OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY 2805/01

Growth, Development and Reproduction

Tuesday **29 JANUARY 2002** Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- 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.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	15	
2	15	
3	15	
4	15	
5	14	
6	16	
TOTAL	90	

This question paper consists of 18 printed pages and 2 blank pages.

Registered Charity Number: 1066969
[Turn over

Answer **all** the questions.

1 Fig. 1.1 shows a diagrammatic cross section of part of the human placenta.

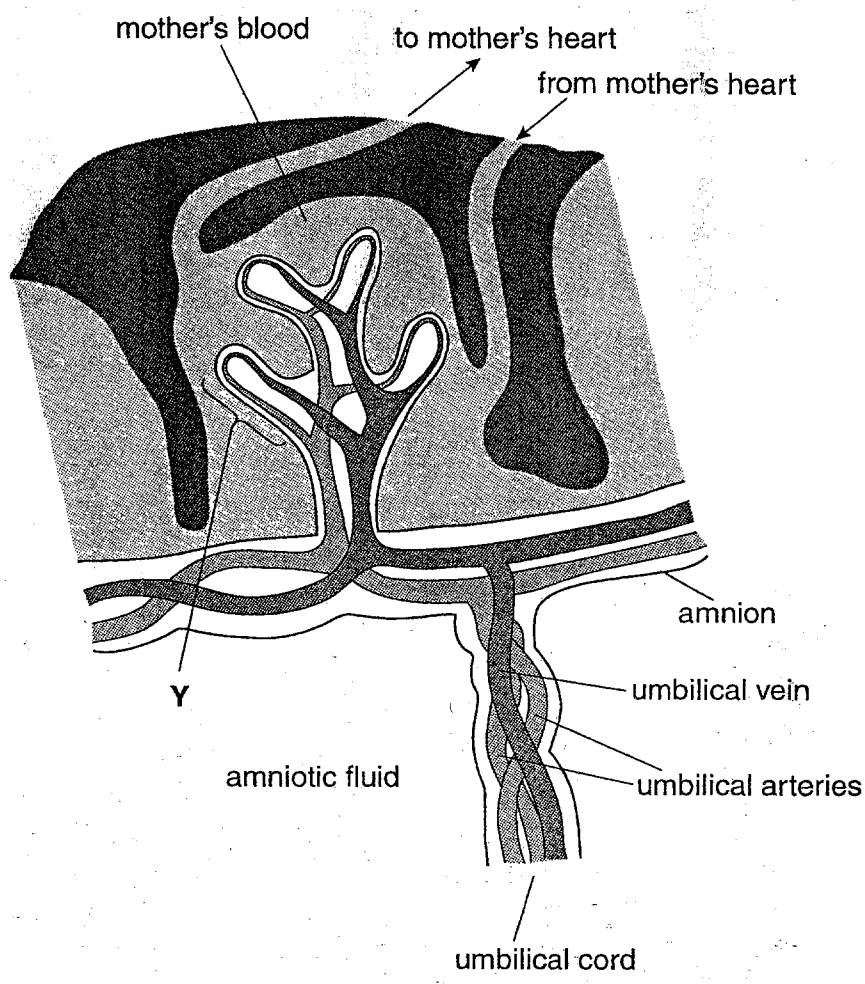

Fig. 1.1

(a) Name structure **Y** and describe the ways in which it is adapted to its function.

Y .....

adaptations to function .....

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..... [5]

For Examiner's Use

(b) State **three** functions of the amnion and the fluid it contains.

1. .....

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2. .....

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3. .....

..... [3]

(c) Describe **three** differences between the composition of blood in the umbilical artery and the blood in the umbilical vein.

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(d) Suggest how a small molecule, such as alcohol, crosses the placenta.

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(e) State **one** similarity and **one** difference between the ways in which a plant embryo and a human fetus receive nutrition during development.

similarity .....

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difference .....

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..... [2]

[Total : 15]

[Turn over

For Examiner's Use

2 **(a)** Explain how **cell division** and **enlargement** lead to growth in a root tip. (*In this question, 1 mark is available for the quality of written communication.*)

[7]

[Turn over

Fig. 2.1 shows the growth rates of parts of the human body in an individual between birth and maturity. The sizes reached by lymph tissue, the brain and head, and the reproductive organs are shown as a percentage of the total growth between birth and maturity. Lymph tissue is involved in the immune response.

