Past HKCEE Questions
Growth and Development
Paper I

1. In an experiment to investigate the changes in seeds before and after germination, two batches of sunflower seeds of equal weight were used. One batch, after its dry weight had been determined, was analysed for its components. The other batch was allowed to germinate in the dark. The seedlings formed were then treated similarly. The results are shown in the table below:

Components	Weight (g)	
	seeds	seedlings formed after germination
Sugars	3.1	10.5
Cellulose	2.0	8.2
Fats	44.2	17.4
Simple proteins	19.3	11.0
Others	11.4	24.0
Total dry weight	80.0	71.1

(i) What is meant by the 'dry weight' of the seeds? (1 mark)

(ii) Account for the difference in total dry weights between the seeds and the seedlings formed after germination. (2 marks)

(iii) According to the results, which component is the most abundant food reserve in the seeds? (1 mark)

(iv) Explain the increase in cellulose content in the seedlings as compared with that of the seeds. (2 marks)

(v) The seedlings looked yellow after germination. Suggest one reason for this. (1 mark)

(vi) Besides the dry weight method, suggest another way to measure the growth of seedlings. (1 mark)

(HKCEE 1987)

2. An experiment was carried out to investigate the effect of removing cotyledons on the growth of bean seedlings. 500 bean seeds were soaked in water for 24 hours. They were then divided into 5 batches (A to E) and allowed to germinate. 4 batches of these germinating seedlings had their cotyledons removed at different stages of the germination. At the end of 8 weeks, all the plants were collected, dried in an oven and weighed to obtain the dry weight. The results are shown in the table below:

Batch	Treatment	Average dry weight (per plant) after 8 weeks
A	Cotyledons not removed	4.3 g
B	Cotyledons removed on the 4th day of germination	0.7 g
C	Cotyledons removed on the 7th day of germination	1.8 g
D	Cotyledons removed on the 10th day of germination	4.0 g
E	Cotyledons removed on the 13th day of germination	4.3 g

(i) Give ONE reason why soaking the seeds in water is necessary for germination. (1 mark)

(ii)

(1) What is meant by 'dry weight'? (1 mark)

(2) Why is dry weight preferred to fresh weight in the interpretation of the results of this experiment? (Note: Fresh weight refers to the weight of the plants freshly collected.) (2 marks)

(iii) Why was a large sample size of seeds (100 per batch) used in this experiment? (1 mark)

(iv) Describe the effect on the growth of bean seedlings of the removal of the cotyledons

(1) on the 4th day of germination.

(2) on the 13th day of germination. (2 marks)

(v) From your knowledge of the functions of cotyledons, explain the effect of each of the above cases mentioned in (iv). (3 marks)

(HKCEE 1991)

3. In a study of the growth of mung bean seedlings, two samples of mung bean seeds were grown under the same conditions except that one sample was kept in daylight while the other in darkness. The same number of seedlings was collected from each group every 6 days. The average dry mass of the seedlings of each group was determined and the results are shown below:

Time of growth (day)	Average dry mass of seedlings (g)	
	In daylight	In darkness
0	0.81	0.80
6	0.65	0.65
12	0.57	0.52
18	0.79	0.41

(i) Explain the change in the average dry mass of the seedlings in both daylight and dark conditions from day 0 to day 12. (3 marks)

(ii) From day 12 to day 18, how do

the seedlings grown in daylight differ from those grown in the dark in terms of the change in the average dry mass? Account for this difference. (4 marks)

(iii) Suggest why the dry mass of seedlings was measured instead of the fresh mass in this study. (1 mark)

(HKCEE 2006)

Past HKCEE Questions
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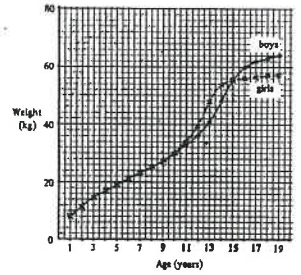
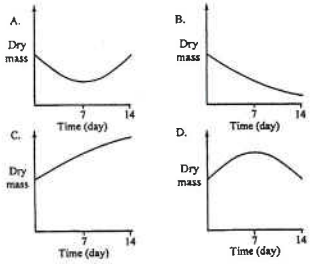
Paper II

91-48
Which of the following can be deduced from the human growth curves shown below?



