

# **G12 ECZ AGRICULTURAL SCIENCE 2017 GCE PAPER 1 SOLUTIONS**

**Grade 12 ECZ Agricultural Science 2017 GCE Paper 1 (5037/1) — Theory**

2 hours | Section A (Q1–5, answer all) + Section B (Q6–10, answer any three)

*The full question paper appears first — worked answers follow.*

Candidate Name \_\_\_\_\_

|               |                  |
|---------------|------------------|
| Centre Number | Candidate Number |
|               |                  |

## EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

### Agricultural Science

5037/1

#### Paper 1 Theory

Tuesday

8 AUGUST 2017

Additional Materials

Answer Booklet

Time: 2 hours

#### Instructions to candidates

Write your **name**, **centre number** and **candidate number** in the spaces at the top of this page and on the Answer Booklet.

There are **ten** questions in this paper.

#### Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

#### Section B

Answer any **three** questions.

Write your answers in the Answer Booklet provided.

At the end of the examination:

- 1 fasten the Answer Booklet securely to the question paper.
- 2 enter the numbers of the **Section B** questions you have answered in the grid for Examiner's use.

#### Information for candidates

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

You are advised to spend no longer than 40 minutes on **Section A**.

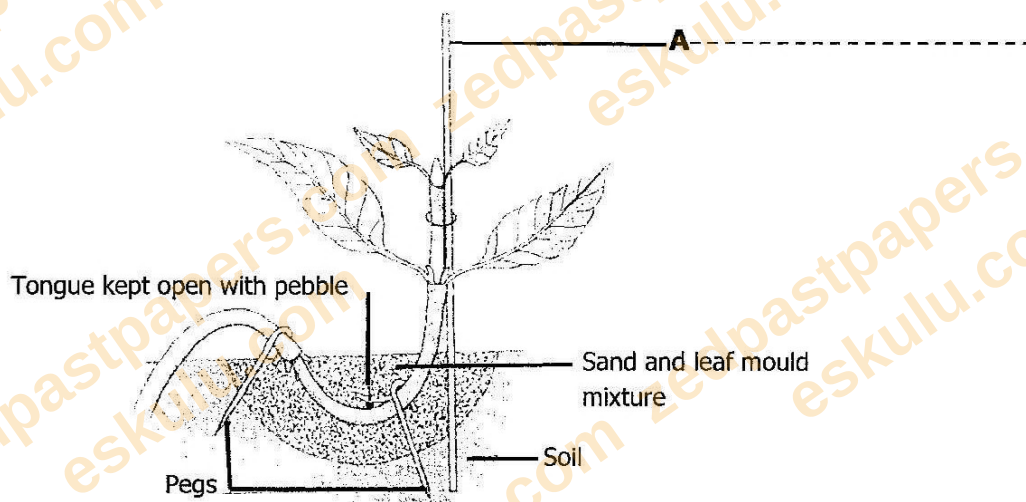
**Cell phones are not allowed in the examination room.**

| FOR EXAMINER'S USE |  |
|--------------------|--|
| Section A          |  |
| Section B          |  |
|                    |  |
|                    |  |
| Total              |  |

Section A

Answer all questions in this section

1 **Figure 1** shows a vegetative propagation method.



**Figure 1**

- (a) (i) Identify the vegetative propagation method represented by **figure 1**.

..... [1]

- (ii) Label part **A** on the diagram. [1]

- (iii) Outline **two** conditions that lead farmers to using the method in **figure 1**.

1 .....

.....

2 .....

..... [2]

(b) Give **two** advantages for carrying out vegetative propagation.

1 .....

.....

2 .....

.....

[2]

(c) How would a farmer:

(i) ensure that the plant structure in **figure 1** survives?

.....

.....

[1]

(ii) conclude that the structure is growing well?

.....

.....

[1]

[8 marks]

- 2 (a) What is meant by the term "day length" in agriculture?

..... [2]

- (b) State the importance of day length to crop growth.

.....  
.....  
..... [2]

- (c) Explain how farmers apply the knowledge of day length in agriculture.

.....  
.....  
..... [2]

- (d) Classify sweet potatoes and maize crops according to day length.