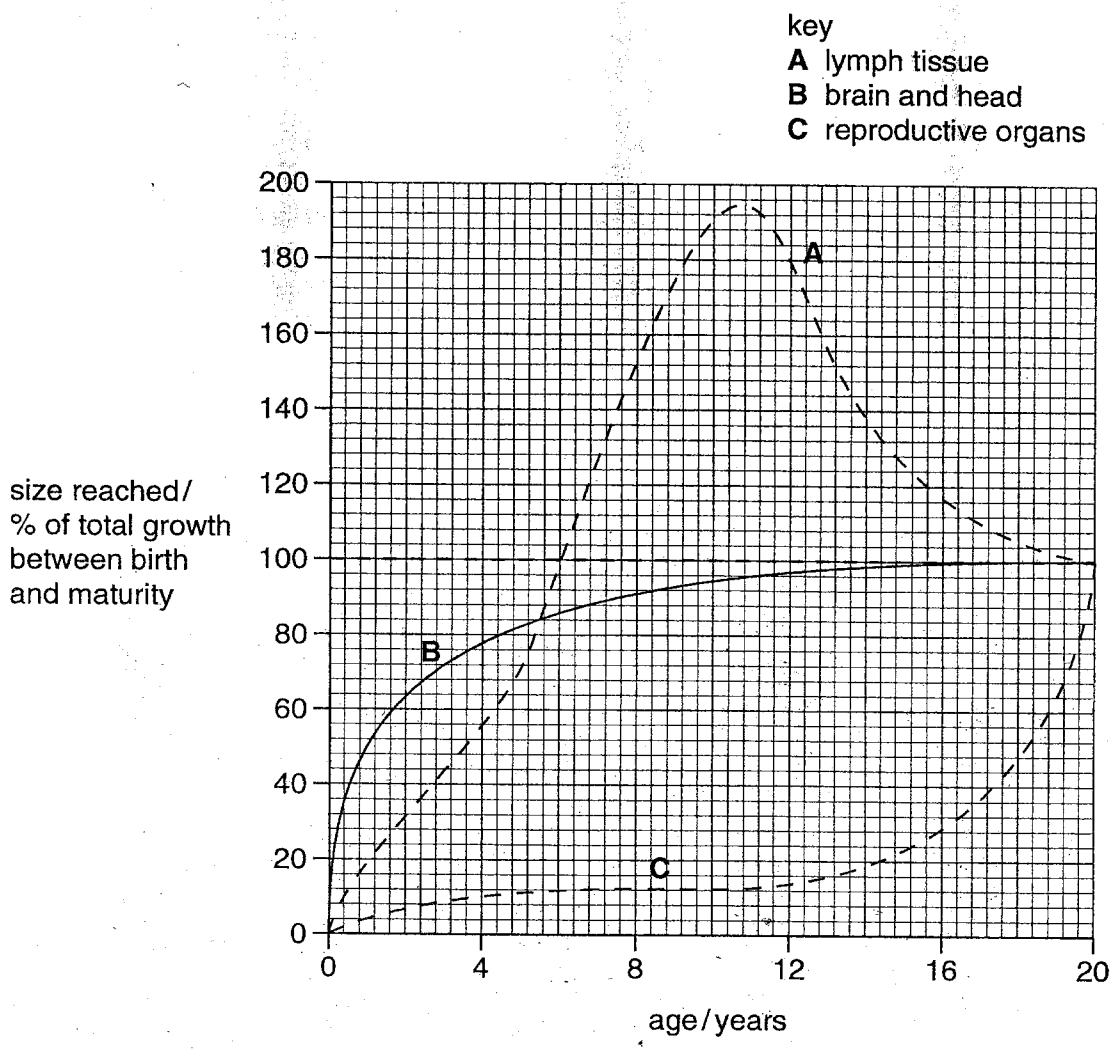

Fig. 2.1

(b) With reference to Fig. 2.1,

(i) explain why all the curves reach 100% at the age of 20;

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(ii) explain the pattern of growth shown by lymph tissue (curve **A**);

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(iii) suggest an explanation for the shape of curve **B**;

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(iv) suggest, giving **one** reason, the age at which puberty begins.

