



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2013**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 16 pages and 1 answer sheet.**

**INSTRUCTIONS AND INFORMATION**

1. GENERAL INSTRUCTIONS AND INFORMATION
  - 1.1 This question paper consists of TWO sections, namely SECTION A and SECTION B.
  - 1.2 BOTH sections are COMPULSORY.
2. SECTION A: MULTIPLE-CHOICE QUESTIONS
  - 2.1 Answer the questions in this section on the attached ANSWER SHEET.
  - 2.2 Follow the instructions when answering the multiple-choice questions.
  - 2.3 Place the COMPLETED ANSWER SHEET in the ANSWER BOOK.
3. SECTION B: STRUCTURED QUESTIONS
  - 3.1 This section consists of FIVE questions.
  - 3.2 Answer the questions in this section in the ANSWER BOOK.
  - 3.3 Number the answers correctly according to the numbering system used in this question paper.
  - 3.4 Start EACH question on a NEW page.
  - 3.5 Non-programmable calculators may be used.

**SECTION A****QUESTION 1**

Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A–C) next to the question number (1.1–1.20) on the attached ANSWER SHEET.

EXAMPLE:

1.0	<input checked="" type="checkbox"/> A	B	C
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- 1.1 Electricity may shock workers when ...
- A insulation material is damaged.
  - B farm implements are not maintained.
  - C unskilled people operate implements. (2)
- 1.2 The first action to take when a worker is shocked by electricity is to ...
- A call a doctor.
  - B switch off the source of electricity immediately.
  - C cool down the person with water. (2)
- 1.3 Water and foam extinguishers must not be used for ... fires.
- A wooden
  - B veld
  - C electrical (2)
- 1.4 Chromium added to form the alloy stainless steel, ensures that ...
- A resistance against corrosion is increased.
  - B it becomes brittle.
  - C it is a softer material to work with. (2)
- 1.5 Because of the enormous tension in electric fences the wires must be very strong. Therefore the minimum thickness of the wires must be ...
- A 3 mm.
  - B 4 mm.
  - C 5 mm. (2)
- 1.6 Safety signs displayed on electric fences warn people about ...
- A security companies.
  - B wooden poles with sharp nails.
  - C electricity. (2)

- 1.7 The ... process that takes place when the surface of mild steel is exposed to the elements of nature is the reason why steel turns red.
- A carbonising
  - B galvanising
  - C oxidising
- (2)
- 1.8 When an adhesive is chosen for a specific job, you must consider the ...
- A conditions under which the joint will be used.
  - B type of material to be joined.
  - C Both A and B
- (2)
- 1.9 The hardening agent used with resin can also be called a/an ...
- A acetone.
  - B catalyst.
  - C polymer.
- (2)
- 1.10 When building a wall, make sure that reinforcement is included after every ... layer of bricks.
- A 10<sup>th</sup>
  - B 7<sup>th</sup>
  - C 5<sup>th</sup>
- (2)
- 1.11 ... can be used to strengthen the openings above windows.
- A Steel
  - B Lintels
  - C Cement
- (2)
- 1.12 ... the soil below foundations prevents sagging that causes cracks in walls, floors and foundations.
- A Compacting
  - B Levelling
  - C Watering
- (2)
- 1.13 Cement is supplied in bags of ... kg.
- A 30
  - B 50
  - C 70
- (2)
- 1.14 Turbines driven by wind energy, are linked to ... to produce electricity.
- A generators
  - B carburettors
  - C batteries
- (2)

