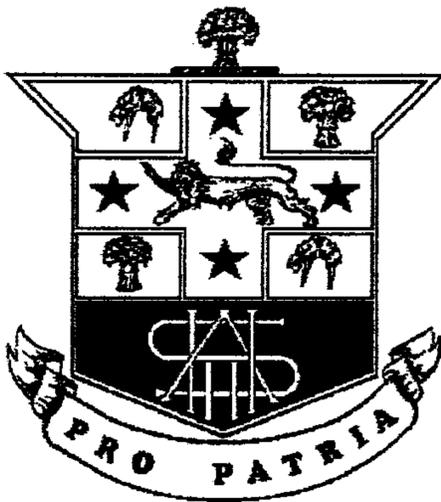


HURLSTONE AGRICULTURAL HIGH SCHOOL



Trial Higher School Certificate Examination
2007

AGRICULTURE

Paper 1

General Instructions:

- * Reading time - 5 minutes
- * **Working time - 2 hours**
- * Write using a black or blue pen
- * Draw diagrams using pencil
- * Board approved calculators may be used
- * Write your student number at the top of each page

Total marks - 70 marks

SECTION I

25 marks

Pages 2 - 7

Questions 1 - 3

Allow about **40 minutes** for this section.

SECTION II

30 marks

Pages 8 - 13

Questions 4 - 5

Allow about **50 minutes** for this section.

SECTION III

15 marks

Pages 14 - 15

Attempt **ONE** question only from questions 6 - 9

Allow about **30 minutes** for this section

DO NOT WRITE IN THIS BOOKLET - use your own paper

SECTION I

25 marks

Attempt Questions 1 - 3

Allow about 40 minutes for this section.

Answer the questions in the spaces provided.

Question 1. (10 marks)

Name ONE farm product that you have studied.

Name of product:

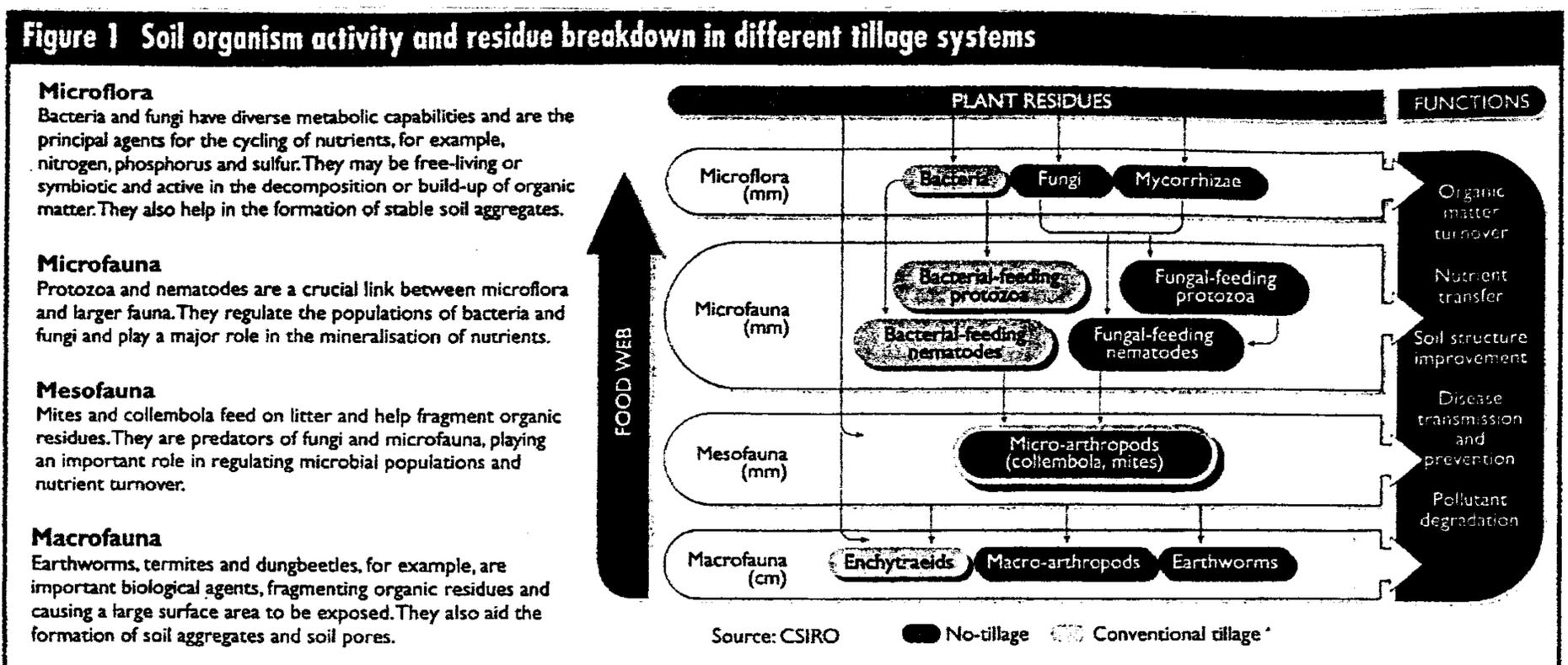
- (a) Identify ONE quality specification that the farmer aims to meet. (1 mark)
- (b) Explain TWO practices the farmer can use to meet or exceed this quality specification. (3 marks)
- (c) Outline the off-farm processing needed to produce one named value - added product. (3 marks)
- (d) Explain how the off-farm processing of your named product may be influenced by consumer demand. (3 marks)