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..... [1]

(c) Name **two** hormones which stimulate the onset of puberty and state where each is produced.

hormone 1 .....

site of production .....

hormone 2 .....

site of production ..... [2]

[Total : 15]

3 Fig. 3.1 shows the development of an embryo sac within the ovule of a flowering plant. When this process is complete the ovule is mature and ready for fertilisation to form a seed.

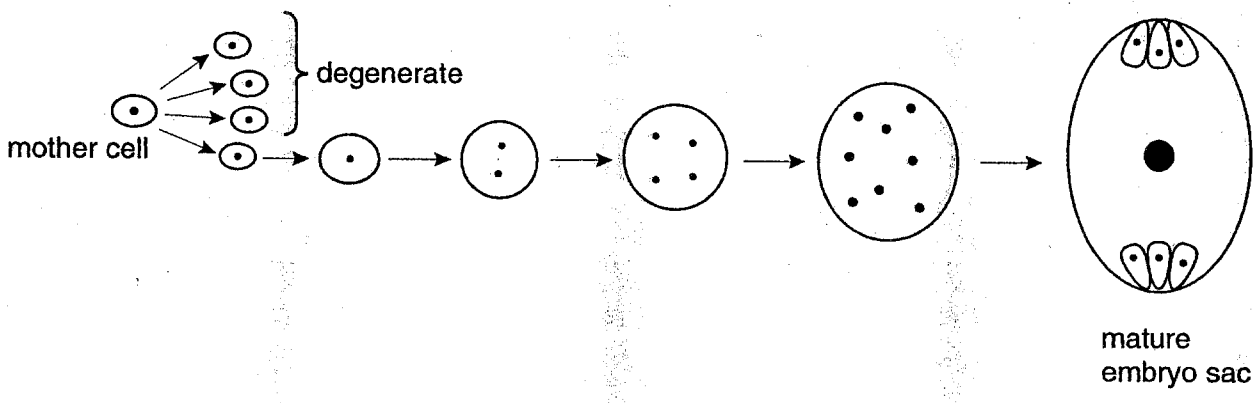

Fig. 3.1

(a) With reference to Fig. 3.1, describe the events that occur as the mother cell develops into a mature embryo sac.

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For Examiner's Use

(b) Describe the events occurring in the embryo sac from fertilisation until the seed becomes dormant. (*In this question, 1 mark is available for the quality of written communication.)*

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(c) Explain the significance of seed dormancy in a flowering plant.

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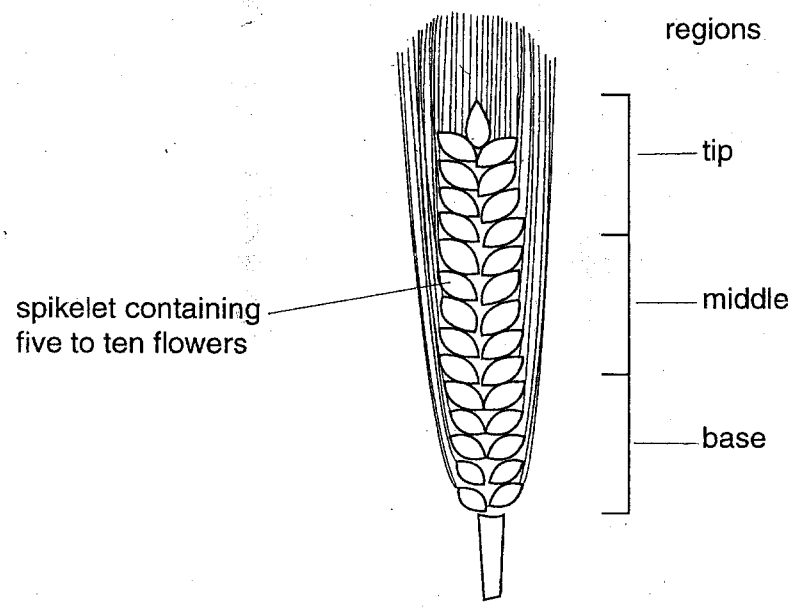
[Total : 15]

[Turn over

4 The flowers in barley are produced in a spike or 'ear' at the end of the stem. Fig. 4.1 shows a barley spike. The spike contains many spikelets each of which contains five to ten flowers. Each flower may produce a barley grain.



barley spike or ear

Fig. 4.1

An experiment was conducted to determine the effect of cold temperatures on the production of barley grains. A batch of barley seedlings, of the same variety, was divided into two identical samples, **A** and **B**. Sample **A** was grown at 15 °C and sample **B** was grown at 8 °C. The seedlings were grown until they flowered and produced grains. The mean percentage of flowers containing barley grains in each of the regions shown in Fig. 4.1 was calculated for each sample. Table 4.1 shows the results of this experiment.

