

**ADVANCED GCE****BIOLOGY**

Growth, Development and Reproduction

2805/01

Candidates answer on the question paper

OCR Supplied Materials:

None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 17 June 2009**Afternoon****Duration:** 1 hour 30 minutesCandidate
ForenameCandidate
Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **90**.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **16** pages. Any blank pages are indicated.

FOR EXAMINER'S USE

Qu.	Max	Mark
1	15	
2	14	
3	16	
4	19	
5	16	
6	10	
TOTAL	90	

Answer **all** the questions.

1 (a) Many aspects of metabolism are controlled by homeostatic mechanisms.

(i) Explain what is meant by a *homeostatic mechanism*.

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..... [2]

(ii) Describe **one** example of a homeostatic mechanism involved in the control of the human menstrual cycle.

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..... [2]

(b) As more women delay having children until they are older, an increasing number are experiencing problems with their fertility.

(i) Suggest why women may experience problems with their fertility as they get older.

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..... [2]

- (ii) It was reported recently that *in vitro fertilisation* (IVF) in women between 40 and 45 years of age has increased more than ten-fold.

Describe the procedure for carrying out IVF.

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..... [5]

- (iii) Attempts have been made to develop methods that could extend the age at which women remain fertile.

Discuss **two** problems that could occur if this became possible.

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2

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..... [4]

[Total: 15]

- 2 (a) Fig. 2.1 shows a longitudinal section of a fertilised ovule of shepherd's purse, *Capsella bursa-pastoris*, containing a developing embryo.

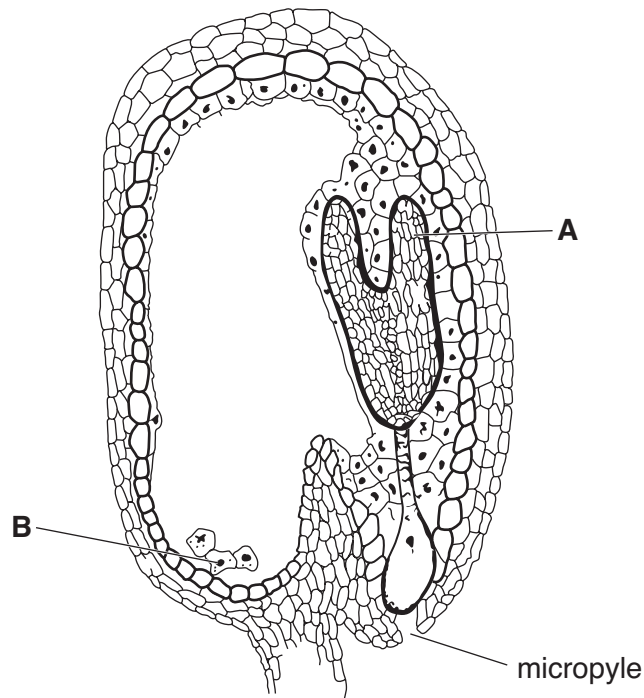


Fig. 2.1

- (i) State what is meant by a *longitudinal section*.

.....
 [1]

- (ii) Name the structure marked **A** on Fig. 2.1 and describe how it developed from the zygote.

name of structure A

how structure A developed from the zygote

.....

 [4]

- (iii) State how many **sets** of chromosome are found in the cell labelled **B** on Fig. 2.1.

..... [1]

- (iv) Describe how you would prepare slides to investigate embryo **development** in a plant such as shepherd's purse.

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..... [5]

- (b) Explain the importance of the micropyle before fertilisation **and** during germination.

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..... [3]

[Total: 14]

- 3 (a)** The nucleus **and** mitochondria in a cell contain DNA.

In humans, mitochondrial DNA is known as mtDNA. Unlike nuclear DNA, mtDNA is usually passed from one generation to another by the female gamete only.

- (i)** Explain why mtDNA is usually passed on to the next generation by the female gamete only.

.....

 [2]

- (ii)** Suggest the function of mtDNA.

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 [2]

- (b)** Sheep may be cloned by using an oocyte from one sheep and a somatic (body) cell from a different sheep.

The nucleus of the oocyte is removed and replaced with the nucleus of the body cell.

The oocyte grows into a cloned sheep that appears to be identical to the sheep that donated the body cell.

- (i)** Explain why the cloned sheep appears to be identical to the sheep that donated the body cell.

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 [2]

- (ii)** Evidence has suggested that cloned sheep age prematurely.

Suggest why these cloned sheep may age prematurely.

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 [2]

[7]

Turn over

- 4 The thyroid gland is made up of follicles lined with endocrine epithelial cells. Fig. 4.1 is a diagram of a transverse section through the thyroid gland.