Question 2. (8 marks)

Figures 1 and 2 show the importance of soil organisms and their ability to thrive under different soil management systems.

No till means that the soil is left undisturbed whilst conventional till means that the soil is ploughed or cultivated with three or four ploughs before seeds are sown.

Answer the questions that follow.



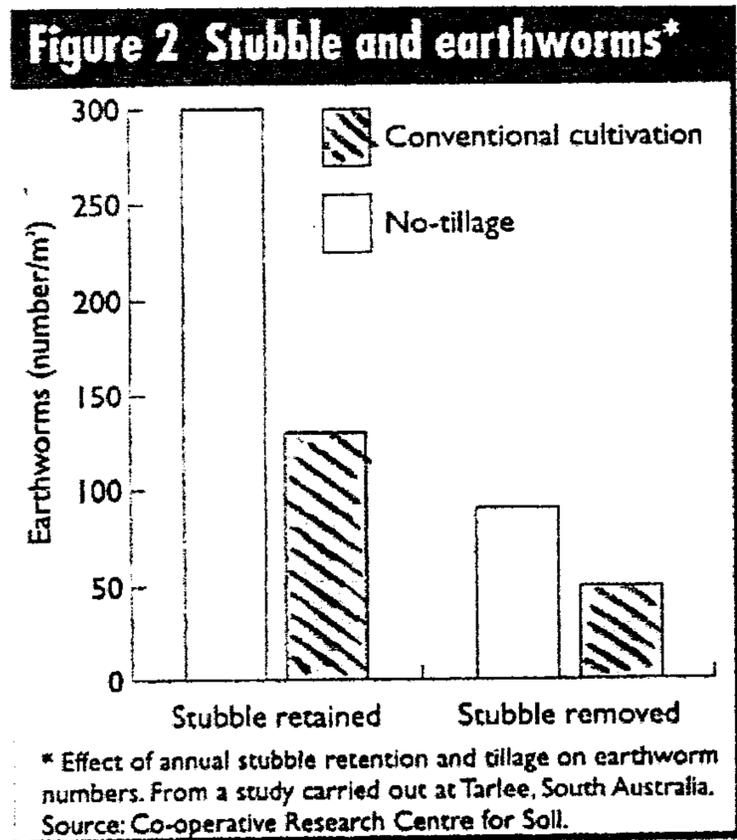
(a) Stubble is the plant "left-overs" after a crop has been harvested. The farmer either leaves or burns this stubble before preparing the soil to sow the seeds of the next crop.