Table 4.1

temperature / °C	mean percentage of flowers containing grains		
	base of spike	middle of spike	tip of spike
15 (sample **A**)	85	75	65
8 (sample **B**)	55	35	10

(a) **(i)** Explain the reason for including the control, sample **A**, in this experiment.

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(ii) With reference to Table 4.1, describe and explain the results of this experiment.

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(b) **(i)** Name an enzyme produced in germinating seeds and state its function in the endosperm.

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(ii) Describe the importance of this function in the development of the embryo.

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..... [3]

(iii) Outline the role of a **named** plant growth regulator in the control of seed dormancy.

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..... [2]

[Total : 15]

5 **(a)** Describe how plants may be produced commercially by,

(i) taking cuttings;

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(ii) grafting.

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Potatoes reproduce asexually by forming tubers on the end of underground stems or *stolons*. Stolons are formed from lateral buds. This process is shown in Fig. 5.1.

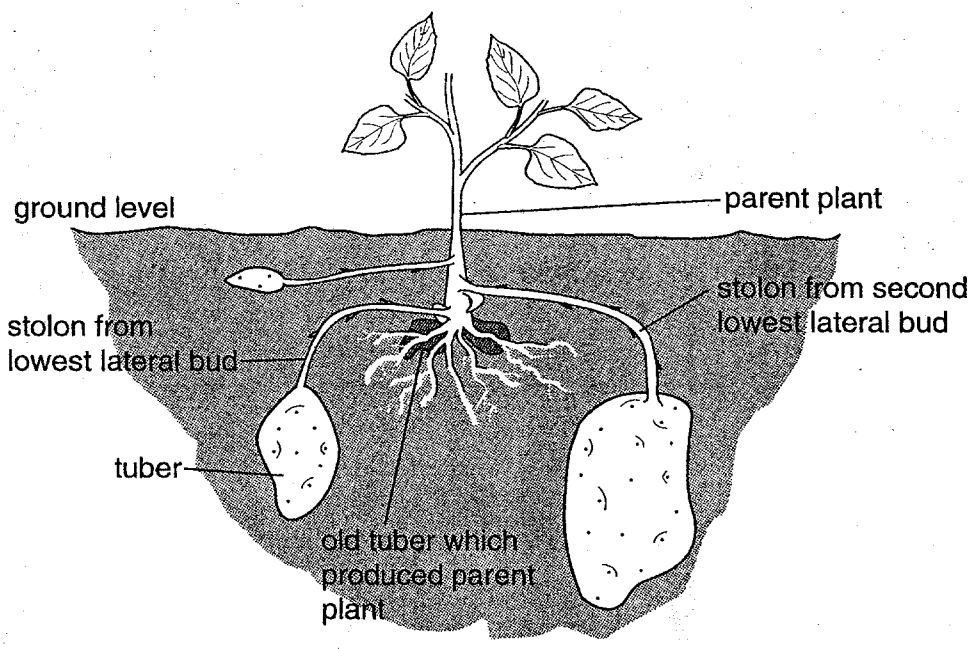

Fig. 5.1

[Turn over

An experiment was carried out to show the effect of light and dark on the formation of stolons and tubers in the potato. Twenty potato plants were grown. Ten of them were grown in such a way that the stolons were exposed to light; the other ten were grown with the stolons in the dark. The results are shown in Table 5.1.

Table 5.1

treatment	number of stolons from lowest bud	number of stolons from second lowest bud	total number of tubers from both stolons
light	10	1	1
dark	10	8	17

(b) With reference to Table 5.1, state the conclusions that can be made from this experiment.

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Young potato plants may also be grown by tissue culture.

(c) **(i)** Explain the advantages of producing potatoes by this method.

