



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2011

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.
3. SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.
4. Start EACH question from SECTION B on a NEW page.
5. Read the questions carefully and make sure that you answer what is asked.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Place your ANSWER SHEET for SECTION A (QUESTION 1) in your ANSWER BOOK.
8. Non-programmable calculators may be used.
9. Write neatly and legibly.

SECTION A**QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A–D) next to the question number (1.1.1–1.1.10) on the attached ANSWER SHEET. NO marks will be allocated if more than one cross (X) appears for an answer.

Example:

1.1.11	<input checked="" type="checkbox"/>	B	C	D
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- 1.1.1 An advantage of free marketing is ...
- A orderly marketing.
 - B standardisation.
 - C that producers have more time for their farming activities.
 - D that sales are often in cash.
- 1.1.2 The main reason why some agricultural products are cooled during the distribution process to various market outlets, is to ...
- A reduce their weight for easier transport.
 - B reduce their volume for easier transport.
 - C improve their taste for the consumer.
 - D prevent them from perishing.
- 1.1.3 A business plan is set up to provide all planning information needed for a specific farming operation. Which ONE of the following aspects is NOT normally part of a business plan?
- A Farm budget
 - B Soil surveyance detail
 - C Detail of employees
 - D Marketing plan
- 1.1.4 The process that describes the changes to primary agricultural products at an industrial plant to increase their value is called ...
- A processing.
 - B a marketing chain.
 - C distribution.
 - D preservation.

- 1.1.5 The economic characteristic of land which makes it senseless for the farmer to try and increase his production by applying more and more fertiliser to the soil, is ...
- A the law of diminishing returns.
 - B the mineral content of the soil.
 - C the water-holding capacity of soil.
 - D the physical properties of soil.
- 1.1.6 A primary natural resource utilised in agricultural production is ...
- A labour.
 - B soil.
 - C capital.
 - D diesel fuel.
- 1.1.7 Increased scarcity of farm labour may be a result of ...
- A political stability.
 - B less attractive working conditions.
 - C unskilfulness.
 - D effective labour management.
- 1.1.8 The quality of labour can best be described and measured as the ...
- A satisfaction of the workers.
 - B willingness of the workers.
 - C size of the labour squad.
 - D productivity of the workers.
- 1.1.9 The phenotypic ratio for a qualitative characteristic in the F_1 generation produced by parents which both have heterozygotic genes will be ...
- A 1 : 2 : 1.
 - B 3 : 1.
 - C 1 : 1.
 - D 4 : 0.
- 1.1.10 ... is one of the internal causes of variation.
- A Climate
 - B Topography
 - C Light intensity
 - D Mutation
- (10 x 2) (20)

- 1.2 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (1.2.1–1.2.5) on the attached ANSWER SHEET, for example 1.2.6 N.

COLUMN A		COLUMN B
1.2.1	Comprehensive activity involving the combination and coordination of human, physical and financial resources	A depreciation B line breeding
1.2.2	The loss or decline in value of assets such as vehicles, machinery et cetera caused by age, wear and tear	C selection D management
1.2.3	Inferior cows are mated with a pure-bred Friesland bull to increase milk production	E species crossing F supervision
1.2.4	A process in breeding by which certain individuals in a population are chosen for the production of the next generation	G motivation H decision-making
1.2.5	A stallion is mated with a jenny (female donkey) resulting in infertile offspring	I control J upgrading

(5 x 2)

(10)

- 1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.3.1–1.3.5) on the attached ANSWER SHEET.

1.3.1 A document in which you write down what you think you will spend and earn over a period of time in your business in order to work out what your profit or loss is likely to be

1.3.2 An autonomous association of persons united voluntarily to meet their social, economic and cultural needs and aspirations through a jointly owned and democratically controlled enterprise

1.3.3 A marketing approach that allows you to select a few segments and to develop a marketing strategy to fit them all

1.3.4 A current is passed through a solution, carrying cells of the recipient plants which allows the desired genes to enter these cells and be incorporated into the DNA to form a transgenic plant

1.3.5 The study of how characteristics are passed from parents to their offspring

(5 x 2)

(10)

1.4 Change the underlined word(s) to make the following statements TRUE. Write the appropriate word(s) next to the question number (1.4.1–1.4.5) on the attached ANSWER SHEET.

1.4.1 Market gathering refers to the collection of information about consumers as well as the existing competition.

1.4.2 Niche marketing involves marketing a product in different ways to reach as many people as possible.

1.4.3 Line breeding is practised by stock farmers to obtain hybrid vigour.

1.4.4 In a communal tenure system, a farmer owns a piece of land that has his/her name on the title deed.

1.4.5 A farm engineer spends most of his/her time on planning, motivation, administration, marketing and supervisory tasks.

