



Sharing the best in Gardening

**R3101**

**PLANT TAXONOMY, STRUCTURE & FUNCTION**

**Level 3**

**Wednesday 27 June 2012**

**09:30 – 11:00**

**Written Examination**

Candidate Number:.....

Candidate Name:.....

Centre Number/Name:.....

**IMPORTANT – Please read carefully before commencing.**

- i) The duration of this paper is **90** minutes.
- ii) **ALL** questions should be attempted.
- iii) **EACH** question carries **10 marks**.
- iv) Write your answers legibly in the spaces provided.
- v) Use **METRIC** measurements only.
- vi) Where plant names are required, they should include genus, species and where appropriate, cultivar.
- vii) Please note, sufficient lined space is provided. It is **NOT** necessary that all lined space is used in answering the questions.

Ofqual Unit Code F/601/0993

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## ANSWER ALL QUESTIONS

## MARKS

## Q1

Describe the external and internal differences between monocotyledons and dicotyledons.

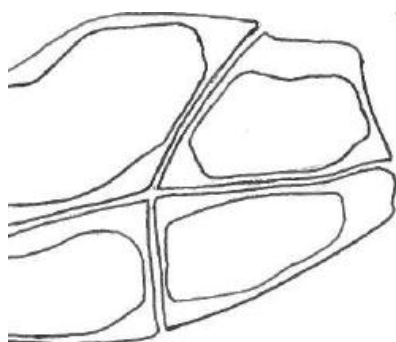
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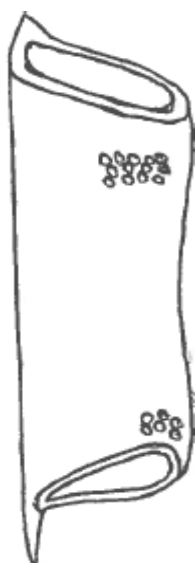
**Q2** a) Name **EACH** of the cell types found in plant tissues drawn below.



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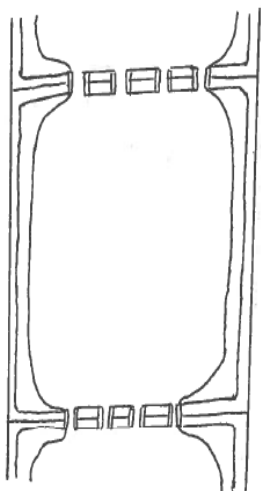
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iv)

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b) Describe the role of the vascular cambium in secondary thickening.

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## MARKS

### Q3

Describe how plant growth substances bring about **EACH** of the following:

- i) stem breaking into several new shoots after pruning;
- ii) leaves falling from deciduous trees in autumn;
- iii) plants growing towards highest light intensity.

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## MARKS





## Q4

Describe, using a **NAMED** plant example in **EACH** case, the adaptation of a flower for pollination by:

- i) moths;
- ii) flies.

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## MARKS



**Q5** a) Describe the light reaction of photosynthesis.

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b) Explain how the level of light can be managed in protected structures to maximise photosynthesis.

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**MARKS**



**Q6**

Distinguish between the following categories using a **NAMED** plant example in **EACH** case:

- i) family and genus;
- ii) variety, cultivar and trade designation.

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**MARKS**



**Q7** a) i) Describe what is meant by 'dormancy'.

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ii) Describe the role of endogenous growth regulators in the control of seed dormancy.

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b) Describe what is meant by ‘vernalisation’ in relation to a **NAMED** plant example.

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**MARKS**



**Q8** a) Describe, with the aid of diagrams and **NAMED** plant examples, **TWO** different types of fleshy/succulent fruits.

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**MARKS**

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b) Describe, using a **NAMED** plant example, what is meant by the term 'parthenocarpy'.

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**MARKS**

**Q9** a) Describe what is meant by **EACH** of the following pathways for water movement:

- i) 'apoplast';
- ii) 'symplast'.

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b) State how **EACH** of the following passes from the apoplast to the symplast:

- i) water;
- ii) mineral ions.

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**MARKS**

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c) Describe the role of the endodermis in water and solute movement. 3

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**MARKS**

**Q10** Explain how outdoor planting conditions can affect the efficiency of **EACH**

i)	photosynthesis by leaves;	<b>3</b>
ii)	respiration by roots;	<b>3</b>
iii)	transpiration by leaves.	<b>4</b>

## MARKS



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## R3101

### PLANT TAXONOMY, STRUCTURE & FUNCTION

#### Level 3

Wednesday 27 June 2012

<b>Candidates Registered</b>	<b>98</b>		<b>Total Candidates Passed</b>	<b>42</b>	<b>55.26%</b>
Candidates Entered	76	77.55%	Passed with Commendation	20	26.31%
Candidates Absent	17	17.35%	Passed	22	28.95%
Candidates Deferred	1	1.02%	Failed	34	44.74%
Candidates Withdrawn	4	4.08%			

**Q1** Describe the external and internal differences between monocotyledons and dicotyledons.

The examiner expected responses to consider cotyledon number, leaf morphology, stem and root anatomy, flower structure, life-form and root morphology. Candidates mainly lost marks by failing to include the full range of differences, often missing out, for instance, reference to flower structure or root anatomy.

