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

Paper Reference(s)

6BI02/1

Edexcel GCE

Biology

Unit 2: Development, Plants & the Environment

Specimen Assessment Material

Time: 1 hour 15 minutes

Examiner's use only

Team Leader's use only

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

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Do not use pencil. Use blue or black ink.
Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (~~☒~~) and then mark your new answer with a cross (☒).

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 8 questions in this question paper. The total mark for this paper is 80.
There are 20 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, including your use of grammar, punctuation and spelling.
Answers should be given in a correct biological context.

Printer's Log. No.
N32917A
W850/XXXX/57570 2/2/2

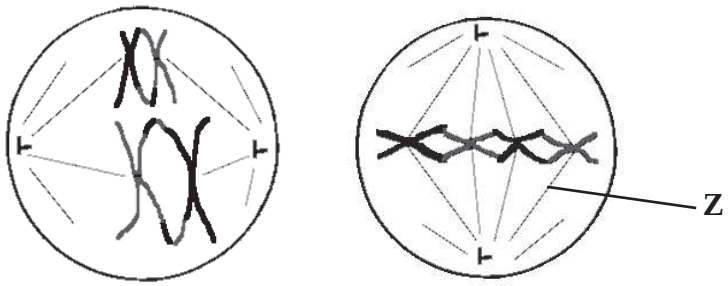
N 3 2 9 1 7 A 0 1 2 0

Turn over

edexcel
advancing learning, changing lives

Leave blank

1. (a) The diagrams **A** and **B** below show cells from the same organism. Both cells are in the same stage of nuclear division. One cell is undergoing mitosis and the other cell is undergoing meiosis.



A **B**

(i) Which cell is undergoing mitosis? Put a cross in the correct box.

A ☒ **B** ☒

(1)

(ii) Give the name of the structure labelled **Z**.

.....

(1)

(iii) Name the stage of mitosis shown.

.....

(1)

(b) Describe how you would prepare cells in order to observe mitosis.

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(Total 7 marks)

Q1

Leave blank

2. (a) Independent assortment and crossing over both result in genetic variation.

(i) Explain how independent assortment leads to genetic variation.

.....

.....

.....

.....

(2)

(ii) Describe how crossing over further increases genetic variation.

.....

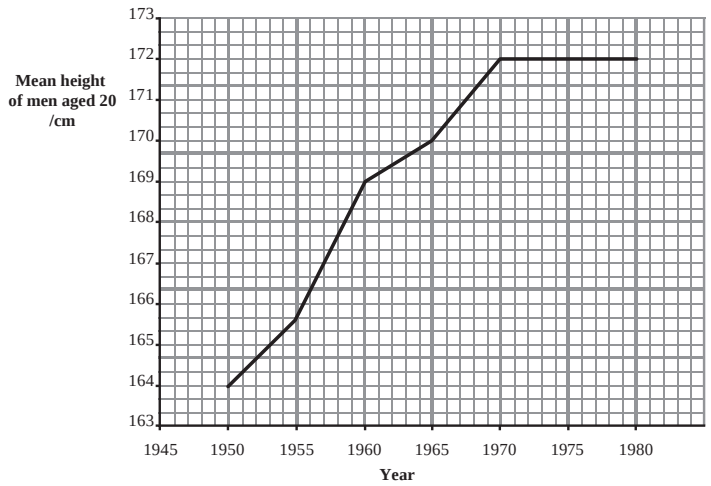
.....

.....

.....

(2)

(b) The graph below shows changes in mean height of men in Japan from 1950 to 1980.



Describe the changes in height between 1950 and 1980.

.....

.....

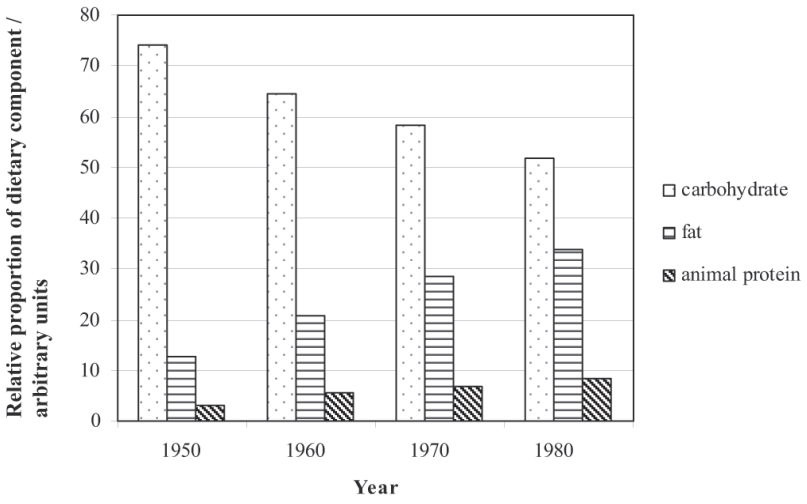
.....

