



# basic education

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

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2011**

**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 provided.
  - 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 It is in your own interest to pay attention to the accuracy and neatness of your work.

**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 The ... must be studied by the farmer and the workers to familiarise themselves with certain safety rules that are relevant to the workshop and the farm.
- A Labour Relations Act  
B Occupational Health and Safety Act (OHS)  
C DOE Act (2)
- 1.2 ... may never be grinded on a bench grinder. This material clogs the wheel pores causing over heating and subsequently a wheel that cracks at high speed injuring people.
- A Cast iron  
B Copper  
C Stainless steel (2)
- 1.3 Argon gas is associated with ... welding.
- A CO<sub>2</sub>  
B arc  
C oxy-acetylene (2)
- 1.4 Heat energy beneath the surface of the earth is used to heat water, producing steam, which drives the turbines of electrical power stations. This type of energy is called ... energy.
- A nuclear  
B bio-  
C geothermal (2)
- 1.5 The reason why black smoke can be seen at the exhaust of a diesel tractor is because ...
- A the piston rings are worn.  
B the diesel mixture is too rich.  
C water is leaking into the combustion chamber. (2)

- 1.6 Hydraulic tools are driven by ... pressure.
- A oil
  - B air
  - C water
- (2)
- 1.7 Stainless steel consists of a combination of metals. Indicate the correct group:
- A Steel, chrome and nickel
  - B Tin, manganese and silver
  - C Aluminium and zinc
- (2)
- 1.8 Which ONE of the following types of plastic is the least heat-resistant?
- A Teflon
  - B Perspex
  - C Bakelite
- (2)
- 1.9 The welding station is surrounded by plastic screens. These plastic screens must be light ...
- A translucent.
  - B absorbent.
  - C reflectant.
- (2)
- 1.10 A solar panel produces direct current with low voltage. The device used to change the direct current to alternating current if an alternating current motor is used, is called ...
- A a transformer.
  - B an alternator.
  - C a distributor.
- (2)
- 1.11 The bale density of rectangular bales can be changed by ...
- A increasing or decreasing the rate of baling.
  - B increasing or decreasing the density of the hay moving through the baling chamber.
  - C increasing the amount of hay that is fed into the baler.
- (2)
- 1.12 Communication systems such as ... are used to activate a centre-pivot irrigation system over long distances.
- A cellphones
  - B two-way radios
  - C the Internet
- (2)

- 1.13 The galvanised coating on pipes must be removed prior to welding because the gases given off during the welding process ...  
A are poisonous.  
B cause welding defects.  
C can cause an explosion. (2)
- 1.14 The poisonous exhaust gas from a petrol engine is ...  
A hydrochloric acid.  
B carbon monoxide.  
C carbon dioxide. (2)
- 1.15 The oil that can be used in the braking system of a vehicle is ...  
A of plant origin.  
B engine oil.  
C mineral oil. (2)
- 1.16 The colour of the fire extinguisher used to extinguish wood, paper or plastic fires is ...  
A green.  
B black.  
C red. (2)
- 1.17 The use of medical gloves when handling an injured person is absolutely necessary because blood can transmit ...  
A Aids.  
B HIV.  
C Both A and B (2)
- 1.18 The MIG welding process uses ... as a shield between the melted puddle and the surrounding atmosphere.  
A inserted gas  
B welding rod flux  
C acetylene gas (2)
- 1.19 The part on the three-point coupling of a tractor used to set the cross angle of a hitched implement like a plough is called a ...  
A top link.  
B levelling box.  
C sensitivity element. (2)
- 1.20 A borehole should be lined ...  
A to prevent loose soil and rocks from falling into the borehole.  
B to prevent water leakage.  
C to prevent pollution. (2)

**TOTAL SECTION A: 40**

**SECTION B****QUESTION 2: MATERIALS AND STRUCTURES**

2.1 Different materials and structures with different qualities and characteristics can be used for various purposes on the farm.

2.1.1 Adding alloy elements like chromium, manganese and nickel to it can alter the properties of stainless steel.

Name FIVE advantages of adding an alloy element like chromium to stainless steel. (5)

2.1.2 When farming with cattle the most important facility that you need, is a kraal where you can handle the cattle.

Design a kraal facility with THREE smaller kraals, a big kraal and a crush pen.

**INSTRUCTIONS:**

- Show the three smaller kraals and the main assembling area. (4)
- Show gates and passages. (1)
- Show measurements. (1)
- Realistic design and workability will be taken into consideration. (4)

2.2 Name any FOUR factors that should be kept in mind when installing water troughs for animals. (4)

2.3 There are many environmental factors that should be considered when erecting buildings and other structures on the farm.