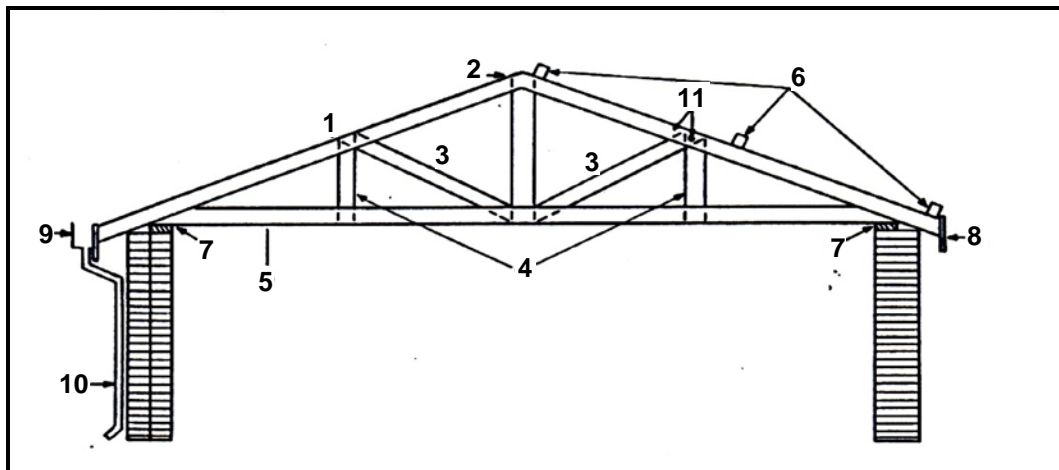
- 1.15 When you gas weld, the welding rod must be held at an angle of ... in relation to the work piece.
- A 10°
  - B 45°
  - C 60°
- (2)
- 1.16 When cast iron needs to be welded, it must be ... to prevent it from forming new cracks.
- A preheated
  - B bonded together with wire
  - C packed into ice for one hour
- (2)
- 1.17 When metal is heated it ... and when it cools down it shrinks.
- A corrodes
  - B distorts
  - C expands
- (2)
- 1.18 Vibration on a hammer mill can be prevented by ...
- A only using it for fresh plant material.
  - B ensuring that it is properly anchored.
  - C never running a tractor near it.
- (2)
- 1.19 When a hazardous substance, like acid, has been spilled it can be neutralised by using ...
- A vinegar.
  - B distilled battery water.
  - C a solution of bicarbonate of soda and water.
- (2)
- 1.20 All electrical appliances used on the farm must be earthed to prevent ...
- A the operator from receiving an electrical shock.
  - B vibrations.
  - C damage to the machine.
- (2)

**TOTAL SECTION A: 40**

**SECTION B**

**QUESTION 2: MATERIALS AND STRUCTURES**

2.1 A farmer needs to take the applicable building rules into account when he/she wants to build. Faulty constructions can lead to big losses due to the high cost of building material. Structures like the one below are used on the farm. Trusses form an important part of the structure.



Identify the parts of this structure numbered **3, 5, 8, 9** and **10**. (5)

2.2 A farmer needs to construct a flat roof over a shed. The span of the roof is 12 metres.

2.2.1 Design and draw a plain iron roof truss that will be strong enough to carry the weight of the roof.

Marks will be given for the following:

- State why you will use this type of construction in your design.
  - Beams
  - Struts
  - Wall
  - 12 m span
  - Neatness
  - Correctness
- (8)

2.2.2 Name TWO advantages of lintels. (2)

2.3 Foundations for all types of walls in buildings on the farm need to adhere to certain specifications.

2.3.1 Complete the table below on the sizes of concrete strip foundations for a farm building. Write down only the missing measurement next to the letter (A to D).

<b>INSIDE WALL FOUNDATION</b>	<b>OUTSIDE WALL FOUNDATION</b>
A. Width:	C. Width:
B. Thickness:	D. Thickness:

(4)

2.3.2 Name THREE types of walls that can be used on the farm and specify the measurements of each type.

(6)

2.3.3 Name the TWO brick bonds that are used to build walls and corners.

(2)

2.4 Describe TWO methods used to store cement and to protect it from moisture.

(2)

2.5 Name THREE places where a damp course can be used when a structure is erected on the farm.

(3)

2.6 List THREE types of material that can be used as an insulator between the wire and the post to prevent a short circuit on fences.

