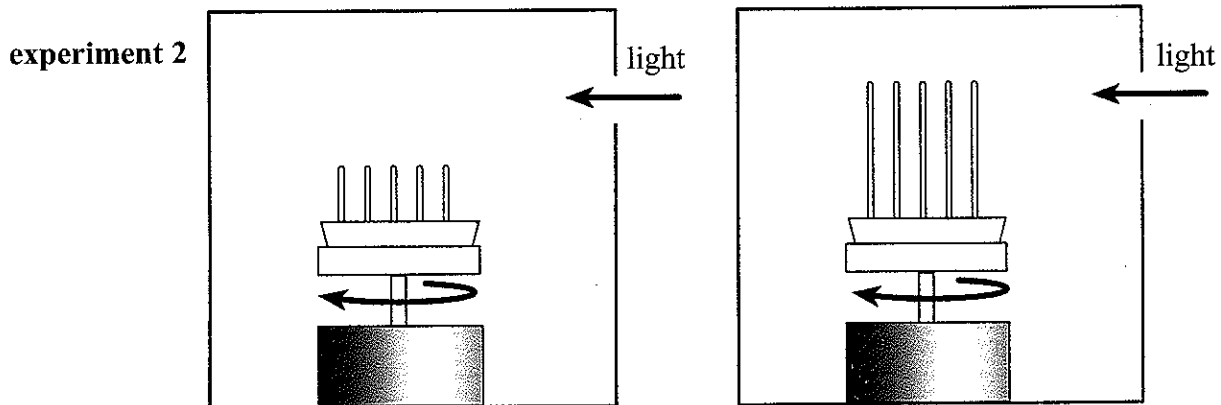


4. Mike investigated the effect of shining light onto oat seedlings growing in pots. He used a turntable which could rotate the pots. In each part of the investigation light was shone from **one side** only.

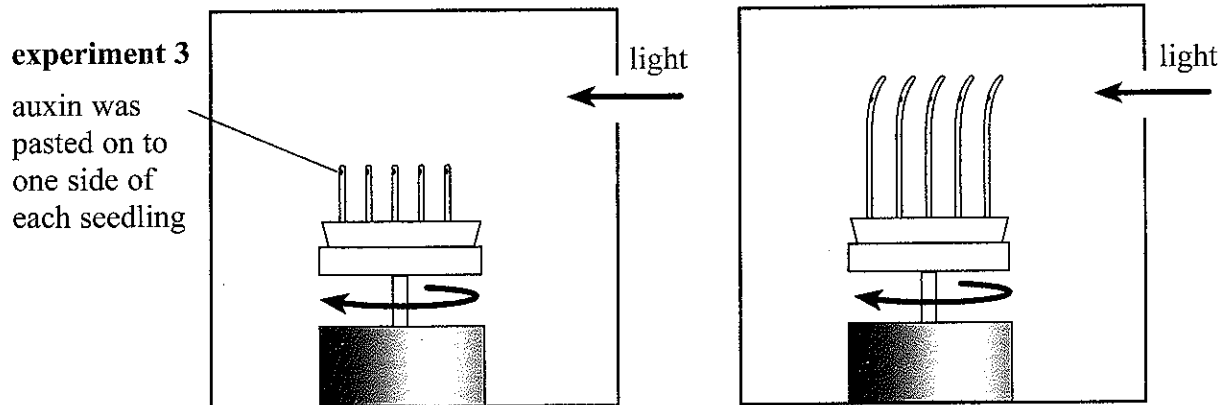
The diagram shows the apparatus at the start and the results of each experiment after seven days.



The turntable was switched off, so did not rotate.



The turntable was switched on, so it rotated.



The turntable was switched on, so it rotated.



(a) In which experiments did light shine equally on all sides of the seedlings?

..... (1)

(b) (i) Compare the differences in growth of the seedlings in experiment 1 and experiment 2.

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

(ii) Suggest an explanation for the differences.