2.3.1 State the most important factor to consider when planning the foundations of these structures. (2)

2.3.2 Name ONE insulation material that can be used in the roofs of buildings to control the temperature. (1)

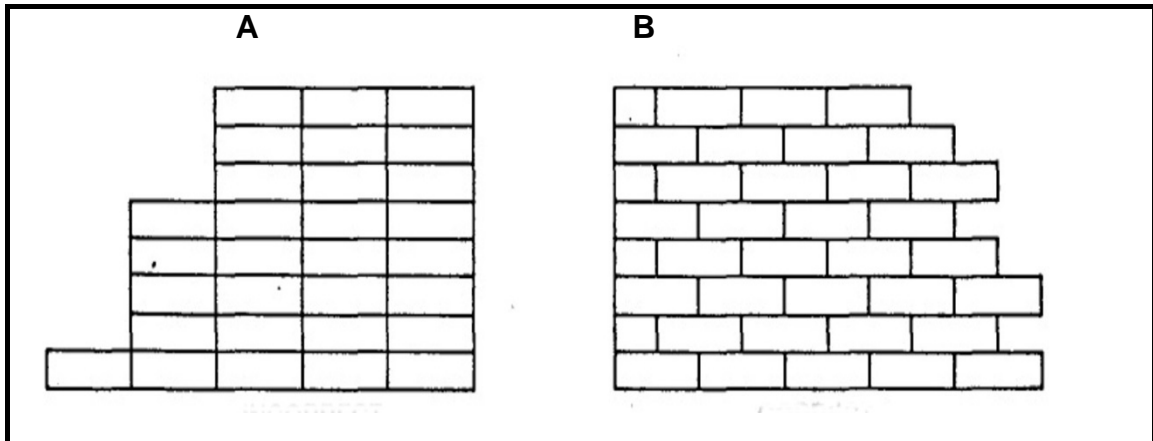
2.3.3 Name TWO important procedures that should be followed before galvanised roof plates can be painted. (2)

2.4 Security fences can be made from various types of wire. Name THREE types of wire used for security fences. (3)

2.5 Describe the difference between the *cohesion* and *adhesion properties* of an adhesive. (2)

2.6 A farmer needs to take the applicable building regulations into account when erecting a structure on a farm. Faulty constructions can lead to great losses due to the high cost of building material.

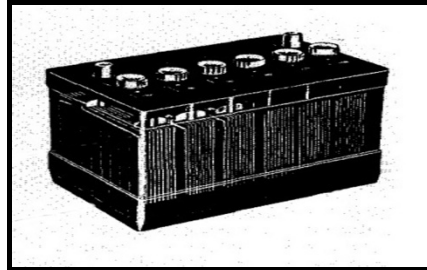
Study the examples of the brick walls below and answer the questions that follow.



- 2.6.1 Identify the best bonding method used for the construction of a brick wall, as shown in FIGURE A and FIGURE B above. (1)
  - 2.6.2 Explain the reasons for your choice in QUESTION 2.6.1. (2)
  - 2.6.3 Name THREE requirements a foundation should adhere to when building this structure on sandy soil. (3)
- [35]**

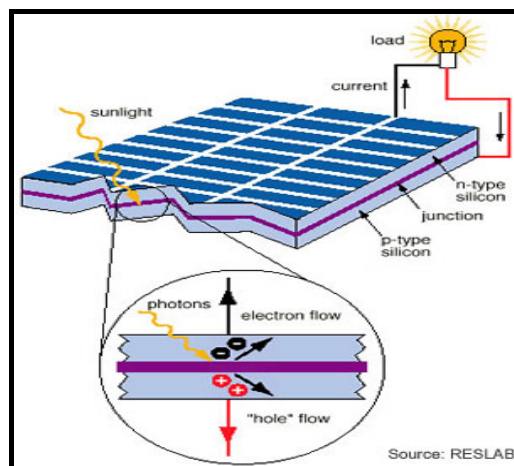
**QUESTION 3: ENERGY**

3.1 Cars, tractors and trucks use batteries, such as the one that is shown below, for various purposes.



- 3.1.1 Name the type of acid that is used inside the battery and name the liquid substance that is used to dilute the acid. (2)
- 3.1.2 What type of metal is used to manufacture the plates inside the battery? (1)
- 3.1.3 Name the type of energy that is transformed to electric energy in a battery. (1)
- 3.1.4 What type of current does a battery produce? (1)

3.2 The sun is the most important source of energy, but is also a source that is mostly untapped. If we could manage to use the energy from the sun more productively, the world's energy crises would be solved.