.....

(2)

Leave blank

(c) The graph below shows changes in the major components of the diet of men in Japan over the same period.



The evidence from both graphs suggests that a combination of genetic and environmental factors influence the height of men in Japan. Give an explanation for this.

.....

.....

.....

.....

.....

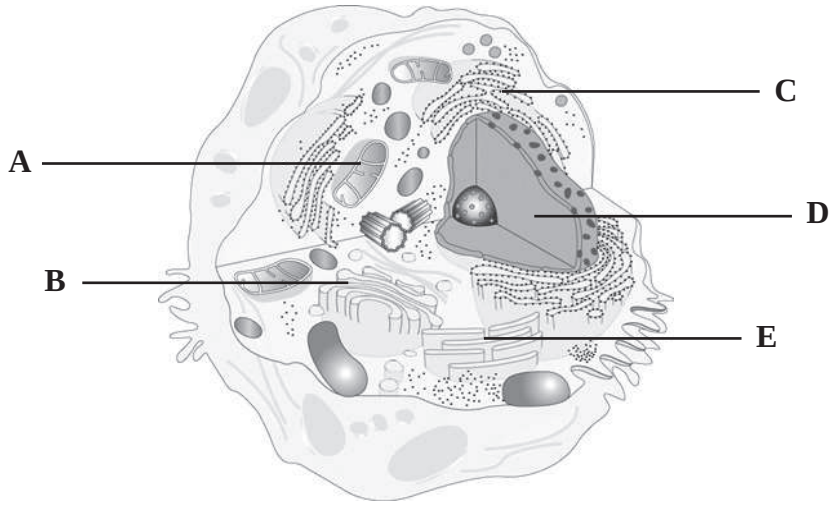
.....

(4) **Q2**

(Total 10 marks)

Leave blank

3. (a) The diagram below shows a view through a typical animal cell.



The table below lists three organelles. Put a cross in the box to match each organelle with the correct letter shown on the diagram.

Organelle	A	B	C	D	E
Rough endoplasmic reticulum	☒	☒	☒	☒	☒
Mitochondrion	☒	☒	☒	☒	☒
Golgi apparatus	☒	☒	☒	☒	☒

(3)

(b) For some time after the Golgi apparatus was identified, there was doubt as to whether it was a new and separate organelle. Explain how the Golgi apparatus could be confused with other organelles within a cell.

.....

.....

.....

.....

.....

.....

(3)

Leave blank

(c) In an experiment to investigate the role of organelles in protein transport, cells were given radioactively-labelled amino acids for a fixed period of time. The percentage of the radioactivity found in four different organelles was then measured at different time intervals. The table below shows the results.

Time after adding radioactively-labelled amino acid / min	Radioactivity present / %			
	Rough endoplasmic reticulum	Golgi apparatus	Secretory vesicles	Mitochondria
4	67	27	1	3
6	53	39	2	1
20	11	73	10	3
240	11	10	73	2

(i) The data provide evidence that the Golgi apparatus is a separate organelle. Suggest an explanation for this.

.....

.....

.....

.....

(2)

(ii) Explain how the data provide evidence for the sequence of events in the process of protein transport in these cells.

.....

.....

.....

.....

.....

.....

.....

.....

(4)

Leave blank

(iii) Suggest **one** reason for the presence of some radioactivity detected in the mitochondria.

.....

.....

(1)

Q3

(Total 13 marks)

Leave blank

4. (a) Three structures found in mammalian sperm cells are described in the table below. Give the name of each structure being described.

Description	Structure
Releases digestive enzymes to penetrate egg	
Allows the sperm to swim to the egg cell	
Provides the energy required for swimming	

(3)

(b) Give the term that describes the ability of a stem cell from an embryo to produce **all** cell types.

.....

(1)

(c) Describe how a cell loses the ability to produce other cell types and becomes specialised.

.....

.....

.....

.....

.....

.....

(3)

Leave blank

(d) Embryos have been produced from human egg cells which have not been fertilised by sperm. These embryos never survive past a few days. This is because some of the genes needed for development are only active in chromosomes from the sperm.