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

QUESTION 2: AGRICULTURAL MANAGEMENT

- 2.1 The table below indicates some of the income and expenses on a farm for the month of July.

EXPENSES			INCOME		
DATE	ITEM BOUGHT	COST (R)	DATE	ITEM SOLD	COST (R)
02/07	Transport of eggs	80,00	04/07	40 dozen @ R7/dozen	280,00
06/07	4 x 50 kg layers feed	320,00	06/07	47 dozen @ R7/dozen	294,00
06/07	Transport of feed @ R5/bag	40,00	06/07	40 dozen @ R7/dozen	280,00
06/07	200 egg trays @ R50 for 100	100,00	07/07	44 dozen @ R7/dozen	308,00
06/07	Loan repayment (ABSA)	125,00	08/07	43 dozen @ R7/dozen	301,00
12/07	Transport of free eggs	80,00	10/07	40 dozen @ R7/dozen	280,00
15/07	Free 4 dozen eggs for workers	28,00	11/07	2 dozen eggs for home	14,00
24/07	4 x 50 kg layers feed	320,00	26/07	43 dozen @ R7/dozen	301,00
TOTAL		1 093,00	TOTAL		2 058,00

- 2.1.1 Give TWO reasons why it is important for a farm manager to keep financial records. (2)
- 2.1.2 Calculate the total monthly cost of transport. (3)
- 2.1.3 Use a formula to calculate the profit the farmer received for the month, based on the data given above. (4)
- 2.1.4 Deduce what incentive the farmer uses to motivate the farm labourers. (2)
- 2.1.5 From the data given above, identify and explain TWO ways in which this farmer generated farm capital. (4)

2.2

CELLPHONES BEAT STOCK THIEVES AND IMPROVE STOCK MANAGEMENT

According to the National Stock Theft Forum, the red meat industry suffered losses of almost R400 million during the 2009/10 financial year due to stock theft. Farmers are now installing high-tech anti-stock theft security systems that send an alarm to the farmer's cellphone when an animal is in danger.

In addition, this technology can also be used to assist in management tasks on the farm. This message also contains information on the movement of the flock. The system can also indicate when mating took place as well as the specific ram and ewe involved.

[Adapted from *Farmers' Weekly*, 4 February 2011]

2.2.1 Give TWO reasons for investing in a high-tech anti-stock theft security system. (2)

2.2.2 Suggest TWO entrepreneurial skills that were used by the manufacturers of the security system. Motivate your answer in each case. (4)

2.3 The following entrepreneurial success factors are necessary for good human relations:

- Appreciation
- Punctuality
- Leadership
- Motivation

Identify the success factor that will match each of the following descriptions. Each success factor can only be used ONCE.

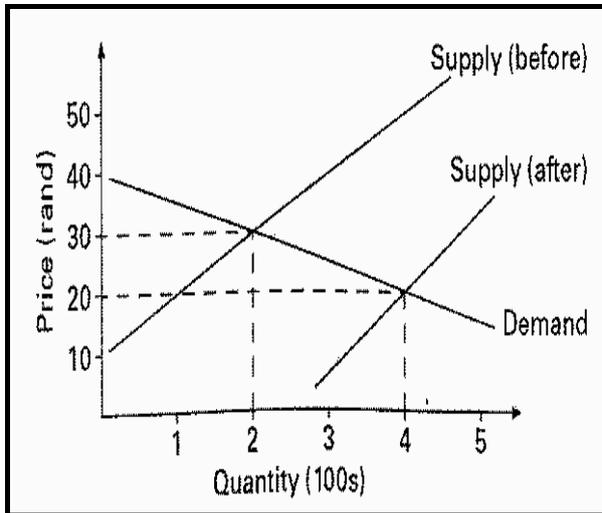
2.3.1 A newly designed bonus system that will improve the productivity of workers, benefiting them when they reach the goals set out for the season, is implemented by the farmer. (1)

2.3.2 The entrepreneur sets an example and arrives 10 minutes ahead of time for duties that have to be performed or meetings that are called. (1)

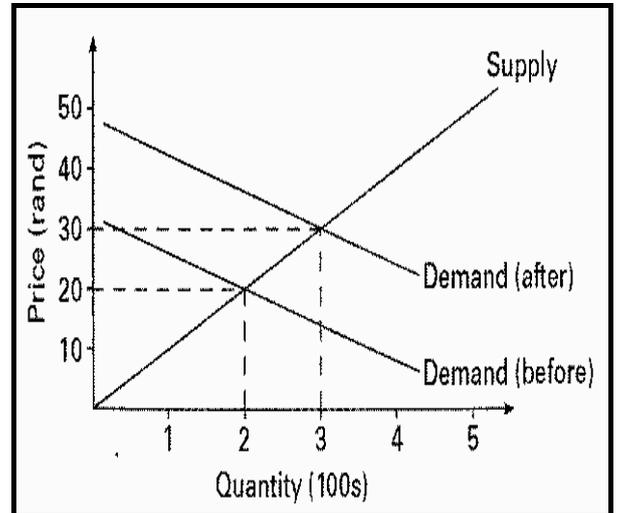
2.3.3 The entrepreneur presents certificates of excellence to workers that performed beyond their normal duty at the annual award ceremony. (1)

2.3.4 The farm manager inspires workers through his/her clear vision and professionalism. (1)

2.4 The graphs below show the changes in equilibrium prices when the supply (GRAPH A) and demand (GRAPH B) of a product increase or decrease at different times.