- 3.2.1 Name the TWO types of energy that are directly generated from solar energy, and name a device in EACH case that can convert this type of energy effectively. (4)
- 3.2.2 Name FOUR advantages of using alternative energy sources. (4)



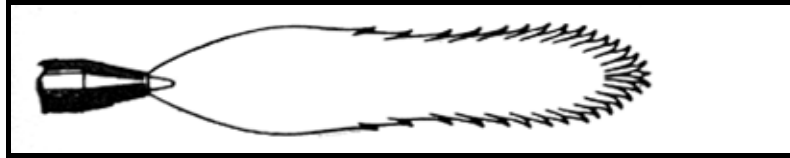
3.3 The sign below is used to warn people against potential dangerous situations.



- 3.3.1 Which dangerous situations does this sign warn people against? (1)
- 3.3.2 Name an important regulation applicable to erecting such signs. (1)
- 3.3.3 Briefly discuss FIVE procedures that should be followed to secure a person that has sustained an electrical shock. (5)
- [20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

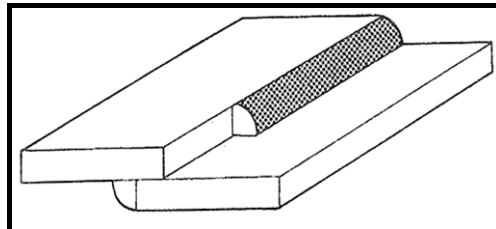
4.1 Study the sketch below of an oxy-acetylene flame and answer the questions that follow.



4.1.1 Name the flame shown in the sketch above. (1)

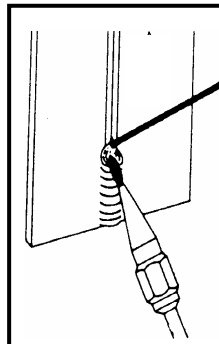
4.1.2 How is this flame obtained? (1)

4.1.3 The sketch below shows a welding joint that can be made with oxy-acetylene welding. Name this welding joint.



(1)

4.2 Vertical upwelds are done where it is not possible for the work to be done in normal down-hand welding, for example on the chassis of a trailer.



4.2.1 Indicate the starting point when you are performing a vertical upweld. (1)

4.2.2 Name the angle at which the welding torch must be held, according to the work piece, while doing a vertical upweld. (1)

4.2.3 How can you prevent that molten metal from the puddle runs down during vertical upwelding? (2)

4.3 A welding operator should have extensive knowledge of the various welding techniques to be able to make a strong and neat welding joint.

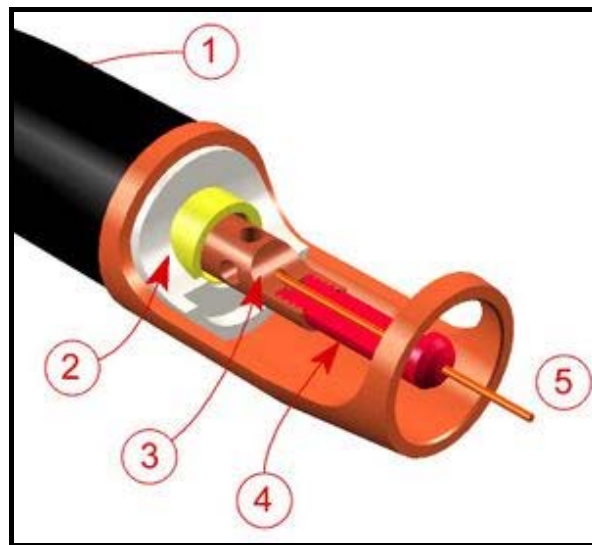
4.3.1 Make a neat sketch of a butt-welding joint where four runs were made to build up the joint.