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(ii) Suggest the possible consequences of the widespread cultivation of a small number of potato varieties.

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[Total : 14]

6 In the past it was assumed that unborn babies could not feel pain. Nowadays, when an unborn baby requires pain relief, drugs may be administered to the mother or directly to the unborn baby.

(a) With reference to the paragraph above,

(i) state **two** reasons why drugs given to the mother to relieve pain in the unborn baby may not be as effective as drugs given directly to the unborn baby;

1. .....

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2. .....

..... [2]

(ii) outline **three** reasons why the ability of an unborn baby to feel pain has become an ethical issue for doctors.

1. .....

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2. .....

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3. .....

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..... [3]

[Turn over

During development of the unborn baby, cells grow and specialise into neurones. During birth, the baby's skin may be damaged. This can destroy sensory neurones. Undamaged sensory neurones then grow to form new dendrites in the spinal cord of the new-born baby. The spinal cord is then over supplied with dendrites from the surviving neurones near by, changing the sensitivity of the skin to touch. These events are shown in Fig. 6.1.

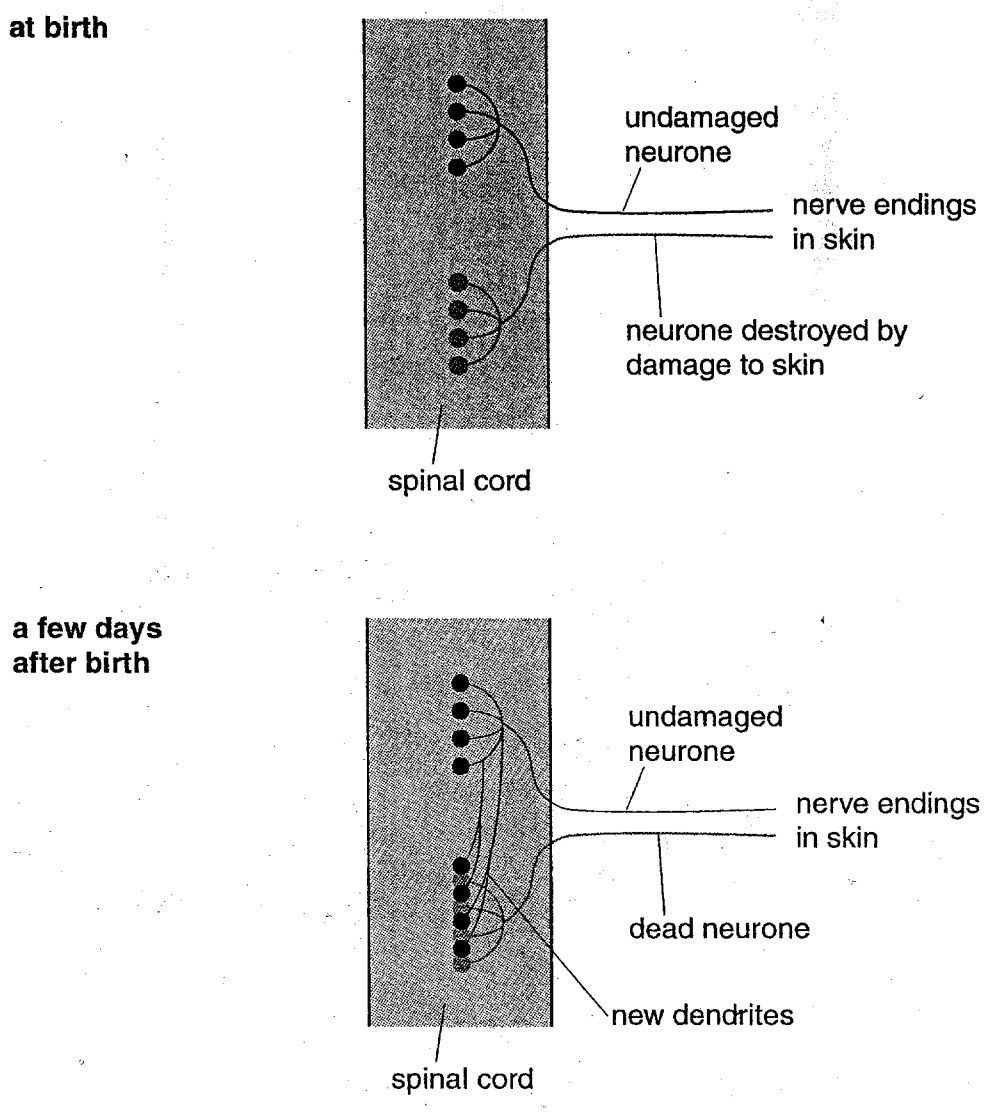

Fig. 6.1

(b) Suggest **two** ways in which the baby's sensitivity to touch may be changed, as a result of the damage to the sensory neurone shown in Fig. 6.1.