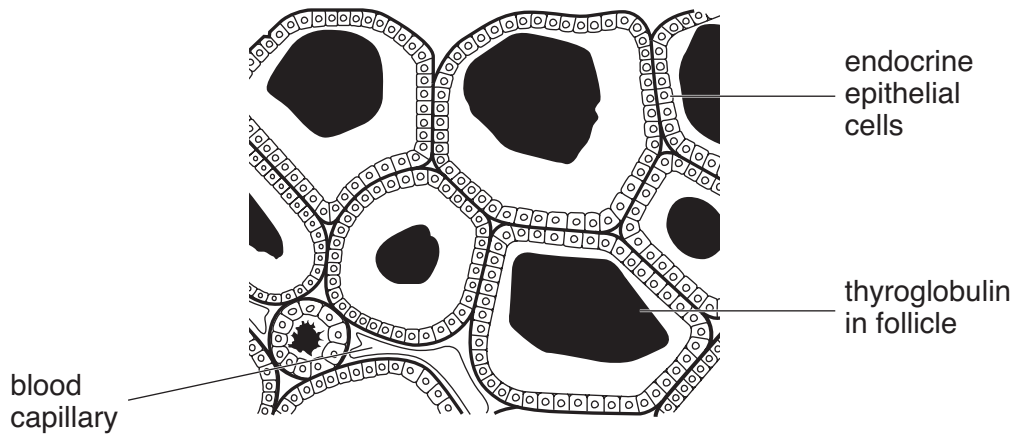


Fig. 4.1

- (a) Thyroxine is stored in the lumen of the follicles as thyroglobulin.

Thyroglobulin is a large glycoprotein molecule containing iodine.

- (i) Explain why it is an advantage to store thyroxine as thyroglobulin.

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..... [2]

- (ii) Epithelial cells of the follicles use active transport to take up iodine ions from the blood.

Describe how active transport moves iodine ions from the blood into an epithelial cell.

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..... [4]

(b) When the thyroid gland is stimulated to release thyroxine into the blood, epithelial cells of the follicle take up the thyroglobulin from the lumen by pinocytosis (endocytosis).

(i) Name the hormone that stimulates the secretion of thyroxine into the blood.

..... [1]

(ii) Explain why pinocytosis is the most suitable method for the epithelial cells to take up thyroglobulin.

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..... [2]

(iii) Thyroxine is then released from the thyroglobulin molecules by enzyme action.

Suggest the type of enzyme **and** the type of reaction used to release thyroxine from the thyroglobulin molecule.

type of enzyme

type of reaction [2]

QUESTION 4(c) STARTS ON PAGE 10

- (c) An underactive thyroid gland causes a condition known as hypothyroidism.

Hypothyroidism may be associated with an enlarged thyroid gland. This produces a swelling in the neck known as a goitre.

These goitres are endemic in some countries, and investigations have been carried out to reduce their prevalence, particularly in children.

The results of one of these investigations are shown in Table 4.1.

Table 4.1

country	prevalence of goitre in children / %	
	before using salt containing iodine	after using salt containing iodine
P	27	14
Q	25	10
R	6	5
S	49	21

- (i) Describe **and** explain the results shown in Table 4.1.

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..... [4]

- (ii) State **two other** symptoms that could be associated with hypothyroidism in children.

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..... [2]

- (iii) Suggest why hypothyroidism may be associated with an enlarged thyroid gland.

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..... [2]

[Total: 19]

- 5 Fig. 5.1 shows a scanning electron micrograph of a transverse section of the xylem vessels of the sage plant, *Salvia officinalis*.

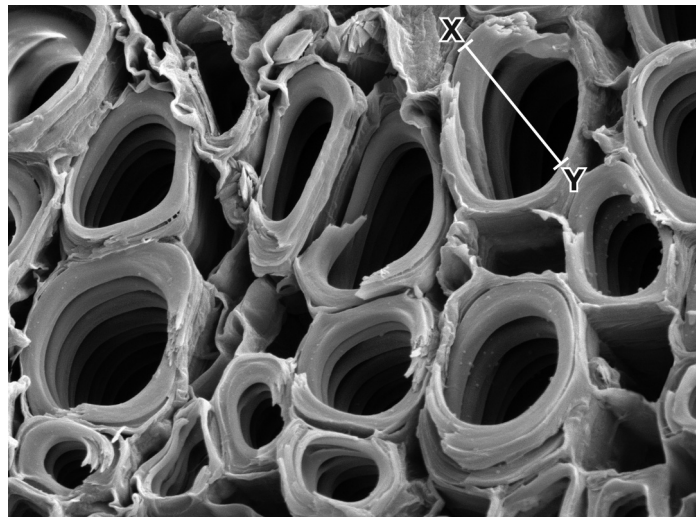


Fig. 5.1

- (a) (i) The line X to Y on Fig. 5.1 measures the diameter of the xylem vessel as $50\mu\text{m}$.

Calculate the magnification of Fig. 5.1.

Show your working and give your answer to the **nearest whole number**.

Answer = x [2]

- (ii) You have been asked to calculate the *magnification* of Fig. 5.1.

Explain the difference between the terms *resolution* and *magnification*.