**Sweet potatoes** .....

.....

**Maize** .....

..... [2]

[8 marks]

3 Figure 2 shows the digestive system of a hen.

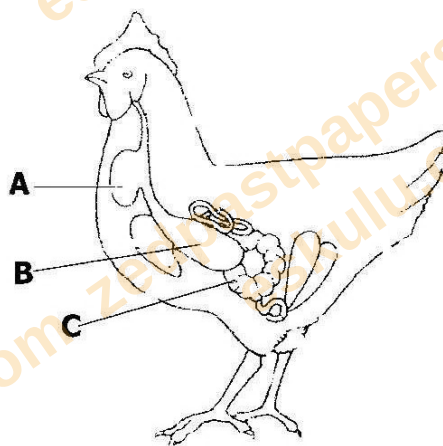


Figure 2

(a) Name the structures labelled **A**, **B** and **C**.

**A** ..... [1]

**B** ..... [1]

**C** ..... [1]

(b) Explain the functions of the structures labelled **A** and **B**.

**A** ..... [1]  
 .....

**B** ..... [2]  
 .....

(c) How can you prevent a hen from laying soft-shelled eggs?

..... [1]  
 .....

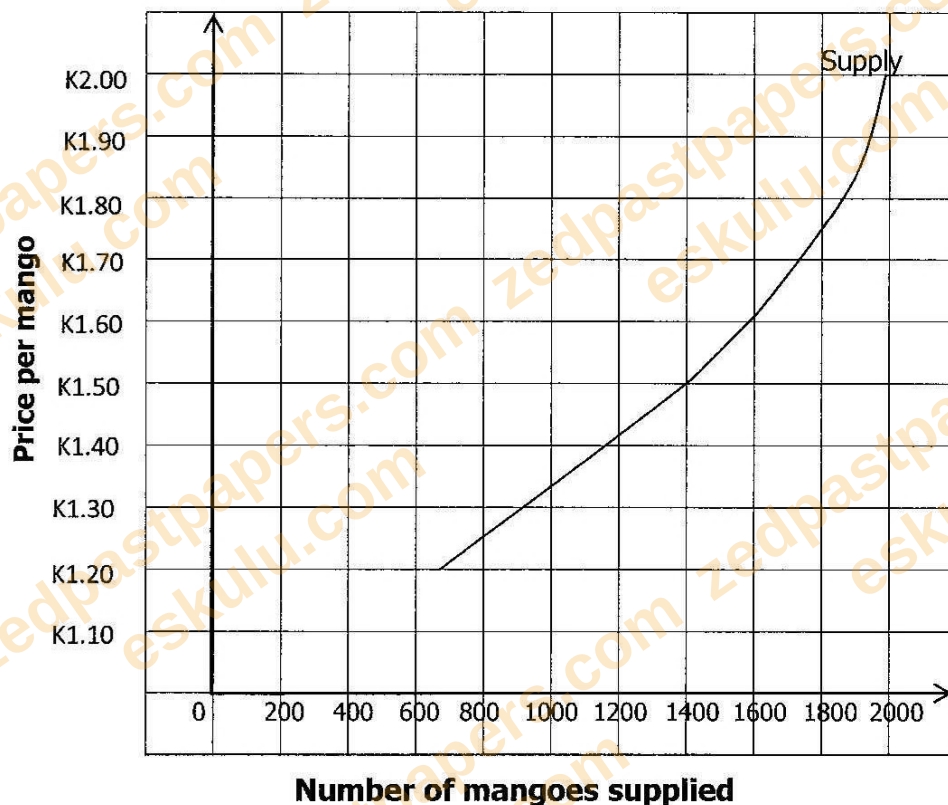
(d) What should a farmer do to improve the function of structure **C** in a hen?

..... [1]  
 .....

[8 marks]

[Turn over]

4 **Figure 3** shows a relationship between supply and price.



**Figure 3**

(a) What is the price per mango when:

(i) 700 mangoes are supplied?

..... [1]

(ii) 2000 mangoes are supplied?

..... [1]

(iii) How many mangoes will be supplied at the price of K1.80 per mango?

..... [1]

(b) State **three** factors of production on a farm.

.....