From Figure 2 -

Calculate the % reduction in earthworm numbers -

- (i) comparing stubble retained / conventional cultivation with stubble retained / no-till.
- (ii) comparing stubble retained / no-till with stubble removed / no-till.

(2 marks)



(b) **Figure 2** shows that disturbing the soil as little as possible and retaining harvested crop residues encourages larger earthworm numbers. Explain how stubble retention and no-till can also minimize the risk of one named soil degradation problem. (2 marks)

(c) Use **Figure 1** to complete the following table - (3 marks)

| Type of soil organism | One example of the type of organism | One <u>direct</u> role of the type of organism. Each of your role examples must be different. |
|-----------------------|-------------------------------------|---|
| Microflora | XXXXXXXXXXXXXXXXXXXX | XX |
| Microfauna | XXXXXXXXXXXXXXXXXXXX | XX |
| Mesofauna | XXXXXXXXXXXXXXXXXXXX | XX |
| Macrofauna | XXXXXXXXXXXXXXXXXXXX | XX |

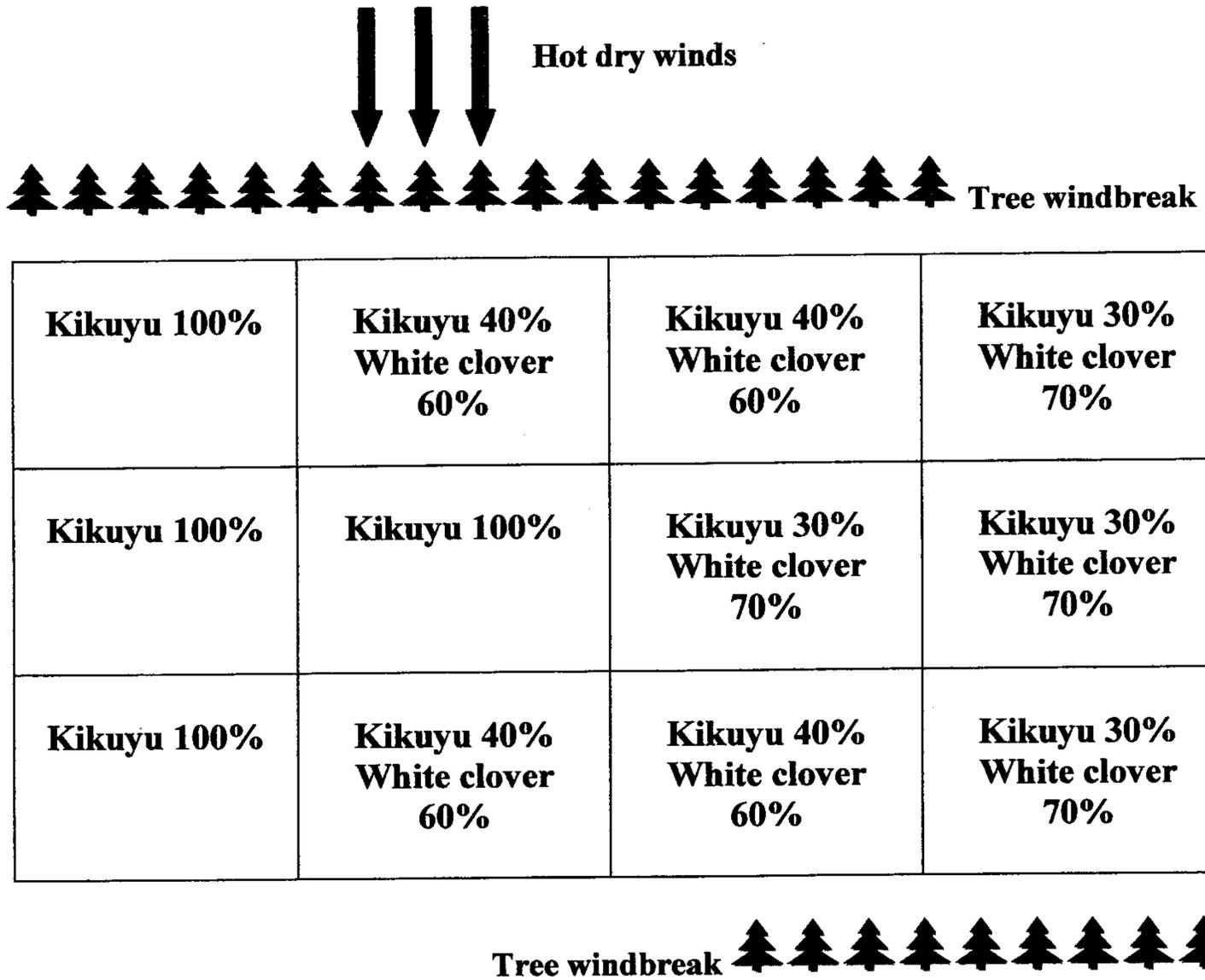
(d) Describe one other management practice that would encourage large and active populations of soil organisms. (1 mark)