It has been suggested that there will be less opposition to the medical use of stem cells from these embryos than from normal embryos. Suggest reasons for this.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

Q4

(Total 10 marks)

Leave blank

5. Taxonomy is the branch of biology concerned with the classification of organisms. In the taxonomic system first developed by Linnaeus, organisms are given a two-part Latin name.

(a) State **one** advantage of the binomial system developed by Linnaeus.

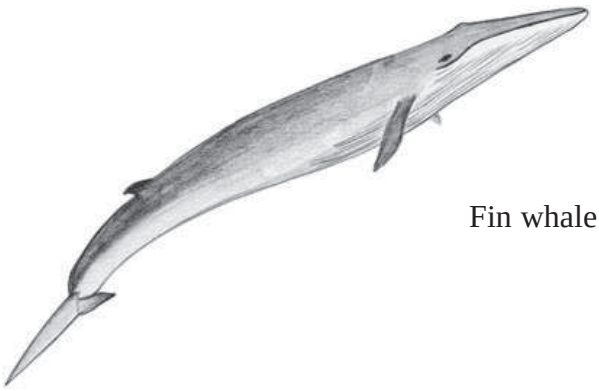
.....

.....

.....

(1)

(b) The table below shows the classification of the blue whale, *Balaenoptera musculus* together with some of the classification of the fin whale, *Balaenoptera physalus*.



Fin whale

Complete the table by suggesting appropriate names for the class, order and family of the fin whale.

Classification taxon	Blue whale	Fin whale
Kingdom	Animalia	Animalia
Phylum	Chordata	Chordata
Class	Mammalia	
Order	Cetacea	
Family	Balaenopteridae	
Genus	*Balaenoptera*	*Balaenoptera*
Species	*Balaenoptera musculus*	*Balaenoptera physalus*

(1)

Leave blank

(c) Below are four features, **A**, **B**, **C** and **D**, used in the classification of organisms. Put a cross in the box or boxes next to the features which are shared by both blue whales and fin whales.

☒ **A** – feed by heterotrophism on organic material

☒ **B** – multicellular

☒ **C** – cells surrounded by cell wall

☒ **D** – cytoplasm of cells contain circular DNA

(2)

(d) Suggest reasons for the classification of the blue whale and the fin whale within the same genus, *Balaenoptera*, but as different species.

.....

.....

.....

.....

.....

.....

(3)

Q5

(Total 7 marks)

Leave blank

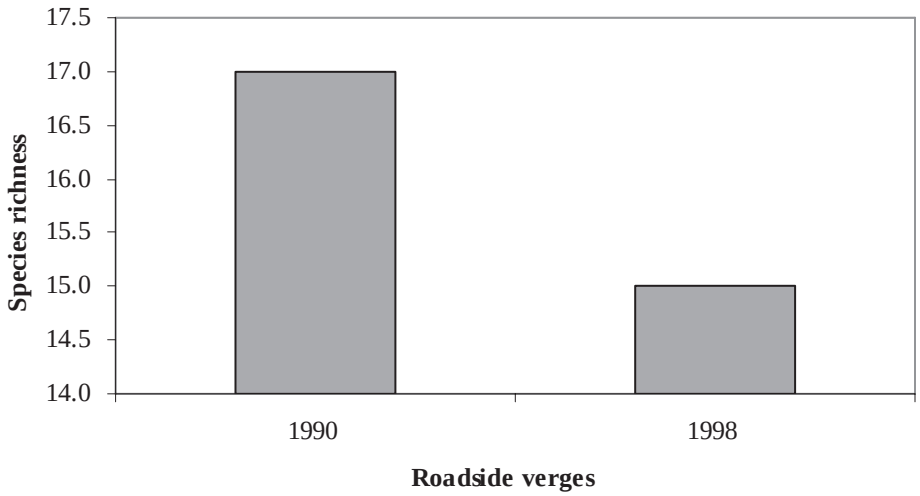
6. (a) State what is meant by the term **species richness**.