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..... [2]

Fig. 6.2 shows the threshold of sensitivity to touch of normal skin and a healed area of skin damaged at birth, from immediately after birth until the infant is three weeks old.

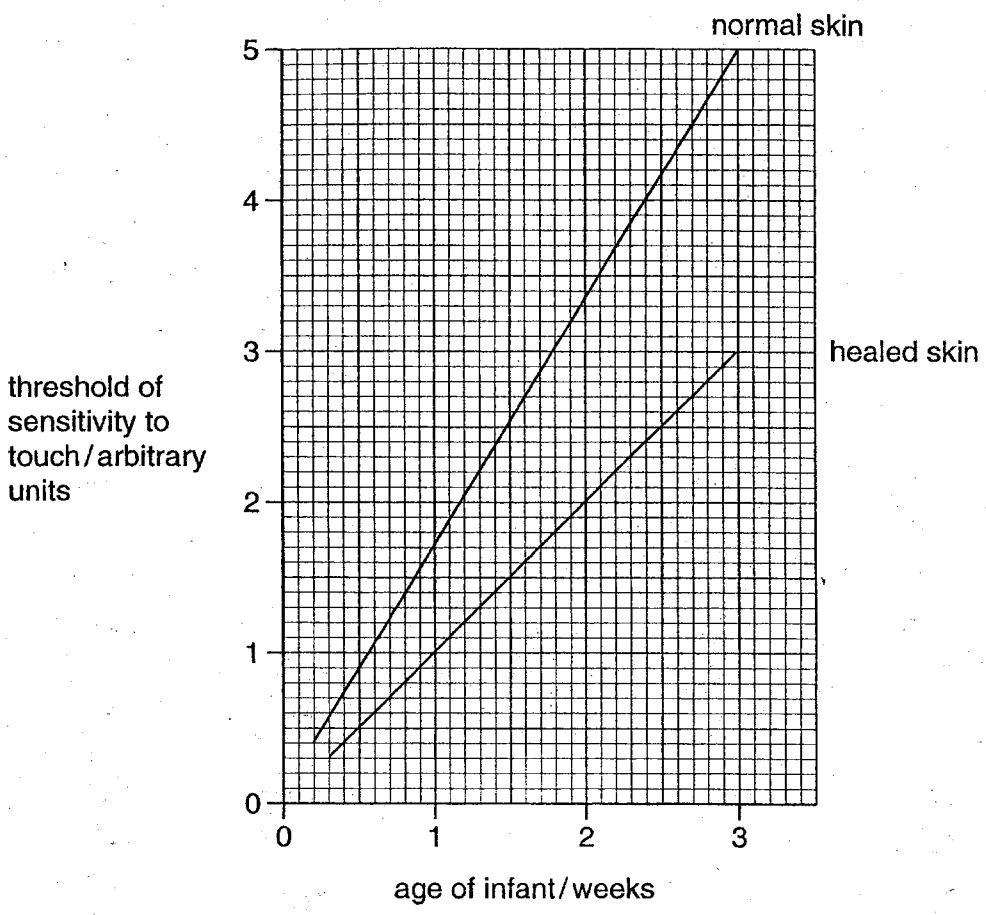

Fig. 6.2

(c) **(i)** Explain what is meant by 'threshold of sensitivity to touch'.

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..... [1]

(ii) Use the information given in Fig. 6.1 to explain the results in Fig. 6.2.

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..... [2]

(iii) Suggest the advantage to the new-born infant of this mechanism.

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[Turn over

The example above shows development as a progressive series of changes, including the **specialisation** of cells.

(d) Describe the changes which may occur in the cells of a shoot tip as they become specialised (differentiated) and mature.

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[Total : 16]