.....

.....

[3]

(c) Give **two** ways by which a farmer can increase sales of agricultural produce/products on a farm.

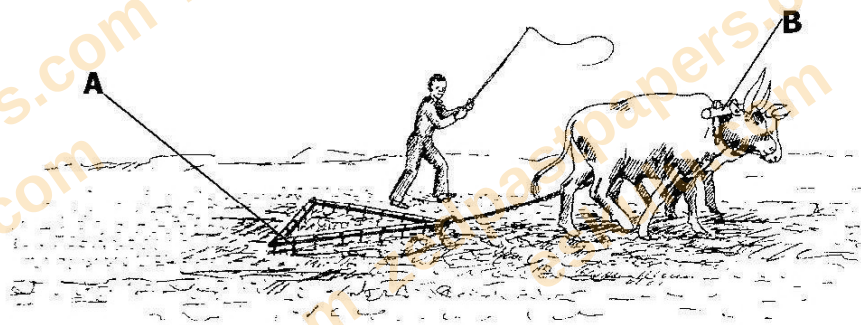
.....

.....

[2]

[8 marks]

5 **Figure 4** shows a farm activity during seedbed preparation.



**Figure 4**

(a) Identify the farm activity represented by **figure 4**.

..... [1]

(b) Name:

(i) the implement labelled **A**.

..... [1]

(ii) the implement labelled **B**?

..... [1]

(c) Give **three** reasons for using the farm implement labelled **A**.

(i) .....

.....

(ii) .....

.....

(iii) .....

..... [3]

(d) Outline maintenance practices which need to be carried out on the farm implement labelled **A**.

.....

.....

.....

..... [2]

**[8 marks]**

**Section B****Answer any three questions from this section.**

- 6** (a) Explain why the local soil and weather conditions are suitable for growing groundnuts in your area. [9]
- (b) Discuss the growing of groundnuts under the following:
- (i) Preparation of soil for sowing, [3]
- (ii) Sowing, [4]
- (iii) Weed control. [4]
- [Total: 20]**
- 7** (a) Outline the factors that affect the development of agriculture in Zambia. [11]
- (b) Give examples of different kinds of agricultural enterprises. [9]
- [Total: 20]**
- 8** (a) Explain why fish farmers prefer *Tilapia* breed of fish in fish farming. [10]
- (b) (i) What is integrated fish farming? [3]
- (ii) State the advantages of integrated fish farming. [4]
- (c) Describe different ways of harvesting fish from fish ponds. [3]
- [Total: 20]**
- 9** (a) Describe how cooperatives are organized. [14]
- (b) Explain the common interest of farmers in a cooperative. [6]
- [Total: 20]**
- 10** (a) List **six** advantages of mechanizing agriculture. [6]
- (b) Outline the different maintenance activities to be carried out on farm equipment before storing them. [8]
- (c) Describe a suitable site for farm buildings. [6]
- [Total: 20]**



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**Question 1. Figure 1 shows a vegetative propagation method: a stem pegged into a sand-and-leaf-mould mixture in the soil, with a tongue cut kept open by a pebble, and part A above ground.**

**Answer: (a)(i) Vegetative propagation method: LAYERING.**

**Answer: (a)(ii) Part A: the PARENT PLANT (the parent stem/shoot, which stays attached to the layer).**

**(a)(iii) Two conditions that lead farmers to use layering:**

**Answer: 1. When the plant does not root easily from cuttings or is difficult to raise from seed.**

**Answer: 2. When the plant has low, flexible branches that can be bent down and pegged into the soil.**

**(b) Two advantages of vegetative propagation:**

**Answer: 1. The offspring are identical to the parent (true-to-type), keeping the parent's good qualities.**

**Answer: 2. The plants mature and bear earlier than plants raised from seed, and a plant that produces no viable seed can still be multiplied.**

**Answer: (c)(i) How a farmer ensures the structure survives: keep the buried part firmly pegged and the soil moist by watering regularly, and protect it from disturbance and animals.**

**Answer: (c)(ii) How a farmer concludes it is growing well: new shoots and leaves develop and roots form at the buried part (the layer stays green and healthy).**