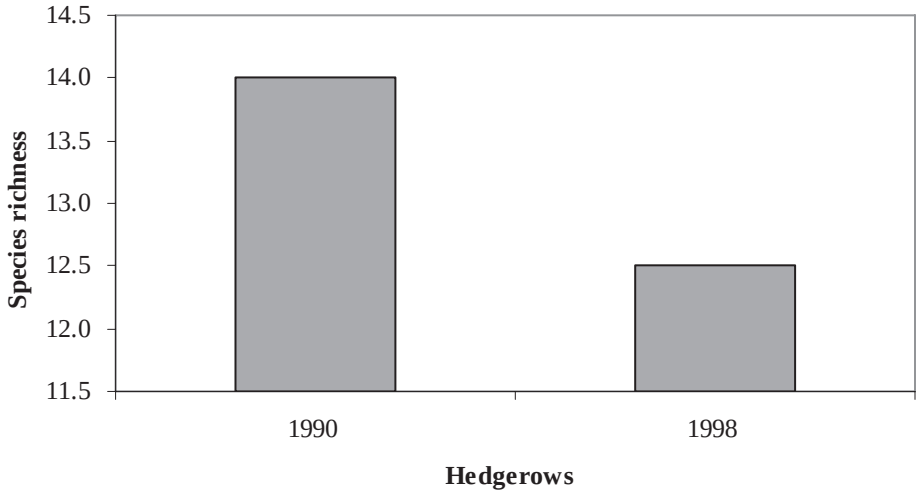
.....

.....

(1)

(b) In a survey, the mean species richness for the vegetation found in roadside verges and hedgerows in England and Wales was measured in 1990 and again in 1998. The results of this survey are shown in the graphs below.





Leave blank

Compare the species richness shown by the survey for the vegetation in the roadside verges with that of the hedgerows over this study period.

.....

.....

.....

.....

.....

.....

(3)

(c) Other information would be needed, in addition to species richness, to measure the biodiversity of the vegetation in the two types of habitat. Give an explanation for this.

.....

.....

.....

.....

.....

.....

(3)

Leave blank

(d) Seed banks, such as the Millennium Seed Bank Project (MSBP), are an effective means of conserving plant species.

Write a short briefing, intended for a government committee, describing how seed banks work and why their funding should be continued.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5)

Q6

(Total 12 marks)

Leave blank

7. Sisal is a material used to make rope. It is made from the sclerenchyma fibres found in the leaves of the plant, *Agave sisalana*.

After extraction of the fibres, the waste leaf material can be used in the production of organic fertiliser.

The four countries that produce most of the world's sisal are Brazil, Kenya, Tanzania and Madagascar. The table below shows the annual harvest of freshly-cut *Agave sisalana* leaves together with the total annual production of sisal.

Country	**Annual harvest of freshly-cut leaves / tonnes x 10^3**	**Annual production of sisal / tonnes x 10^3**
Brazil	995	199
Kenya	196	40
Tanzania	145	28
Madagascar	96	20
TOTAL	**1432**	

(a) (i) Complete the table to show the total annual production of sisal.

(1)

(ii) Calculate the total percentage of sisal produced from freshly-cut leaves. Show your working.

Answer ..... %

(2)

Leave blank

(b) Nylon is a synthetic (man-made) fibre which can be used to make ropes. Nylon ropes are lighter and stronger than those made using sisal. Suggest **two** advantages of using sisal rather than nylon to make ropes.

1 .....

.....

2 .....

.....

(2)

(c) (i) Explain what is meant by the term **tensile strength** of a fibre.

.....

.....

(1)

(ii) Suggest how you could carry out a practical investigation to compare the tensile strength of sisal and nylon fibres.

.....

.....

.....

.....

.....

.....

.....

.....

(4)

Leave blank

(d) Describe **two** ways in which the structure of xylem vessels is similar to that of sclerenchyma fibres.

1 .....

.....

2 .....

.....

(2)

Q7

(Total 12 marks)

Leave blank

8. (a) Below are four cell structures **A**, **B**, **C** and **D**. Place a cross in the box next to each structure found **only in plant cells**.

☒ **A** plasmodesmata

☒ **B** ribosome

☒ **C** tonoplast

☒ **D** chromosome

(2)

(b) The list below shows some organelles found in eukaryotic cells.

amyloplast **centriole** **chloroplast**

lysosome **mitochondrion** **nucleus** **ribosome**

Complete the table by choosing the correct organelle to match each description.

Organelle	Description
	Has a smooth outer membrane and a folded inner membrane
	Contains a starch granule enclosed by a membrane
	Spherical sac formed from a single membrane and containing enzymes

(3)

Leave blank

(c) Describe the structure of a cellulose microfibril.

.....

.....

.....

.....

.....

.....

.....

.....

(4) **Q8**

(Total 9 marks)

TOTAL FOR PAPER: 80 MARKS

END