DO NOT WRITE IN THIS BOOKLET - use your own paper

Question 3. (7 marks)

An agronomist set up a pasture trial to make recommendations to dairy farmers on the south coast of NSW.

She used twelve 10 m² plots.



The results obtained were -

Table: Comparing the Dry Matter (DM) yield (tonnes/hectare) of three types of pasture suitable for dairy cattle.

| Yields from the 4 plots of 100% Kikuyu pasture. (t/ha DM) | Yields from the 4 plots of 30% Kikuyu / 70% White clover pasture. (t/ha DM) | Yields from 4 plots of 40% Kikuyu / 60% White clover pasture. (t/ha DM) |
|---|---|---|
| 3.8 | 4.0 | 4.2 |
| 3.6 | 3.9 | 4.4 |
| 3.8 | 4.0 | 3.9 |
| 3.7 | 3.7 | 3.9 |

| | | | |
|---------------------------|----------------------|----------------------|----------------------|
| Mean | XXXXXXXXXXXXXXXXXXXX | XXXXXXXXXXXXXXXXXXXX | XXXXXXXXXXXXXXXXXXXX |
| Standard deviation | 0.10 | 0.14 | 0.24 |

(a) Calculate the mean or average yield for each pasture and complete the table. (1 mark)

- (b) Explain what the standard deviations tell the agronomist about the performance of each pasture. (2 mark)
- (c) Which pasture would the agronomist recommend. Explain the agronomist's choice. (1 mark)
- (d) The agronomist could have set up the trial a little more carefully. Describe the poor experimental design features used and how they could be improved. (3 marks)

SECTION II

30 marks

Attempt Questions 4 - 5

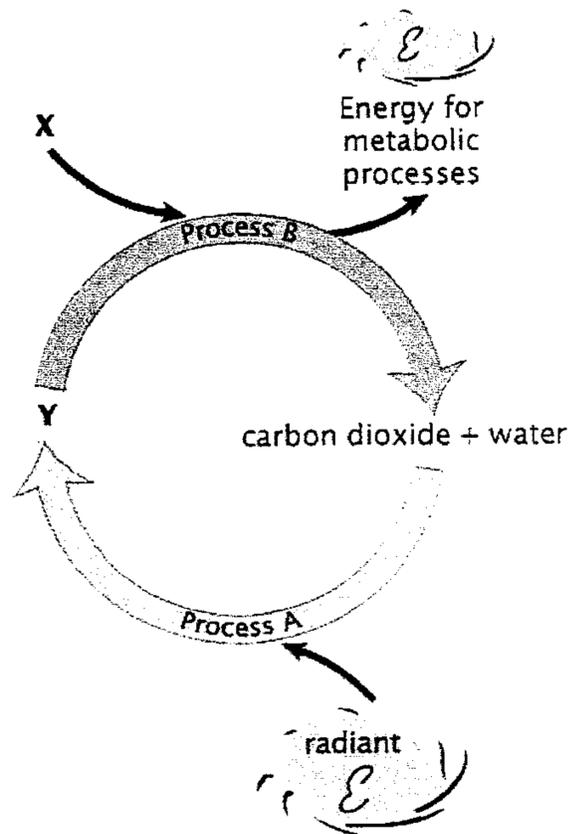
Allow about 50 minutes for this section

Answer the questions in the spaces provided.