(3)

**[35]**

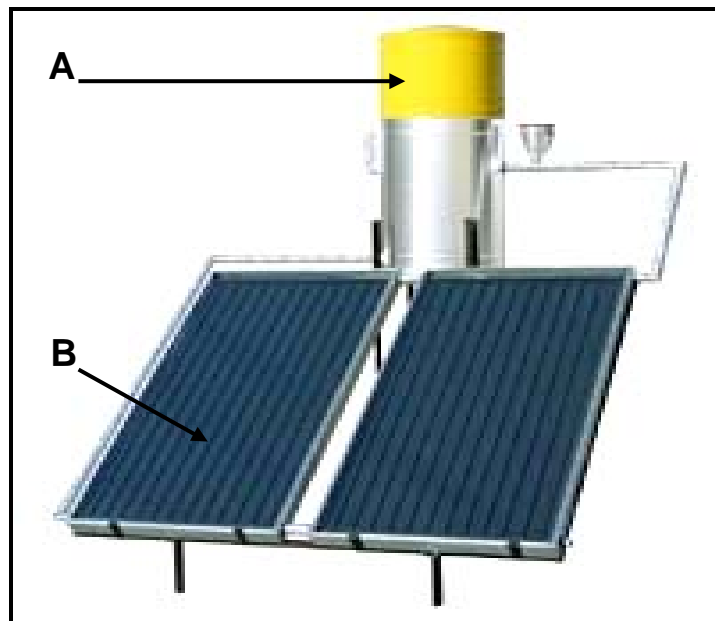
**QUESTION 3: ENERGY**

3.1 The solar panels below are used to supply electricity to a submersible pump that provides drinking water for farm animals. Answer the questions that follow.



- 3.1.1 Explain what is meant by *solar power*. (4)
- 3.1.2 Explain the conversion process of radiant energy (from the sun) to electricity that takes place in a solar panel. (4)
- 3.1.3 The efficiency of solar electric panels is reduced by certain factors. Describe TWO of these factors. (2)
- 3.1.4 Indicate the type of current that is generated by an electric solar panel. (1)

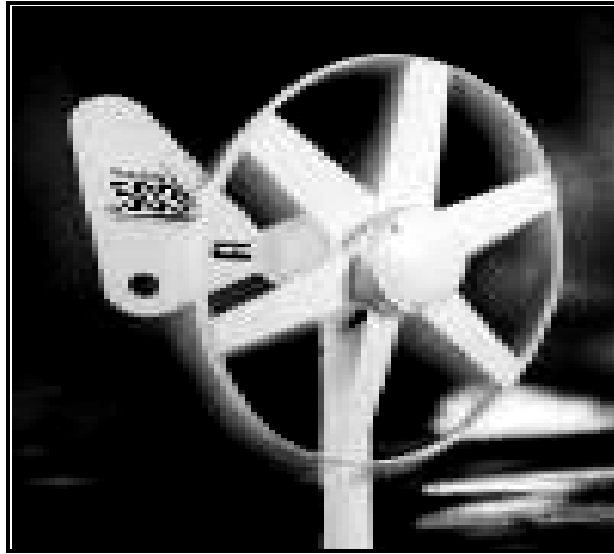
3.2 Study the picture below and answer the questions that follow.



- 3.2.1 Identify the devices that are labelled **A** and **B** in the picture above. (2)
- 3.2.2 Give a reason why this system is preferred to conventional systems as an alternative energy source. (1)



3.3 The picture below shows a wind turbine used to generate electricity on a farm.



3.3.1 State TWO factors to consider before buying a wind turbine for your farm. (2)

3.3.2 Name THREE disadvantages of wind turbines. (3)

3.4 Name ONE alternative fuel that originates from plants. (1)  
**[20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

