

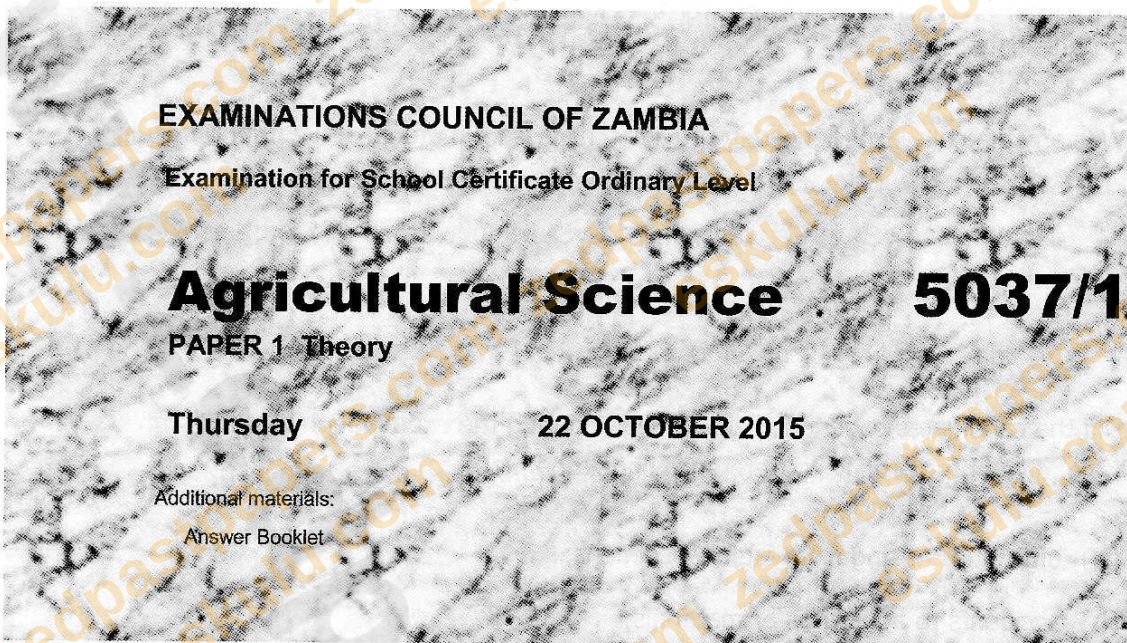
G12 ECZ AGRICULTURAL SCIENCE 2015 PAPER 1 SOLUTIONS

Grade 12 ECZ Agricultural Science 2015 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							



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	
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Total	

Section A

Answer all questions in this section

- 1 **Figure 1** shows an activity in the reproduction of cattle.



Figure 1

- (a) Identify the activity in **Figure 1**.

..... [1]

- (b) State the condition in which the cow must be for the activity to take place.

..... [1]

- (c) List the signs that help the farmer identify a cow in the condition stated in (b) above.

(i)

(ii) [2]

- (d) Name a farming practice similar to the activity shown **Figure 1**.

..... [1]

- (e) State the conditions necessary for the farming practice named in (d) to be successful.

(i)

(ii)

(iii) [3]

[Total: 8]

- 2 **Figure 2** shows a diagram of a soil profile.

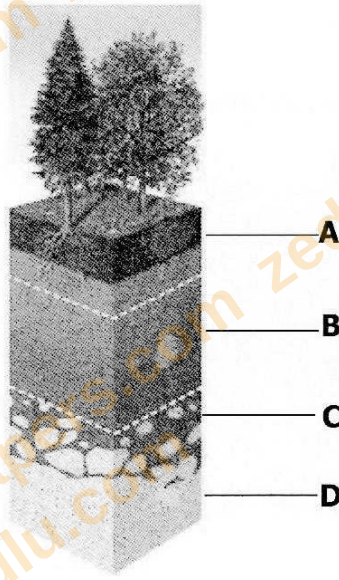


Figure 2

- (a) Name the layers labelled **A** to **D**.

A

B

C

D [4]

- (b) What is a soil profile?

.....

.....

..... [2]

- (c) State the importance of the soil profile of any arable land.

(i)

.....