.....  
.....  
..... (1)

(c) Describe, and give the reason for, the response of the oat seedlings in experiment 3.

description .....  
reason .....  
..... (2)

(d) Give **two** commercial applications of auxin on plants.

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

(Total 8 marks)

Q4



5. Rosalind Franklin was a scientist who worked in the 1950s.

She was trying to find out about the structure of DNA. Genes are made of DNA.



Courtesy of Cold Spring Harbor Laboratory Archives



At the same time, several other scientists including James Watson and Francis Crick, were also trying to find the structure of DNA.

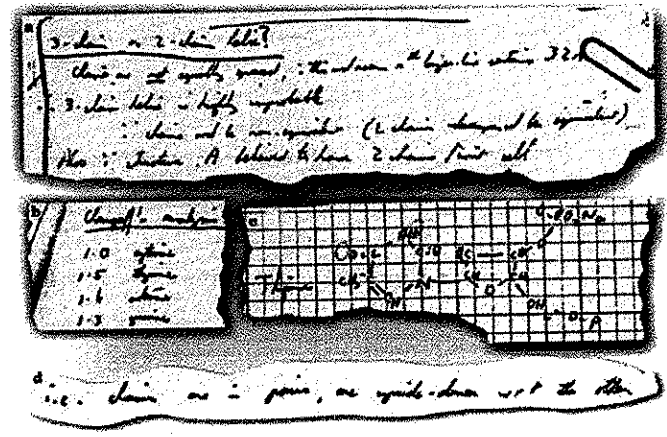
(a) Where are genes found in a cell?

.....

(1)

(b) Here are some of the notes that Rosalind Franklin made while she was working.

You do not need to be able to read them.



(i) Suggest why she repeated her experiments.

.....  
.....

(1)

(ii) Suggest **one** way in which Rosalind Franklin might have informed other scientists about her work.

.....  
.....

(1)

(c) When they heard about Rosalind Franklin's work, Watson and Crick thought that they had made a mistake in their own work.

(i) Suggest **two** things that a scientist could do to find out if there is a mistake in their work.

1 .....

2 .....

(2)

(ii) Many people think that Watson and Crick would not have found out the structure of DNA if Rosalind Franklin had not been doing similar work.

Suggest **two** ways in which her work may have helped them.

1 .....

2 .....

(2)

(Total 7 marks)