Question 4. (15 marks)

- (a) The diagram shows the relationships between two very important plant processes.

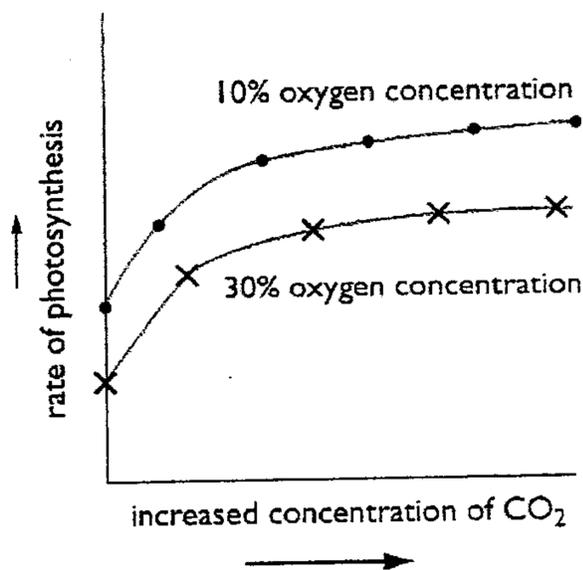
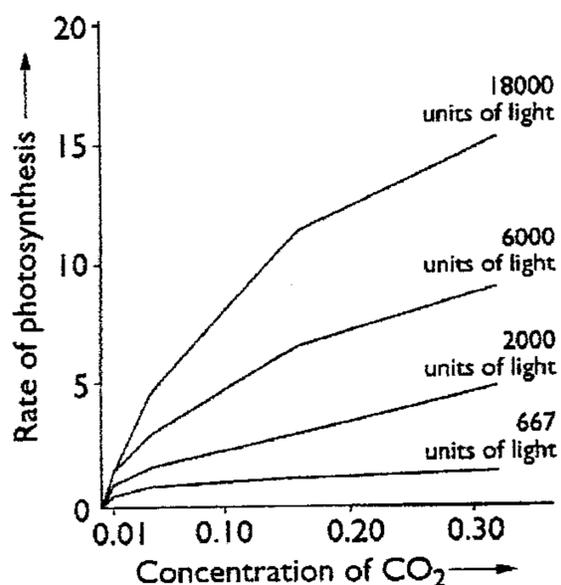
(2 marks)



From the diagram correctly name -

- (i) Process A:
- (ii) Process B:
- (iii) X :
- (iv) Y :

- (b) The two graphs show environmental factors that can influence photosynthesis.