(ii)

..... [2]

[Total: 8]

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- 3 (a) Name **two** types of exotic trees.
- (i)
- (ii) [2]
- (b) Explain how exotic trees are propagated.
-
-
- [2]
- (c) State **three** advantages of exotic trees over indigenous trees.
- (i)
- (ii)
- (iii)
- [3]
- (d) Give **one** reason for pruning plantation trees.
-
- [1]

[Total: 8]

- 4 **Figure 3** shows a method of propagation.

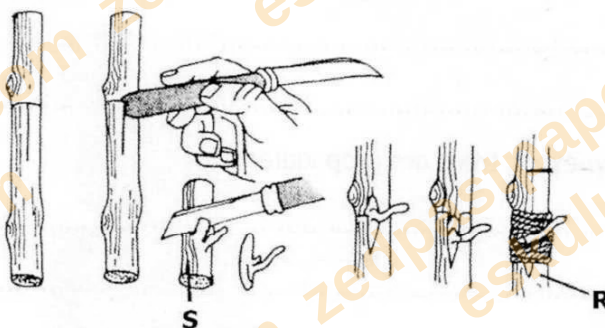


Figure 3

- (a) Identify the parts labelled **S** and **R**.

S

R [2]

- (b) Name the method of propagation shown in **Figure 3**.

..... [1]

- (c) State the type of citrus commonly used as **R** in citrus production.

..... [1]

- (d) List the advantages of using the citrus type named in (c) above when propagating citrus plants.

(i)

(ii)

(iii)

(iv)

..... [4]

[Total: 8]

- 5 **Figure 4** is a diagram of a tractor hydraulic jack machine.

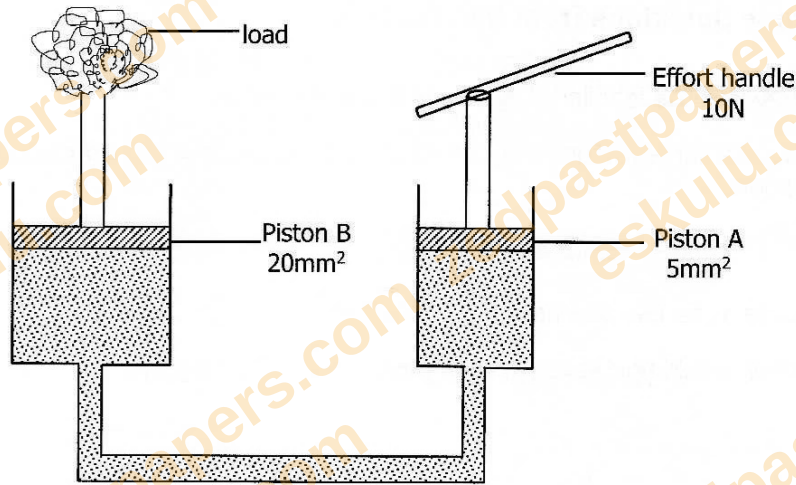


Figure 4

If a force of 10 Newtons is applied on the effort handle of piston **A**:

- (a) Calculate the pressure which will be transmitted in the liquid to piston **B**.
(show your working)

.....

.....

.....

..... [3]

- (b) Calculate the force by which piston B will be pushed upwards to lift the load..
(show your working)

.....

.....

.....

..... [3]

- (c) Work out the mechanical advantage of this hydraulic jack.

.....

.....

.....

..... [2]

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[Total: 8]

Section B

Answer any three questions from this section.

6 (a) Draw a large labelled diagram of the water cycle. [11]

(b) Discuss some factors that can affect the development of agriculture in a nation. [9]

[Total: 20]

7 (a) Explain the use of water in a cow's body. [10]

(b) What would you consider when designing a housing system for cattle? [10]

[Total: 20]

8 (a) List the common types of fish you have studied. [2]

(b) Describe a suitable site for making a fish pond. [3]

(c) Explain how a farmer can construct a fish pond. [15]

[Total: 20]

9 (a) State the functions of the following hand tools on a farm:

(i) spade

(ii) shovel

(iii) rake, and

(iv) Wheelbarrows [4]

(b) Discuss the maintenance of hand tools on a farm. [7]

(c) (i) Describe primary tillage. [2]

(ii) List the advantages of primary tillage. [7]

[Total: 20]

10 Distinguish clearly between:

(a) supply and demand. [12]

(b) variable and fixed costs. [8]

[Total: 20]



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Question 1. Figure 1 shows an activity in the reproduction of cattle (a bull mounting a cow).