Q5

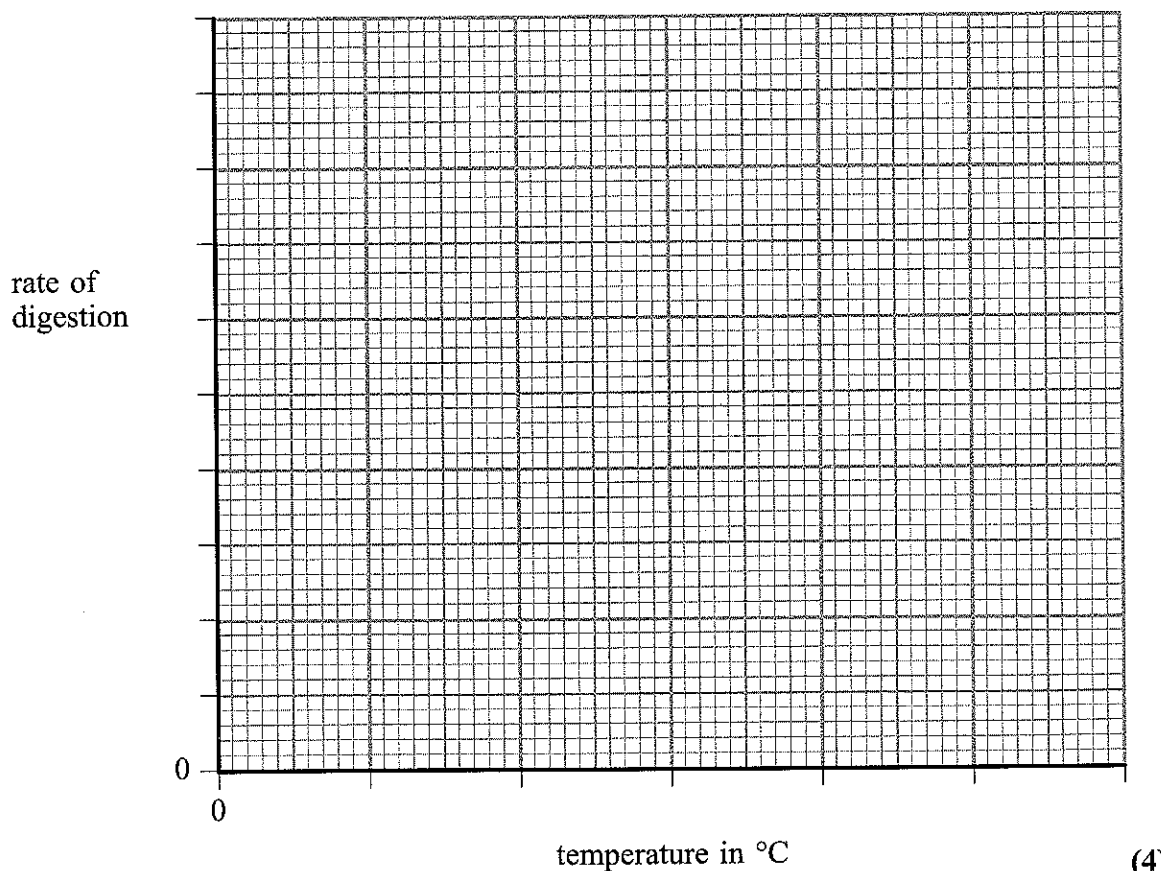
TURN OVER FOR QUESTION 6



6. A student investigated the rate at which the enzyme amylase digests starch solution. She repeated her experiment at six different temperatures. She timed how long it took for the same amount of starch to be digested at each temperature. She then worked out the rate of digestion. The results are shown in the table.

temperature (°C)	time taken for starch to be digested (minutes)	rate of digestion (1/minutes)
10	5.0	$\frac{1}{5.0} = 0.2$
25	1.7	$\frac{1}{1.7} = 0.59$
30	1.2	$\frac{1}{1.2} = 0.83$
40	1.0	$\frac{1}{1.0} = 1.0$
55	2.0	$\frac{1}{2.0} = 0.5$
60	10.0	

- (a) Complete the table. (2)
- (b) Use the grid to draw a graph of the rate of digestion against temperature.



(c) (i) At which temperature was starch broken down fastest?

.....°C  
(1)

(ii) Use your graph to estimate the rate of starch breakdown at 35°C.

.....  
(1)

(d) Use the graph to help you explain the effect of temperature on enzyme activity.



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

(5)

(Total 13 marks)

Q6

**TURN OVER FOR QUESTION 7**



N 2 1 2 6 9 A 0 1 3 2 4

7. Explain the **differences** between

(a) phenotype and genotype

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

(2)

(b) vasodilation and vasoconstriction

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

(2)

(c) antibiotics and antibodies

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

(2)