**Q2** a) Name **EACH** of the cell types found in plant tissues drawn below.  
b) Describe the role of the vascular cambium in secondary thickening.

Candidates experienced some difficulty with naming the cell types from the drawings provided. The following cell type were accredited where appropriate: collenchyma, xylem vessel element, tracheid, sclerenchyma fibre and phloem sieve tube element. Several candidates did achieve full marks. In the second part of the question, the roles of the cambium in producing ray parenchyma and dividing to add to the circumference of the cambium ring were usually missed.

**Q3** Describe how plant growth substances bring about **EACH** of the following:

- i) stem breaking into several new shoots after pruning;
- ii) leaves falling from deciduous trees in autumn;
- iii) plants growing towards highest light intensity.

The descriptions of phototropism and apical dominance in the first and third parts of the question were usually done well although the role of auxin in the latter was not always stated clearly. Abscission, on the other hand, was not usually done well. The mechanism is now believed to be: auxin levels fall in the autumn; this causes the abscission zone cells to become more sensitive to ethylene, low concentrations of endogenous ethylene cause cellulase production and leaf fall. The mechanism involving auxin levels falling to the level in the stem was also given credit.

**Q4** Describe, using a **NAMED** plant example in **EACH** case, the adaptation of a flower for pollination by:

- i) moths;
- ii) flies.

The moth pollination syndrome was usually done well, although many candidates used the atypical Yucca as an example. The fly syndrome was less well understood with some candidates including hoverfly type open flowers with carrion fly type flowers in the same answer. Either was acceptable but including both sometimes led to confused accounts. The descriptions of Arum-type trap flowers were usually unclear.

**Q5** a) Describe the light reaction of photosynthesis.  
b) Explain how the level of light can be managed in protected structures to maximise photosynthesis.

Candidates were usually able to summarise the light reaction of photosynthesis as the capture of PAR by chlorophyll, which produces excited electrons which generate ATP and NADPH<sub>2</sub> with the accompanying photolysis of water.

In the second part of the question, candidates were usually aware of the need to clean glass and provide supplementary lighting, although some details of the latter e.g. distance from plants, use of reflectors were often missed. The question asked for the 'management of the light level' and many answers included much irrelevant information by not keeping to this.

**Q6** Distinguish between the following categories using a **NAMED** plant example in **EACH** case:

- i) family and genus;
- ii) variety, cultivar and trade designation.

In general, this question was done well. The greatest confusion occurred with 'trade designation', many equating this with plants protected under PBR (plant breeders' rights). A trade designation is a name used for marketing a plant instead of the true cultivar name. This plant may or may not be protected under PBR. Thus Rosa **Graham Thomas** is the marketing name of Rosa 'Ausmas' and is not protected while Rosa **Harlow Carr** is the marketing name of Rosa 'Aushouse' which is protected under PBR.

- Q7**
- a)
    - i) Describe what is meant by 'dormancy'.
    - ii) Describe the role of endogenous growth regulators in the control of seed dormancy.
  - b) Describe what is meant by 'vernalisation' in relation to a **NAMED** plant example.

The concept of dormancy was almost universally misunderstood. Most considered a plant to be dormant if it were not growing/germinating due to external unfavourable conditions e.g. winter. However, dormancy is a failure to grow/germinate *when conditions are otherwise favourable*. Thus a leafless twig of a deciduous tree brought into warm conditions in October will not shoot while a similar twig in January, after a period of cold, will shoot.

Vernalisation is best exemplified by rosette biennials where extension growth and flowering follows a period of chilling.

- Q8**
- a) Describe, with the aid of diagrams and **NAMED** plant examples, **TWO** different types of fleshy/succulent fruits.
  - b) Describe, using a **NAMED** plant example, what is meant by the term 'parthenocarpy'.

This question was usually answered well although it was not always noticed by candidates that the answer required a description as well as diagrams. The latter were often sketchy. Parthenocarpy was usually well understood.

- Q9**
- a) Describe what is meant by **EACH** of the following pathways for water movement:
    - i) 'apoplast';
    - ii) 'symplast'.
  - b) State how **EACH** of the following passes from the apoplast to the symplast:
    - i) water;
    - ii) mineral ions.
  - c) Describe the role of the endodermis in water and solute movement.

The distinction between apoplast and symplast was usually well known, although some candidates equated the apoplast just with the intercellular spaces of the root cortex instead of the cellulose cell walls.

The role of the endodermis was also usually well understood.

**Q10** Explain how outdoor planting conditions can affect the efficiency of **EACH** of the following processes:

- i) photosynthesis by leaves;
- ii) respiration by roots;
- iii) transpiration by leaves.

In the first part of the question, shade reducing light intensity and the effect of other plants on the wavelengths of light available to plants beneath them, were the commonest answers. Not many referred to the effect of dry conditions closing stomata and thereby reducing photosynthesis.

In the second part, the effect of waterlogging and compaction in reducing the level of oxygen available to roots, leading to anaerobic respiration, was the commonest answer given. Few referred to the effect of soil temperature on the rate of respiration.

In the third part, the commonest answer referred to wind increasing the rate of transpiration. There were also a few answers describing how dry conditions may close stomata thereby reducing the rate of transpiration and to high temperature also increasing the rate.

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