4.1 The picture below shows a MIG welding machine. Answer the questions that follow.



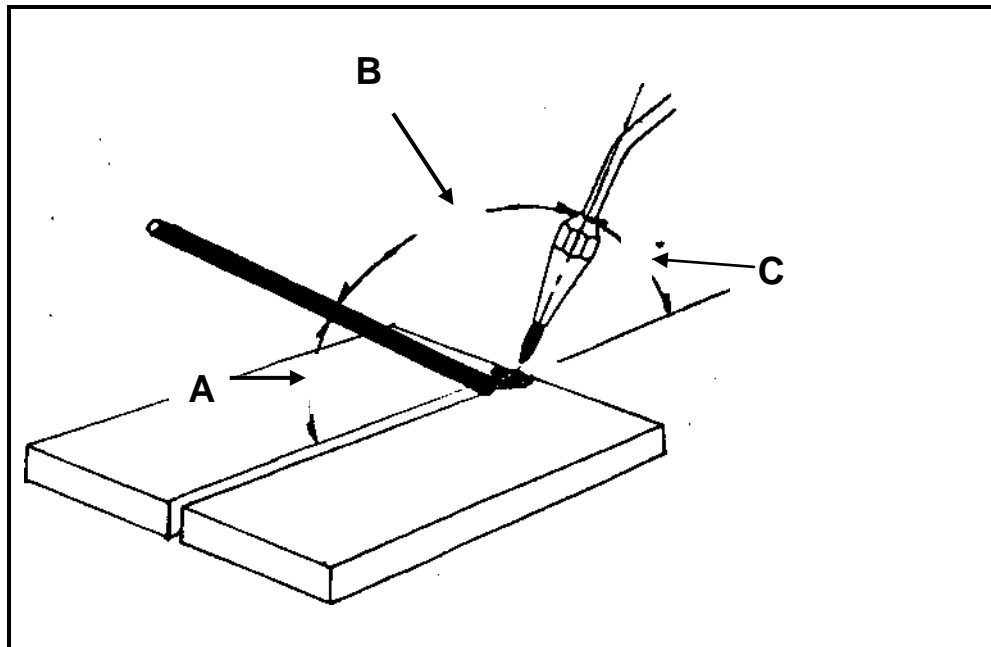
- 4.1.1 Explain the meaning of *MIG welding*. (3)
- 4.1.2 Name the THREE types of gases used in the MIG welding process. (3)
- 4.1.3 Indicate the correct method to use with a MIG welding head to produce a neat welding joint. (2)
- 4.1.4 Name the shielding gas that shields the welding area from the surrounding atmosphere (oxygen) during the welding process. (1)

4.2 The picture below shows a safety mechanism that is found on an oxy-acetylene welding apparatus.



- 4.2.1 Identify this safety mechanism. (1)

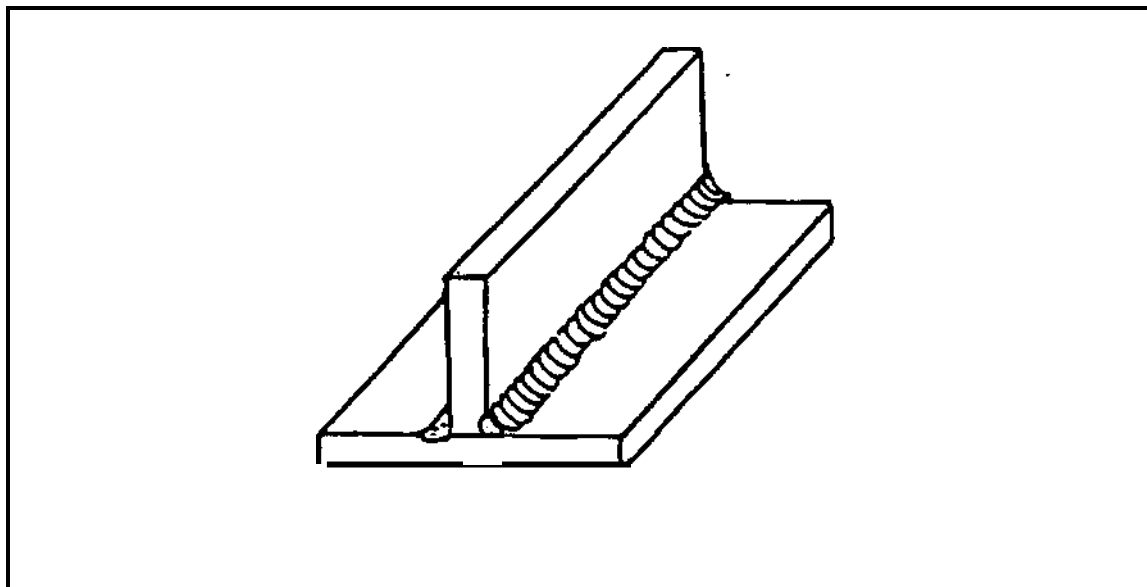
- 4.2.2 Describe the purpose of installing such a mechanism on the oxy-acetylene welding apparatus. (2)
- 4.2.3 Indicate the different angles between the electrode and the welding head of an oxy-acetylene welding set as indicated by the labels **A**, **B** and **C** in the sketch below.