**(Total 6 marks)**

Q7

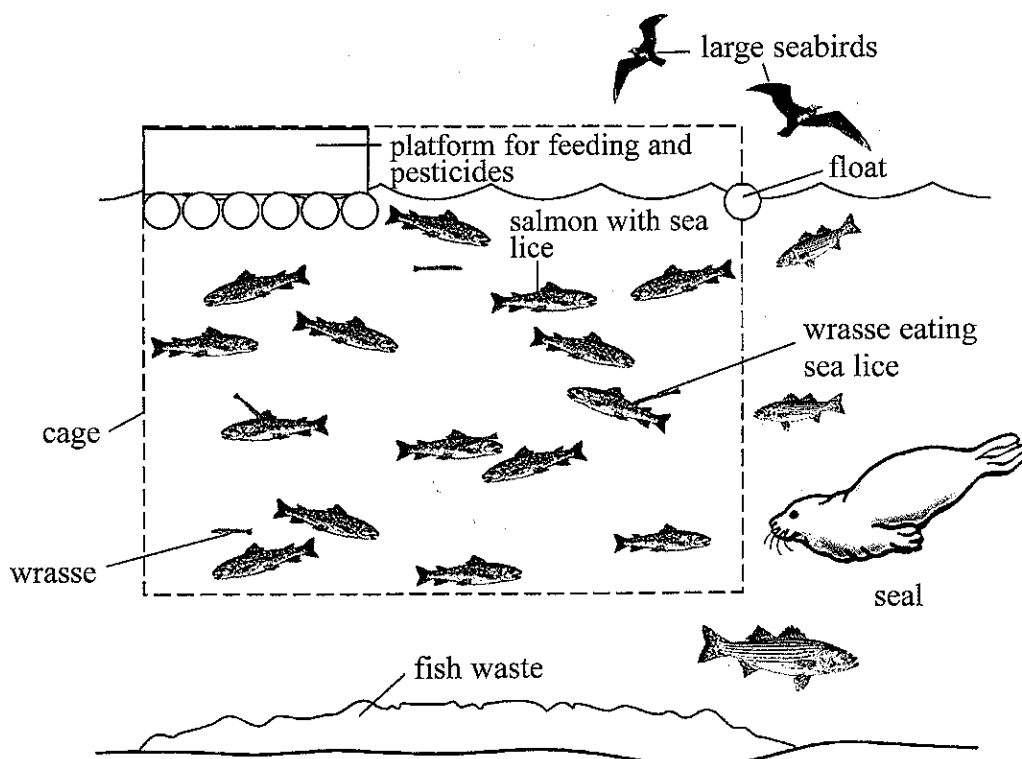


8. The Tasty Salmon Company farms salmon in the sea off the UK coast. The company aims to produce the maximum amount of good quality fish by

- supplying the best food and conditions for rapid growth
- prevention of pests and diseases
- control of predators

Salmon are damaged by sea lice which stick to their bodies. Wrasse are fish which eat sea lice.

The salmon are fed on high protein, high oil content food which contains fish oil and fishmeal made by processing pilchards caught off the South American coast. These pilchards feed on plankton and, are themselves the food of bigger fish and seabirds. The diagram shows a fish cage at the Tasty Salmon fish farm.



Use the information above and your own knowledge to answer the following questions.

(a) Explain how the Tasty Salmon Company produces the maximum amount of good quality salmon.

.....

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.....