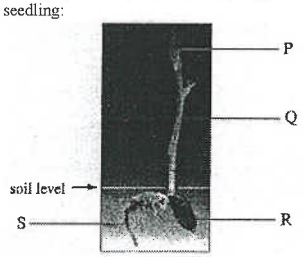
A. Between the ages of 1 and 10, boys and girls have the same height.
B. Between the age of 11 and 14, girls are heavier than boys.
C. At the age of 13, boys and girls have the same growth rate.
D. Between the ages of 16 and 19, males are taller than females.

00-44
A student soaked some mung beans in water for two days and then put them on moist cotton wool in a petri dish. Which of the following graphs indicates the change in dry mass of the seedlings?



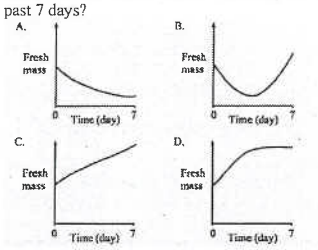
01-40
Which of the following may affect the body mass of newborn babies?
(1) genetic make-up of the father
(2) smoking habit of the mother
(3) diet of the mother
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

01.
Directions: Questions 45 and 46 refer to the photograph below, which shows a 7-day-old bean seedling:

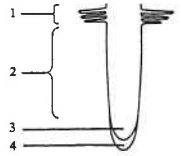


01-45
The food that supported the growth of the seedling up to this stage mainly came from
A. the photosynthesis of P.
B. the photosynthesis of Q.
C. the food stored in R.
D. the absorption of nutrients from the soil by S.

01-46
Which of the following graphs correctly shows the changes in the fresh mass of the seedling in the past 7 days?

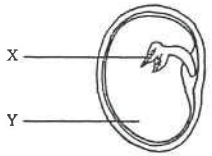


02-56
The diagram below shows the longitudinal section of a young root:

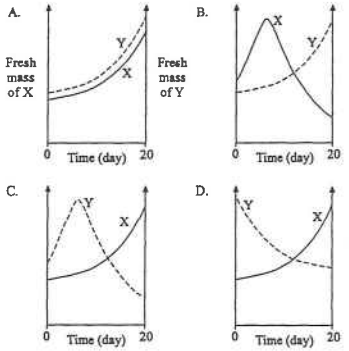


Xylem and phloem are found in region
A. 1.
B. 2.
C. 3.
D. 4.

02-60
The diagram below shows abroad bean seed



Which of the following graphs correctly shows the changes in the fresh mass of parts X and Y during germination?



03-60
Which of the following is a relatively reliable parameter for measuring the growth of a person?
A. body height
B. waistline
C. hair length
D. intelligence quotient (IQ)

Past HKCEE Questions
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Suggested Answers

Paper I

1. (i) weight with water 1
   (ii) During germination, some stored food is used in respiration / oxidation 1 1
   (iii) Fat 1
   (iv) number of cells increases 1
   cellulose is used in the formation of the cell wall 1
   (v) lack of chlorophyll due to absence of light 1
   (vi) to measure the length / size / fresh weight of seedlings 1

2. (i) to activate the enzymes in seeds / to help rupturing the seed coat / to soften the seed coat / other suitable answers 1
   (ii) (1) weight with all water removed 1
   (2) dry weight gives a more accurate measurement of the amount of organic matter present / measurement on fresh weight shows greater variation 1
   water content is affected by different environmental conditions 1
   (iii) to minimize error due to individual variation / death / unsuccessful germination 1
   (iv) (1) retarding / slowing growth 1
   (2) no effect on growth 1
   (v) (1) cotyledons provide food reserve for germination 1
   therefore early removal of cotyledons resulted in less growth
   (2) food reserve in cotyledons would have been used up 1
   seedlings would have developed leaves for photosynthesis 1
   therefore removal of cotyledons had no effect on growth

3. (i) The average dry mass of both samples decreases from day 0 to day 12 1
   because the stored food in seed 1
   is used in respiration / is broken down to carbon dioxide and water 1
   (ii) The average dry mass of the seedlings grown in daylight increases from day 12 to day 18, while that of seedlings grown in darkness continues to decrease 1
   because under daylight, the seedlings have developed green leaves 1
   for photosynthesis 1
   The rate of food production is faster than the rate of food consumption 1
   resulting a net gain in dry mass
   Effective Communication (C) 1
   (iii) The dry mass shows the actual biomass / organic matter of the seedlings / The water content of the seedlings varies and hence the fresh mass cannot indicate the actual biomass 1

Paper II

91-48	B
00-44	A
01-40	D
01-45	C
01-46	C
02-56	A
02-60	C
03-60	A