- Show the TWO pieces of metal with the FOUR welding runs. (1)
- Show the sequence of runs 1 to 4. (2)
- Correctness and neatness will be taken into account. (1)

4.3.2 Describe THREE precautionary measures that should be taken to prevent undercutting and overlapping when doing arc welding. (3)

4.3.3 Name TWO advanced arc-welding methods, apart from the normal underhand welding, that can be used on the farm. (2)

4.4 The sketch below shows an apparatus that is used with certain types of welders.



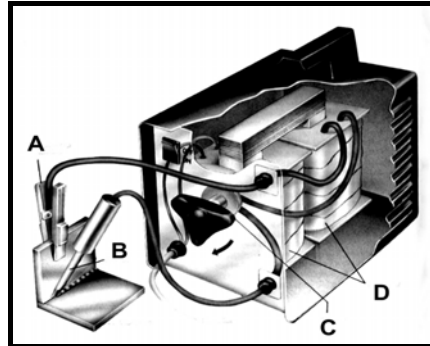
4.4.1 Identify this type of welding machine and the gas that is used. (2)

4.4.2 Name THREE different metals that can successfully be welded with this type of welding machine. (3)

4.4.3 Briefly discuss THREE advantages of MAG welding when compared to normal arc welding. (3)

4.4.4 Name THREE precautionary measures that you should take before you start welding. (3)

- 4.5 Study the picture below which shows a machine that is used to build metal structures and repair equipment on the farm. Answer the questions that follow.

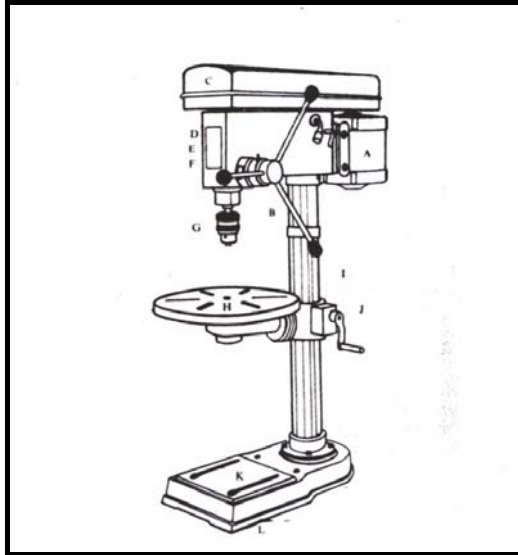


- 4.5.1 Identify the type of machine shown above. (1)
- 4.5.2 Name the function of the part labelled **D**. (1)
- 4.5.3 Name TWO types of metal that can effectively be welded with this type of welder. (2)
- 4.6 The inverter welding machine is one of the latest welding machines on the market and can be used very effectively on the farm for various welding jobs.
- 4.6.1 Name the type of current used by this welding machine. (1)
- 4.6.2 Name a non-ferrous metal that can easily be welded with this welding machine if the correct welding rods are used. (1)
- 4.6.3 Describe TWO main advantages of the inverter welding machine. (2)

**[35]**

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

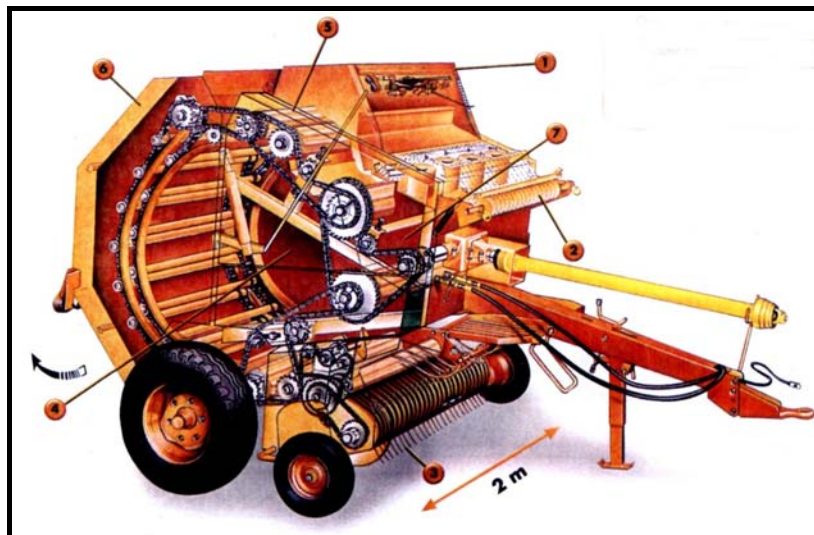
5.1 The picture below shows an electrical machine used in a workshop to drill holes with.