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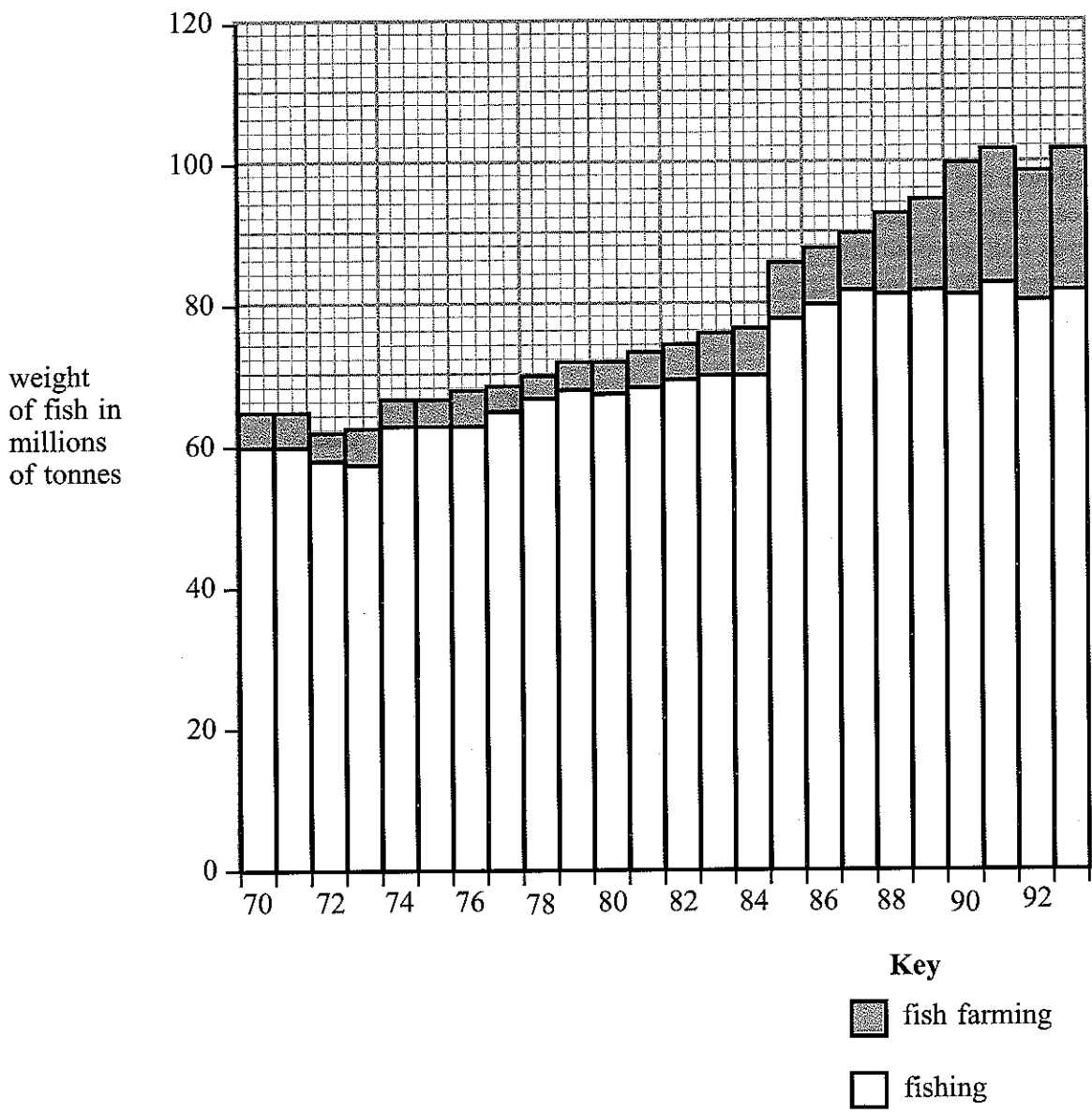
.....

.....

(6)



(b) The bar graph shows world fish production from fishing of wild fish and fish farming between 1970 and 1993.



Explain the information shown in the graph about fishing for wild fish and fish farms between 1970 and 1993.

.....

.....

.....

(2)





(c) The company released a statement: "Wild salmon numbers are now very low. We see the work of the Tasty Salmon Company as being vital. While we supply our fish to the public, reduced fishing will enable breeding stocks of wild salmon to recover. The Tasty Salmon Company is responsible and a friend to the environment."

The Tasty Salmon Company claims to be 'a friend to the environment'.

Explain, giving evidence, **one** reason **for** this claim and **one** reason **against** this claim.

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

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

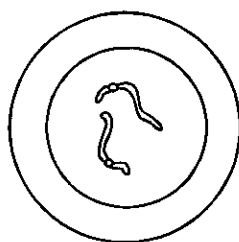
(Total 12 marks)

Q8

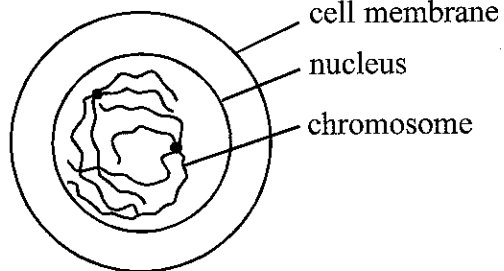
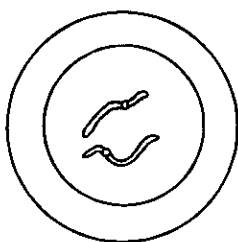
TURN OVER FOR QUESTION 9