(3)

- 4.2.4 Name the type of flame that should be used during the general oxy-acetylene welding process. (1)

- 4.3 The sketch below shows a workpiece that has been welded. Answer the questions that follow.



- 4.3.1 Name the type of welding joint indicated in the sketch above. (1)
- 4.3.2 List the types of shrinking that can occur during the welding process. (4)

4.3.3 State why welding joints shrink during the welding process. (1)

4.3.4 Name FOUR ways to prevent the distortion of metal caused by heat during the welding process. (4)

4.4 The picture below shows an anvil that has been welded.



4.4.1 Define the concept *hard facing*. (2)

4.4.2 List the different types of wear that metal parts can be subjected to. (4)

4.4.3 Discuss the process of hard-face welding. (3)  
**[35]**

**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**

5.1 The picture below shows a baling machine that is used to make hay bales.



5.1.1 Name the type of bale produced by the baler in the picture above. (1)

5.1.2 Indicate FIVE tasks that should be performed regularly to maintain this baler. (5)

5.2 A hammer mill can be used to mill fodder into different sizes. The sizes will be determined by the type of sieve that is used.



5.2.1 Name the factors that the farmer should consider when a suitable hammer mill is purchased. (4)

5.2.2 State the functions of the following parts of a hammer mill:

- (a) Rotor and hammers
  - (b) Sieves
  - (c) Fan
  - (d) Cyclone
- (4)

5.2.3 Safety is of the utmost importance when working with a hammer mill.

Describe FIVE measures that must be considered when working with this machine. (5)

5.3 The picture below shows a hydraulic cylinder that is used on farm equipment.



5.3.1 Identify the type of hydraulic cylinder indicated by the arrow in the picture. (1)

5.3.2 Which action of the hydraulic cylinder is the weakest, the push action or the pull action? Give a reason for your answer. (3)

5.4 Answer the following questions on the sensitivity element of a tractor.

5.4.1 Indicate THREE locations on the hydraulic power lift system of the tractor where the sensitivity element can be installed. (3)

5.4.2 Give another name for the *sensitivity element*. (1)

5.5 Modern combine harvesters use computers and satellite positioning systems to simplify operational activities.

5.5.1 Discuss the role of computers and satellite positioning systems in modern combine harvesters. (4)

5.5.2 State FIVE advantages of using combine harvesters over the traditional hand-picking method. (5)

5.6 A tractor, as shown below, is one of the necessities on a farm.



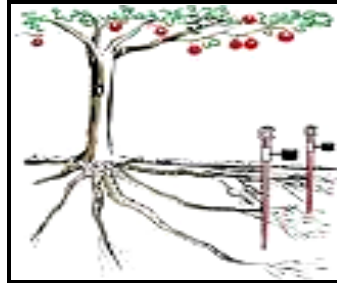
5.6.1 Explain what could be wrong with the tractor when blue smoke is visible from the exhaust pipe when the engine is running. (3)