**Question 2. Day length in agriculture.**

**Answer: (a) Day length (photoperiod): the number of hours of daylight (the length of the light period) a plant receives in a 24-hour day.**

**(b) Importance of day length to crop growth:**

**Answer: It controls flowering and reproduction in many crops (photoperiodism), influences bulb and tuber formation, and affects the time of maturity — so it determines which crops do well in a season.**

**Answer: (c) How farmers apply the knowledge of day length: they choose crops/varieties suited to the season's day length and time their planting so that flowering occurs at the right day length (and, in horticulture, may use artificial lighting to control flowering).**

**Answer: (d) Classification: Sweet potatoes = SHORT-DAY plant; Maize = DAY-NEUTRAL plant (not greatly affected by day length).**

**Question 3. Figure 2 shows the digestive system of a hen, with structures A, B and C.**

**Answer: (a) Structures: A = CROP; B = PROVENTRICULUS (true/glandular stomach); C = GIZZARD.**

**(b) Functions of A and B:**

Answer: A (crop) — temporarily stores and softens/moistens the food before it passes on.

Answer: B (proventriculus) — secretes digestive juices (acid and enzymes) that begin digestion, especially of protein.

Answer: (c) How to prevent a hen from laying soft-shelled eggs: provide enough CALCIUM in the diet (limestone/oyster-shell grit) together with vitamin D and a balanced ration.

Answer: (d) To improve the function of structure C (gizzard): provide GRIT (small stones) for the hen to swallow, since the gizzard needs grit to grind the food (birds have no teeth).

**Question 4. Figure 3 is a supply curve showing the relationship between the price per mango and the number of mangoes supplied.**

Answer: (a)(i) Price when 700 mangoes are supplied: about K1.35 (read from the curve).

Answer: (a)(ii) Price when 2,000 mangoes are supplied: about K2.00.

Answer: (a)(iii) Number of mangoes supplied at K1.80 per mango: about 1,700 mangoes.

Answer: (b) Three factors of production on a farm: Land, Labour and Capital (plus Management).

(c) Two ways a farmer can increase sales of produce:

Answer: 1. Improve the quality, grading and packaging of the produce. 2. Advertise/promote it and sell at competitive prices in accessible markets (or add value by processing).

**Question 5. Figure 4 shows a farm activity during seedbed preparation — an animal-drawn implement A being pulled, with B at the oxen.**

Answer: (a) Farm activity: HARROWING (secondary cultivation to prepare the seedbed).

Answer: (b)(i) Implement A: a HARROW.

Answer: (b)(ii) B: the YOKE (the beam fastened across the oxen's necks to which the implement is hitched).

(c) Three reasons for using the harrow (A):

Answer: (i) To break the clods into a fine tilth/seedbed.

Answer: (ii) To level the soil surface.

Answer: (iii) To cover the broadcast seed and to uproot/control young weeds.

Answer: (d) Maintenance of the harrow: clean off soil after use, oil/grease the metal parts, sharpen or replace worn tines, tighten loose bolts, and store it under shelter.

**Question 6. [SECTION B] (a) Explain why the local soil and weather conditions are suitable for growing groundnuts in your area. (b) Discuss the growing of groundnuts under: (i) preparation of soil for sowing, (ii) sowing, (iii) weed control.**

(a) WHY LOCAL CONDITIONS SUIT GROUNDNUTS:

**Answer:** Groundnuts do best on deep, loose, well-drained SANDY-LOAM soils that let the pegs enter easily — the kind common in many local areas; they need WARM temperatures, a MODERATE, well-distributed rainfall (about 500–600 mm) during growth, followed by a DRY spell for ripening and harvest — conditions that the local climate generally provides.

**Answer: (b)(i) PREPARATION OF SOIL FOR SOWING:** clear the land, plough and then harrow to a loose, fine, well-drained tilth; level the seedbed; and apply lime if the soil is acidic.

**Answer: (b)(ii) SOWING:** use certified seed shelled just before planting and dressed with a fungicide; sow at the onset of the rains about 5 cm deep at roughly 45 cm between rows and 10–15 cm within the row, placing the seeds singly.