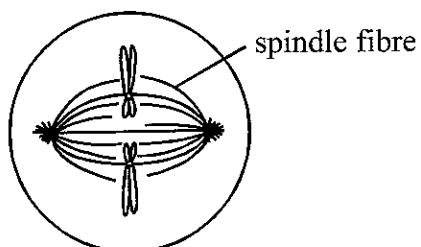
9. The diagrams show stages in mitosis. The stages are in the wrong order.



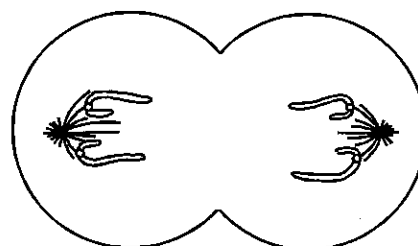
A



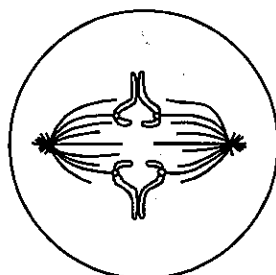
B



C



D



E

(a) Complete the table to show the correct order in which these stages occur.

The first one has been done for you.

number	1	2	3	4	5
letter	B				

(3)



(b) Give **two** ways in which mitosis differs from meiosis.

1 .....

.....

2 .....

.....

(2)

(c) Explain the importance of meiosis to living organisms.

.....

.....

.....

(2)

Q9

(Total 7 marks)

**TURN OVER FOR QUESTION 10**



10. The Human Genome Project was set up to map the sequences of bases for every human gene. The sequences of bases below, each found at the same position along a chromosome, are part of the **same gene** in six different people.

GCC TTA TTC CCG CTG CAT	} <b>P</b> (normal sequence for this gene)	<b>Key</b> A = adenine C = cytosine G = guanine T = thymine
GCC TTA TTC CCG CTG CAT		
GCC TTA TTC CCG CTG CAT		
GCC TTA TTC CCG CTG CAT		
GCC TTA TTC CCG CTG CAT		
GCC TTA TTC CCG CGG CAT	} <b>Q</b> (different sequence for this gene)	

(a) (i) Describe the difference between sequence **P** and sequence **Q**.

..... (1)

(ii) What term is given to a change in the base sequence along a molecule of DNA?

..... (1)

(iii) Suggest what may cause a change in DNA to take place.

..... (1)

(iv) Complete the boxes below to show the **base pairs** along a double strand of the DNA of sequence **Q**.