Answer: (a) Activity: natural MATING (natural service / copulation).

Answer: (b) Condition the cow must be in: she must be ON HEAT (in oestrus).

(c) Two signs that help the farmer identify a cow on heat:

Answer: (i) Restlessness and bellowing; she mounts other cows or stands still to be mounted.

Answer: (ii) A swollen, reddened vulva with a clear mucus discharge (and often a drop in milk yield/appetite).

Answer: (d) A similar farming practice: ARTIFICIAL INSEMINATION (A.I.).

(e) Conditions for A.I. to be successful:

Answer: (i) The cow must be on heat and inseminated at the correct time.

Answer: (ii) Good-quality, viable semen that has been properly stored (in liquid nitrogen).

Answer: (iii) A skilled/trained inseminator using clean, sterile equipment and correct technique.

Question 2. Figure 2 shows a diagram of a soil profile with layers A to D (top to bottom).

Answer: (a) Layers: A = TOPSOIL (A horizon); B = SUBSOIL (B horizon); C = WEATHERED ROCK / parent material (C horizon); D = BEDROCK (solid parent rock).

Answer: (b) A soil profile is a VERTICAL SECTION through the soil showing the different layers (horizons) from the surface down to the parent rock.

(c) Importance of the soil profile on arable land:

Answer: (i) It shows the depth of topsoil and the rooting/drainage conditions, helping decide whether the land is suitable for crops.

Answer: (ii) It guides land use and management (e.g., choice of crops, need for drainage or deep cultivation).

Question 3. Exotic trees.

Answer: (a) Two types of exotic trees: (i) Eucalyptus (gum tree); (ii) Pine (Pinus). (Also cypress, grevillea, jacaranda.)

Answer: (b) How exotic trees are propagated: mainly by SEED raised in nursery seedbeds and later transplanted to the field (some are also raised from cuttings).

(c) Three advantages of exotic trees over indigenous trees:

Answer: (i) They grow faster and mature earlier.

Answer: (ii) They produce straight stems giving good-quality, useful timber.

Answer: (iii) They give higher and more uniform yields and are easier to manage.

Answer: (d) One reason for pruning plantation trees: to remove side branches so as to produce straight, knot-free timber of good quality (and encourage upward growth).

Question 4. Figure 3 shows a method of plant propagation (a scion joined onto a rootstock and bound at R).

Answer: (a) Parts: S = SCION (the selected upper shoot/bud that bears the wanted variety); R = ROOTSTOCK (the lower rooted plant onto which the scion is joined).

Answer: (b) Method of propagation: GRAFTING.

Answer: (c) Type of citrus commonly used as the rootstock (R) in citrus production: ROUGH LEMON.

(d) Advantages of using rough lemon as the rootstock when propagating citrus:

Answer: (i) It is resistant/tolerant to many root pests and diseases.

Answer: (ii) It has a vigorous, deep root system giving strong, healthy growth.

Answer: (iii) It tolerates drought and a range of soil conditions.

Answer: (iv) It brings plants into bearing earlier and gives uniform, true-to-type trees (good roots combined with a good fruiting scion).

Question 5. Figure 4 is a tractor hydraulic jack: effort 10 N is applied on piston A (area 5 mm²); piston B has area 20 mm².

(a) Pressure transmitted to the liquid (and to piston B) = Force ÷ Area of A = 10 N ÷ 5 mm².

Answer: Pressure = 2 N/mm².

(b) Force pushing piston B up = Pressure × Area of B = 2 N/mm² × 20 mm².

Answer: Force on piston B = 40 N.

(c) Mechanical Advantage = Load ÷ Effort = 40 N ÷ 10 N.

Answer: Mechanical Advantage = 4.

Question 6. [SECTION B] (a) Draw a large labelled diagram of the water cycle. (b) Discuss some factors that can affect the development of agriculture in a nation.

(a) THE WATER CYCLE (label these stages in the diagram):

Answer: Sun heats water in seas, rivers and lakes → EVAPORATION (and TRANSPIRATION from plants) → water vapour rises and cools → CONDENSATION forms clouds → PRECIPITATION (rain/snow) falls → water flows as RUN-OFF into rivers/lakes or soaks in by INFILTRATION (and percolation to groundwater) → returns to the sea, and the cycle repeats.