5.6.2 Why is it important to standardise farm implements? (1)

**[40]**

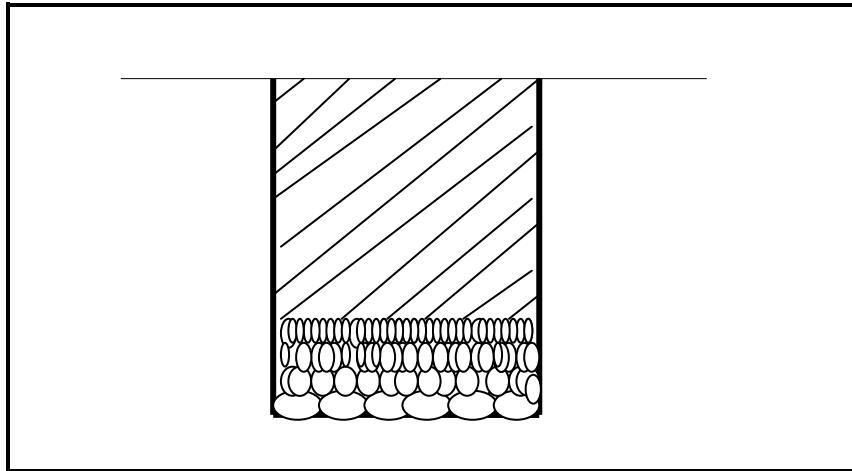
**QUESTION 6: WATER MANAGEMENT**

- 6.1 The picture below shows a fruit tree and equipment in the soil that is used for water management.



- 6.1.1 Identify the equipment shown in the illustration above. (1)
- 6.1.2 What is the purpose of the above equipment? (1)
- 6.2 Give ONE concept/word for each of the following descriptions by choosing a concept/word from the list below. Write only the concept/word next to the question number (6.2.1–6.2.5) in the ANSWER BOOK.
- stone drain; septic tank; fishbone drain; sieve; open drain
- 6.2.1 Ditches are dug at fixed depth levels to remove free water from waterlogged soil (1)
- 6.2.2 The bottom of the trench is loosely packed with large stones, covered with smaller stones and finally with soil (1)
- 6.2.3 This waste-water management system uses biological principles to break down the waste (1)
- 6.2.4 The lateral drain runs into the main drain at an angle of about 45° (1)
- 6.2.5 The opening of the drain should be covered with this to prevent soil or stones from falling in (1)
- 6.3 Drainage of agricultural soil is important for successful crop cultivation.
- 6.3.1 Name THREE types of drainage systems used in waterlogged fields. (3)
- 6.3.2 Describe TWO disadvantages of closed drainage systems. (2)
- 6.4 It is sometimes important for a farmer to determine the flow rate of water in a pipe system.
- 6.4.1 Give THREE reasons why it is necessary to determine the flow rate. (3)
- 6.4.2 Calculate the flow rate of water in a pipe system by using the data below. (Show ALL calculations.) (3)
- The liquid content of the tank is 8 000 litres.
  - It took 8 minutes to fill the tank to the top.

6.5 A cross section of a septic tank system is shown in the sketch below.



- 6.5.1 Septic tanks must have one or two manholes. State TWO functions of a manhole. (2)
- 6.5.2 Name FIVE components of a typical household sewage water system. (5)
- 6.6 List the factors that must be considered when installing drinking water for animals. (5)

[30]

**TOTAL SECTION B: 160**  
**GRAND TOTAL: 200**



**ANSWER SHEET****CENTRE NUMBER:**

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**EXAMINATION NUMBER:**

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**SECTION A****QUESTION 1**

1.1	A	B	C
1.2	A	B	C
1.3	A	B	C
1.4	A	B	C
1.5	A	B	C
1.6	A	B	C
1.7	A	B	C
1.8	A	B	C
1.9	A	B	C
1.10	A	B	C
1.11	A	B	C
1.12	A	B	C
1.13	A	B	C
1.14	A	B	C
1.15	A	B	C
1.16	A	B	C
1.17	A	B	C
1.18	A	B	C
1.19	A	B	C
1.20	A	B	C

**TOTAL SECTION A (20 x 2): 40****TOTAL:**

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