5.1.1 Name any TWO safety precautions that you should take when you work with electrical equipment. (2)

5.1.2 The machine in the picture uses V-belts in its drive mechanism. Briefly describe FOUR advantages of V-belts. (4)

5.2 The round baler, as shown in the illustration below, is used on a farm to make large round bales.

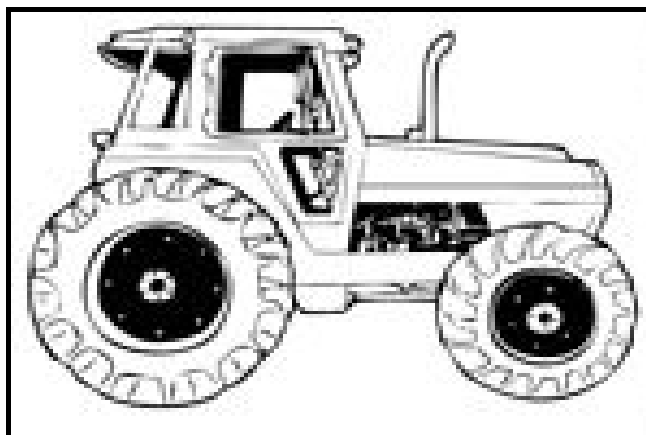


5.2.1 Explain the working of the round baler that uses the Vermeer system for binding the bales. (3)

5.2.2 Describe EIGHT procedures that should be followed when the baler is stored for a long period at the end of the season. (8)

5.2.3 Name TWO advantages of the round baler. (2)

5.3 A tractor is the most important machine on the farm and the machine that is used the most. It is very expensive and must be properly cared for.



5.3.1 Name FIVE checkpoints that the driver of a tractor has to inspect before a job is undertaken. (5)

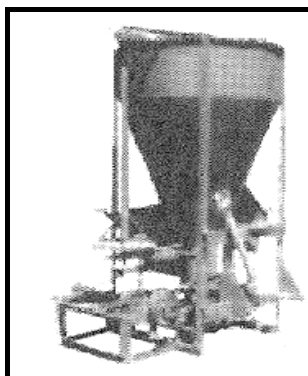
5.3.2 Describe THREE factors that have an influence on the depth control system of a tractor during ploughing. (3)

5.4 Engines cannot perform properly without an air cleaner.

5.4.1 Name TWO qualities of a good air cleaner used in a tractor. (2)

5.4.2 Describe the most important function of the air cleaner of a tractor. (3)

5.5 A hammer mill is a necessity on a farm. It helps a farmer with the milling of feeds.



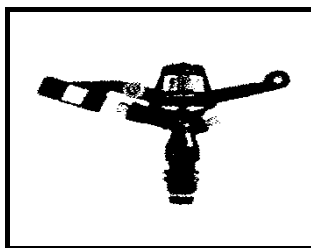
5.5.1 Name FOUR points that you must take into account when you are installing a hammer mill. (4)

5.5.2 Maintenance is very important to prolong the lifespan of a hammer mill. Describe FOUR factors that must be kept in mind when maintenance is carried out on a hammer mill. (4)

**[40]**

**QUESTION 6: WATER MANAGEMENT**

- 6.1 Drainage systems must be designed in such a way that excess water is effectively removed from waterlogged fields.
- 6.1.1 Briefly explain the components of the THREE layers of a stone drain. (3)
- 6.1.2 Name the drainage system used where a piece of land has a clear depression down the middle. (1)
- 6.2 Irrigation pipes are often buried underneath the soil. Name THREE precautionary measures that should be taken when these pipes are laid. (3)
- 6.3 Sprinklers form an important part of irrigation systems.



- 6.3.1 What is the function of the sprinkler head in the picture above? (1)
- 6.3.2 Name TWO materials that can be used effectively to manufacture the sprinkler head, as indicated in the picture. (2)
- 6.3.3 Recommend FIVE aspects a farmer should take into consideration before he decides which type of pump can be used. (5)
- 6.3.4 Describe TWO disadvantages of a rotary pump. (2)

- 6.4 The demand on our scarce water resources has forced the efficient use of all water in South Africa. Irrigation systems must be designed to ensure maximum efficiency of water that is supplied to a specific system.

Study the picture of an irrigation system below and answer the questions that follow.



- 6.4.1 Give THREE reasons why a farmer would prefer sprinkler irrigation to flood irrigation. (3)
- 6.4.2 Name FIVE advantages of the irrigation system referred to in the picture in QUESTION 6.4. (5)
- 6.5 Animals cannot survive without the availability of a reliable water source.
- 6.5.1 Briefly discuss any FOUR requirements that have to be kept in mind when installing water troughs for animals. (4)
- 6.5.2 Name the device that can be used in a water trough to prevent spillage. (1)

**[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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