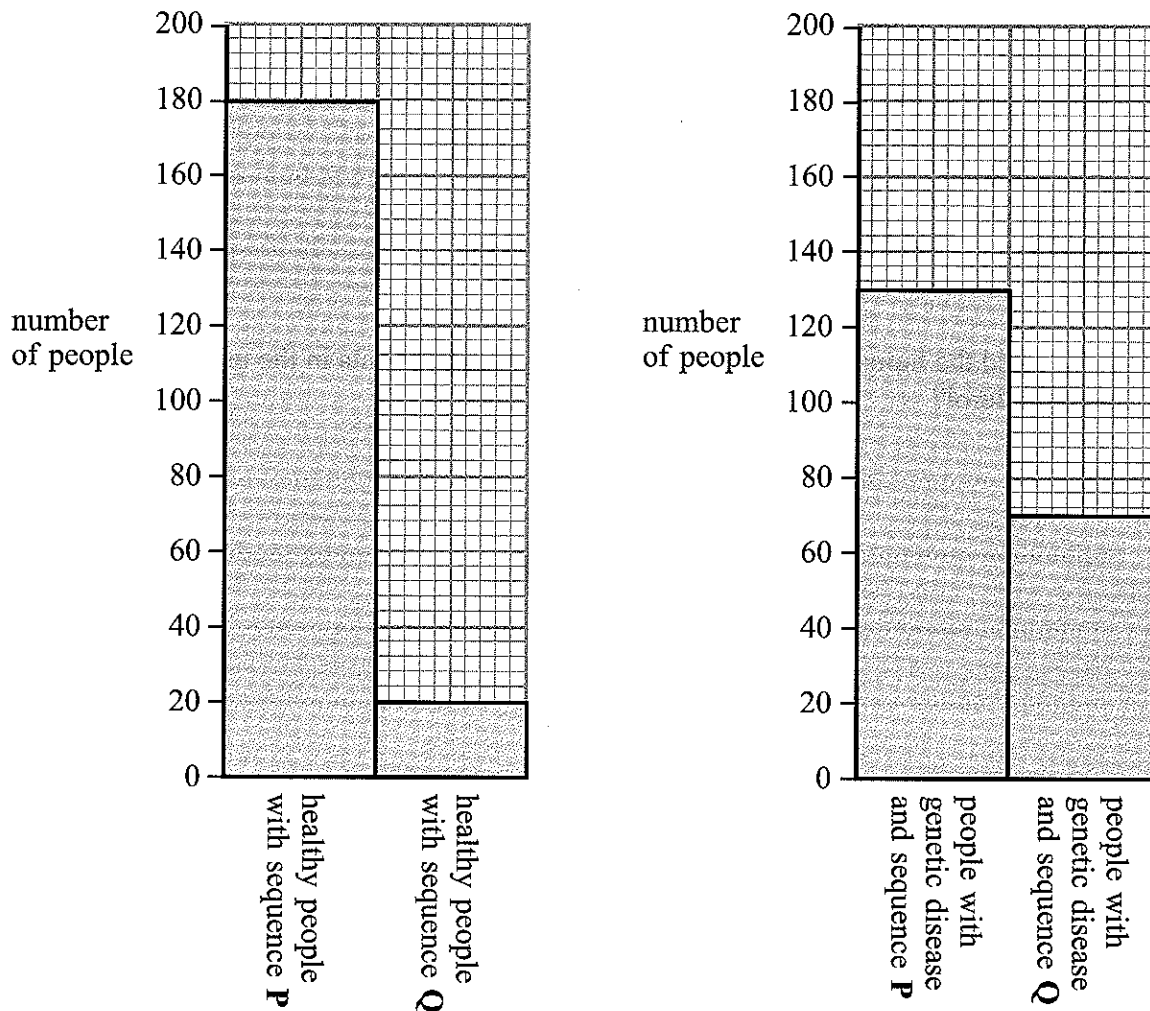
base pairs {	G	C	C	T	T	A	T	T	C	C	C	G	C	G	G	C	A	T
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(2)



- (b) The presence of sequences **P** or **Q** was investigated in two groups of people, one a group of 200 healthy people and the other a group of 200 people who all had the same genetic disease.

The results are shown in the bar graph.



- (i) Calculate the percentage of people in the group with genetic disease, who also had base sequence **Q**.

.....  
 .....

(2)

- (ii) How do the results suggest that base sequence **Q** is part of the cause of the genetic disease?

.....  
 .....

(1)



(c) Genes control the production of specific proteins.

- Albuterol is a drug which can help some people who suffer from asthma.
- The drug acts on a specific protein in the smooth muscle of bronchial tubes.
- The drug is only effective in asthmatics who produce this protein.
- Other asthmatics have a different base sequence for the gene.

(i) Explain why some asthmatics do not respond to Albuterol.

.....  
.....

(1)

(ii) How could the human Genome Project lead to improvements in the use of drugs like Albuterol?

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(2)

Q10

(Total 11 marks)

**TOTAL FOR PAPER: 90 MARKS**

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