..... [2]

- (b)** In this question, one mark is available for the quality of spelling, punctuation and grammar.

The xylem vessel develops from a meristematic cell at the apex of the growing shoot.

Describe the sequence of events as meristematic cells at the apex of a growing shoot develop into xylem vessels such as those shown in Fig. 5.1.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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..... [7]

Quality of Written Communication: [1]

- (c) Explain how the structure of the xylem vessels shown in Fig. 5.1 helps them to transport water up the plant.

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..... [4]

[Total: 16]

- 6 The actions of the mother during pregnancy have a significant effect on the developing fetus.

An investigation was carried out into the effect of smoking by the mother on the length of gestation.

The results are shown in Fig. 6.1.

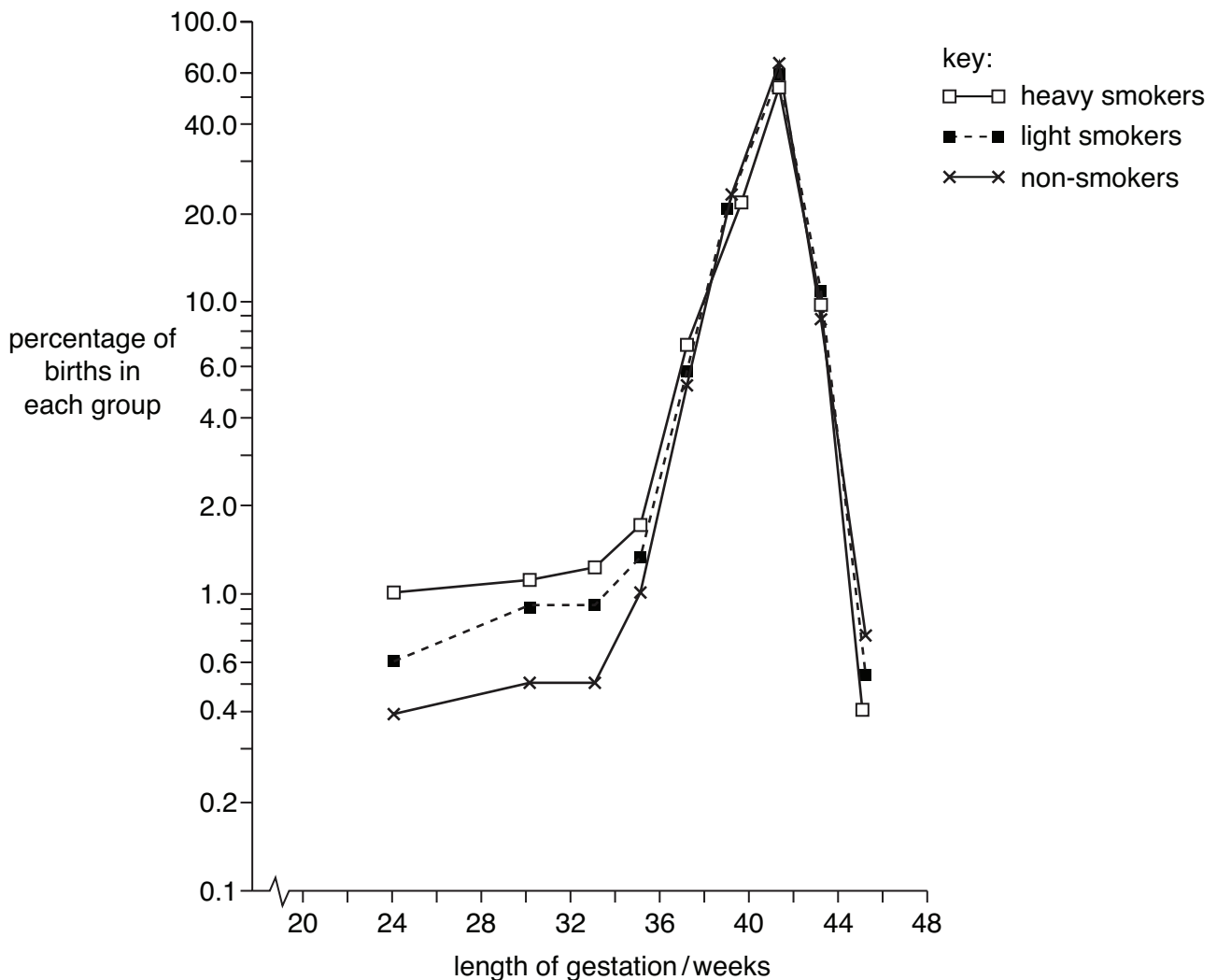


Fig. 6.1

- (a) Explain why the data in Fig. 6.1 are epidemiological rather than experimental data.

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..... [2]

(b) Describe the trends shown in Fig. 6.1.

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..... [3]

(c) Explain how carbon monoxide and nicotine from cigarettes may affect fetal development.

carbon monoxide

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nicotine

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..... [5]

[Total: 10]

END OF QUESTION PAPER

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