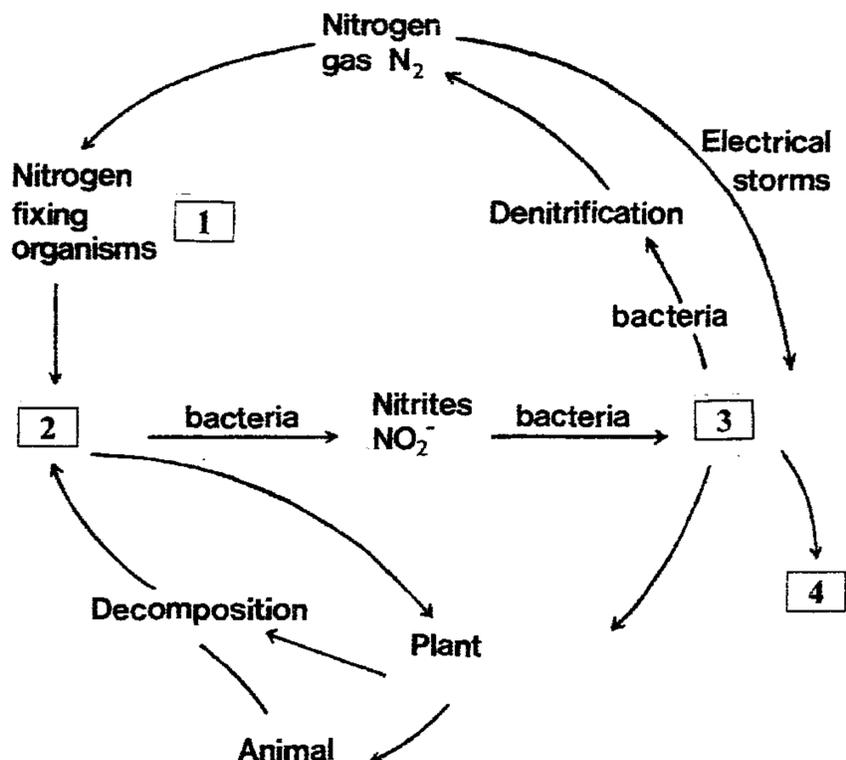


State two relationships between the rate of photosynthesis and an environmental factor. (2 marks)

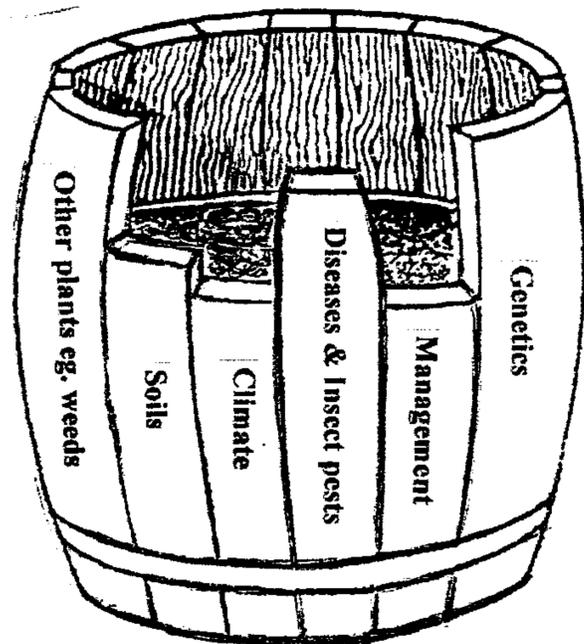
(c) The diagram represents the Nitrogen cycle on a farm.

Correctly identify from the diagram -
(2 marks)

- (i) **1**: One N-fixing microorganism.
- (ii) **2** : What should be written in the box
- (iii) **3**: What should be written in the box
- (iv) **4**: The process.
- (v) Define the term mineralization: (1 mark)
- (vi) Explain how the farmer can manage the nitrogen cycle to maximize farm productivity. (4 marks)



(d) The diagram shows factors that influence plant production. The structure of the barrel would vary from one crop or pasture to the next.