(b) FACTORS AFFECTING AGRICULTURAL DEVELOPMENT IN A NATION:

Answer: Capital and credit facilities; government policy and support; availability of markets and good prices; transport and infrastructure (roads, storage); climate and weather; soil type and

fertility; pests and diseases; availability of skilled labour; level of technology and research/extension; and land tenure/availability.

Question 7. (a) Explain the use of water in a cow's body. (b) What would you consider when designing a housing system for cattle?

(a) USES OF WATER IN A COW'S BODY:

Answer: Aids digestion and the breakdown of food; transports nutrients and oxygen in the blood; regulates body temperature (cooling); is the main constituent of milk (milk is about 87% water); removes wastes through urine and sweat; is the medium for body chemical reactions/metabolism; keeps cells turgid; produces saliva and lubricates joints.

(b) CONSIDERATIONS WHEN DESIGNING CATTLE HOUSING:

Answer: Adequate space per animal; good ventilation and lighting; easy drainage and easy cleaning (sloped floor); protection from rain, sun, cold and wind; durable, affordable materials; a well-drained site away from dwellings; provision of feed and water troughs; waste/manure management; and security.

Question 8. (a) List the common types of fish studied. (b) Describe a suitable site for making a fish pond. (c) Explain how a farmer can construct a fish pond.

Answer: (a) Common types of fish: TILAPIA (bream) and CATFISH (barbel).

Answer: (b) A suitable site: on a gentle slope, near a reliable source of clean water, on water-retaining (clay) soil, away from trees and flood paths, and easily accessible.

(c) CONSTRUCTING A FISH POND:

Answer: Select and clear the site and mark it out; dig out the pond, creating a shallow end and a deeper end; build and compact the dykes/walls with clay soil; puddle (compact) the floor to reduce seepage; fit an inlet and an outlet pipe each with a screen to control water and keep fish in; fill the pond with water and check for leaks; lime and fertilize the water to encourage natural food; then stock it with fingerlings.

Question 9. (a) State the functions of: (i) spade, (ii) shovel, (iii) rake, (iv) wheelbarrow. (b) Discuss the maintenance of hand tools. (c)(i) Describe primary tillage; (ii) list the advantages of primary tillage.

Answer: (a)(i) SPADE — for digging, lifting and turning soil and making drains/holes.

Answer: (a)(ii) SHOVEL — for lifting and moving loose materials such as soil, sand and manure.

Answer: (a)(iii) RAKE — for levelling soil, breaking clods, gathering trash/leaves and preparing a fine seedbed.

Answer: (a)(iv) WHEELBARROW — for carrying and transporting materials (manure, soil, tools, harvest) around the farm.

(b) MAINTENANCE OF HAND TOOLS:

Answer: Clean off soil after use and dry them to prevent rust; oil/grease metal parts; sharpen cutting edges; tighten or replace loose/broken handles; repair damage promptly; and store them in a dry shed/store.

Answer: (c)(i) **PRIMARY TILLAGE:** the first and deepest cultivation of land that opens, loosens and inverts the soil (e.g., ploughing) before a fine seedbed is made.

(c)(ii) **ADVANTAGES OF PRIMARY TILLAGE:**

Answer: Loosens and aerates the soil; buries weeds and crop residues; exposes pests to the sun and predators; improves water infiltration; incorporates manure; deepens the rooting zone; and helps control weeds.

Question 10. Distinguish clearly between: (a) supply and demand; (b) variable and fixed costs.

(a) **SUPPLY vs DEMAND:**

Answer: **SUPPLY** is the quantity of a good that producers are willing and able to offer for sale at a given price over a period of time — supply **RISES** as price rises (a direct relationship).

Answer: **DEMAND** is the quantity of a good that consumers are willing and able to buy at a given price over a period of time — demand **FALLS** as price rises (an inverse relationship).

(b) **VARIABLE vs FIXED COSTS:**

Answer: **FIXED COSTS** do NOT change with the level of output and are incurred even when nothing is produced (e.g., rent, land, machinery, permanent salaries).

Answer: **VARIABLE COSTS** CHANGE with the level of output and are zero when nothing is produced (e.g., seed, fertilizer, feed, fuel, casual labour).

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