**Answer: (b)(iii) WEED CONTROL:** weed early and regularly by hand-hoeing or with herbicides while the crop is young; keep cultivation shallow; and stop weeding once pegging begins so the developing pods are not disturbed.

**Question 7. (a) Outline the factors that affect the development of agriculture in Zambia. (b) Give examples of different kinds of agricultural enterprises.**

(a) FACTORS AFFECTING AGRICULTURAL DEVELOPMENT IN ZAMBIA:

**Answer:** Availability of capital and credit; markets and prices; transport and infrastructure (roads, storage); government policy and support; climate and rainfall; soil type and fertility; pests and diseases; availability of skilled labour; the level of technology, research and extension; and land tenure/availability.

(b) EXAMPLES OF AGRICULTURAL ENTERPRISES:

**Answer:** Crop enterprises (e.g., maize, groundnuts, cotton, vegetables/horticulture); livestock enterprises (e.g., beef and dairy cattle, poultry, piggery, goats); fish farming; and mixed farming (crops and livestock together).

**Question 8. (a) Explain why fish farmers prefer the Tilapia breed in fish farming. (b)(i) What is integrated fish farming? (ii) State the advantages of integrated fish farming. (c) Describe different ways of harvesting fish from fish ponds.**

(a) WHY FARMERS PREFER TILAPIA (BREAM):

**Answer:** It grows fast; it is hardy and resistant to disease; it tolerates poor water and low oxygen; it breeds easily and is prolific; it feeds on a wide range of cheap food (omnivorous); it tolerates high stocking density; and it has a good taste and ready market.

**Answer: (b)(i) INTEGRATED FISH FARMING:** combining fish farming with another enterprise (crops or livestock) so that the wastes/by-products of one are used by the other — for example,

poultry or pig manure is used to fertilize the fish pond.

(b)(ii) ADVANTAGES OF INTEGRATED FISH FARMING:

**Answer:** It makes efficient use of resources and recycles wastes/nutrients; it cuts feed costs (manure feeds the pond); it diversifies and increases income; and it raises total productivity from the same piece of land.

**Answer: (c) WAYS OF HARVESTING FISH:** by netting (using a seine net); by draining the pond and collecting the fish; by hook and line; and by using traps/baskets.

**Question 9. (a) Describe how cooperatives are organized. (b) Explain the common interest of farmers in a cooperative.**

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(a) HOW COOPERATIVES ARE ORGANIZED:

**Answer:** Membership is **VOLUNTARY** and open; members join by buying shares and contribute the capital (with loans where needed). The cooperative is **REGISTERED** and run by a constitution/by-laws. Members are equal — it is **DEMOCRATIC** (one member, one vote) — and at the Annual General Meeting they elect a management committee/board. The committee appoints a manager to run the day-to-day work, and any surplus (profit) is shared among members as dividends in proportion to their dealings.

(b) COMMON INTEREST OF FARMERS IN A COOPERATIVE:

**Answer:** To buy inputs cheaply in bulk; to market their produce together for better prices and bargaining power; to obtain credit/loans and share services and equipment; and to help one another improve their farming.

**Question 10. (a) List six advantages of mechanizing agriculture. (b) Outline the maintenance activities to be carried out on farm equipment before storing them. (c) Describe a suitable site for farm buildings.**

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(a) SIX ADVANTAGES OF MECHANIZING AGRICULTURE:

**Answer:** It increases output/productivity; saves time and labour; allows operations to be done in good time; reduces drudgery; makes it possible to work large areas; and improves the quality and accuracy of the work (overcoming labour shortages).

(b) MAINTENANCE BEFORE STORING FARM EQUIPMENT:

**Answer:** Clean off all soil and trash and wash and dry the equipment; oil/grease the moving and metal parts to prevent rust; sharpen or replace worn parts; tighten loose bolts and repair any damage; drain fuel/water from engines; and store it under shelter, resting on blocks.

(c) A SUITABLE SITE FOR FARM BUILDINGS:

**Answer:** Well-drained, slightly elevated ground (to avoid flooding) with a firm foundation; near a reliable water supply; easily accessible by road and close to where it is used; away from sources of pollution and dwellings; and well oriented with respect to sun and wind, and secure.

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