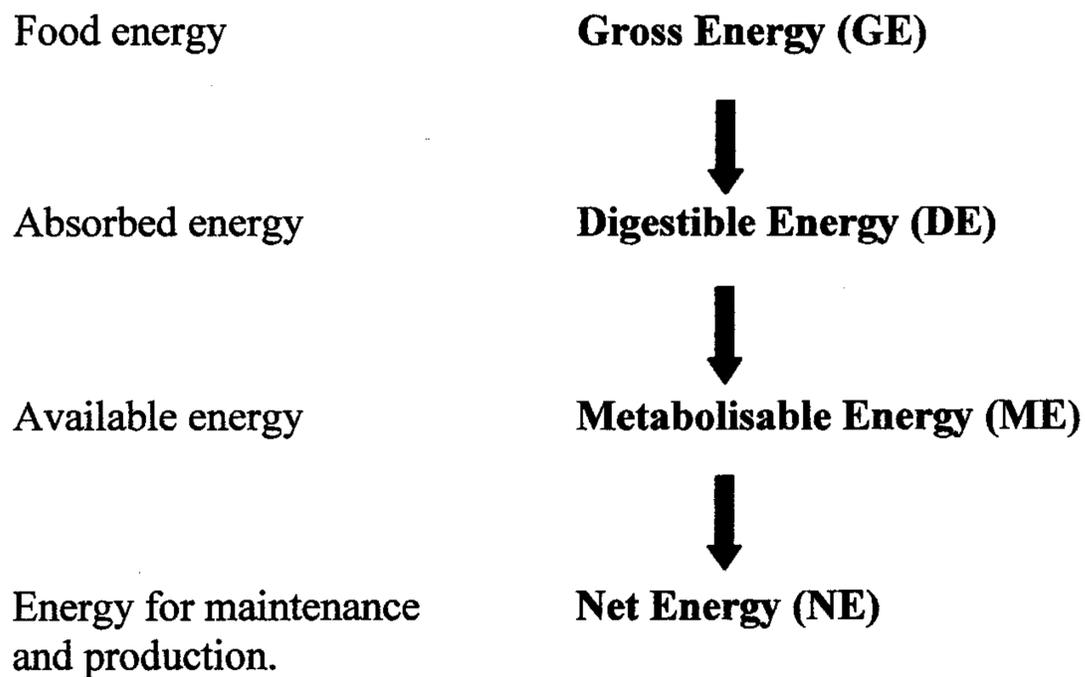
Using a crop that you have studied demonstrate the meaning of $P = G + E$

(6 marks)

| Recommended Response Length (this is a guide only). | |
|--|--|
| Value of the question (marks) | Recommended length of answer (number of lines) |
| 1 | 2 |
| 2 | 4 |
| 3 | 7 |
| 4 | 10 |
| 5 | 13 |
| 6 | 16 |
| 7 | 19 |
| 8 | 22 |

Question 5. (15 marks)

(a) The diagram below shows the fate of energy in animal nutrition.



Outline the fate of energy in food eaten by a ruminant animal. (2 marks)

(b) Compare the role of the hormones oestrogen and progesterone in the regulation of animal reproduction. (2 marks)

(c) Describe the process of growth and development in animals in terms of bone, muscle and fat. (2 marks)

(d) Name TWO factors that limit fertility in farm animals.
For each factor, explain ONE management practice that improves fertility in farm animals. (3 marks)

(e) The following is a feed label from a bag of feed used in an animal enterprise -

Feed

| | |
|----------------------------|------------|
| Protein (%) | 22.0 |
| Digestible energy (MJ/kg) | 18.0 |
| Fibre (%) | 1.9 |
| Vitamins (A, B, C, D, etc) | Full range |
| Urea | nil |

(i) Describe the suitability of the above feed for ruminant and monogastric animals.

(ii) Evaluate the information on the label for ruminant and monogastric animals in terms of -

- * protein;
- * vitamins;
- * urea.

(6 marks)

End of section II

SECTION III

15 marks

Attempt ONE question from Questions 6 - 9

Allow about 30 minutes for this section

Answer the question in a writing booklet. Extra writing booklets are available.

Question 6. (15 marks)

- (a) For a crop or pasture that you have studied describe the types of plant interference that could have adversely impacted on its productivity. (5 marks)
- (b) For a crop or pasture that you have studied and one potential pest or disease, assess the effectiveness of the recommended Integrated Pest Management program. (10 marks)

OR

Question 7. (15 marks)

- (a) Plant breeding systems (or methods of developing superior plants) for agriculture include -

| Group A | Group B |
|--|---|
| <ul style="list-style-type: none"> * Inbreeding * Crossbreeding inbred lines * Crossbreeding - open pollination * Crossbreeding - wide cross | <ul style="list-style-type: none"> * Genetic engineering * Tissue culture * Leaf and stem cuttings |

Choose one system from group A and one from group B, and compare the genetic basis for plant improvement. (5 marks)

- (b) Assess native and introduced pasture species as sources of both feed quantity and quality. (10 marks)

OR

Question 8. (15 marks)

- (a) Describe how organic matter can improve the physical and chemical characteristics of a soil. (5 marks)
- (b) Define "sustainable farming."
Assess the effectiveness of sustainable farming practices that have now been adopted by many farmers. (10 marks)

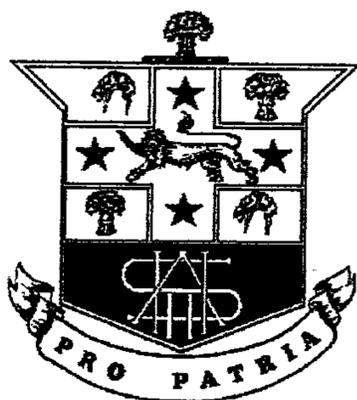
OR

Question 9. (15 marks)

- (a) Describe the genetic benefits gained from linebreeding, inbreeding and crossbreeding in animals. (5 marks)
- (b) Evaluate THREE management practices that are components of an Integrated Pest Management program for an animal disease you have studied. (10 marks)

End of Paper 1.

HURLSTONE AGRICULTURAL HIGH SCHOOL



Trial Higher School Certificate Examination 2007

AGRICULTURE

Paper 2

General Instructions:

- * Paper 2 should be attempted only by students who have studied the electives
- * Reading time - 5 minutes
- * **Working time - 1 hour**
- * Write using a black or blue pen
- * Write your student number at the top of each answer booklet.
- * Use a separate answer booklet for each of your two electives
- * Extra answer booklets are available

Total marks - 30 marks

- * Attempt TWO questions from questions 1 - 6
- * Allow about 30 minutes for each question.

Total marks - 30

Attempt TWO questions from Questions 1 - 6

Allow about 30 minutes for each question

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

Question 1 - Agribusiness (15 marks)

This elective is not offered at Hurlstone and hence there is no question for you to attempt.

Do not attempt this elective in the HSC.

Question 2 - Animal Management (15 marks)

- (a) Describe the nature of the immune system and how it prevents disease by vaccination. (3 marks)
- (b) Describe how ONE breeding technique is used to manipulate reproduction in farm animals. (4 marks)
- (c) State the aim of one study of a current technique/technology which is advancing productivity in animal production systems.
Outline the findings of this study.
Assess the appropriateness of the methods used to carry out this study. (8 marks)

Question 3 - Horticulture (15 marks)

This elective is not offered at Hurlstone and hence there is no question for you to attempt.
Do not attempt this elective in the HSC.

Question 4 - Innovation and Diversification (15 marks)

This elective is not offered at Hurlstone and hence there is no question for you to attempt.
Do not attempt this elective in the HSC.

Question 5 - Plant Management (15 marks)

- (a) Describe the process of reproduction in flowering plants. (3 marks)
- (b) Roots, stems and leaves are the main organs of plants. Select ONE of these organs, and explain how its cellular anatomy relates to the function of the organ. (4 marks)
- (c) State the aim of one study of plant breeding or related research in advancing productivity in plant production.
Outline the findings of this study.
Assess the appropriateness of the methods used to carry out this research. (8 marks)

Question 6 - Sustainable Land and Resource Management (15 marks)

- (a) Describe how an Australian land capabilities system can be applied to ensure sustainable land use. (3 marks)
- (b) Describe the farming practices that produce acidified soils. (4 marks)
- (c) Describe ONE study of an innovative technology or practice that assists with the conservation and efficient use of water in agricultural production systems.
Outline the findings or results of the study.
Describe the method(s) that was used to present the data. (8 marks)