GRAPH A



GRAPH B

- 2.4.1 Deduce the relationship between supply and demand as illustrated in the graphs above. (2)
- 2.4.2 Define the *equilibrium price* for a particular agricultural product. (2)
- 2.4.3 Describe the effect of supply at different times on the equilibrium price, as illustrated in GRAPH A above. (2)
- 2.4.4 Determine the quantities of the product sold at the equilibrium price before and after a specific event that affected the marketing of that product, as indicated in GRAPH B. (2)
- 2.4.5 Choose a graph that represents the marketing of an agricultural product which resulted in a higher demand after intensive promotion was done. Give a reason to support your answer. (2)

[35]

Start this question on a NEW page.

QUESTION 3: PRODUCTION FACTORS AND MANAGEMENT

- 3.1 Record-keeping in a farming situation is just as important as planning. Examples include physical and financial records that reflect the farm assets and finances. Examples of farm assets are listed below.

tractor; borehole fitted with a wind mill; fertiliser bags;
pesticides; farm shed; bakkie (farm van); diesel; bags of maize seed

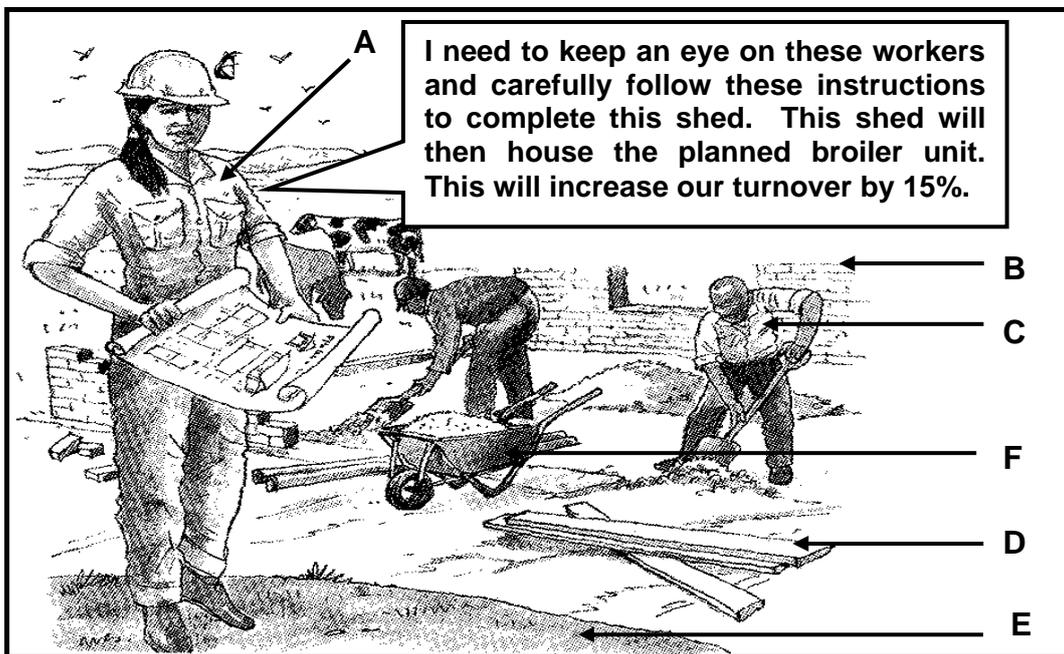
- 3.1.1 Tabulate the farm assets listed above under the following headings: (2)
- (a) Fixed assets (2)
- (b) Movable assets (2)
- 3.1.2 When large capital investments are made in a farming operation, the capital would normally be borrowed from external sources. Suggest THREE examples of such sources. (3)
- 3.1.3 Describe the term *net worth* of a farming business as reflected by financial records. (3)
- 3.2 State THREE functions of land as a factor in agricultural production. (3)
- 3.3 The following represent the approaches to management of farmer A and farmer B:

Farmer A: 'I like to have a neat farming operation and am prepared to invest in the neatness of my farming operation. All my fences and gates are in an excellent condition and I spend a lot of time improving my farm roads and watering facilities. I recently erected new homes for my farm workers and am proud to say that they have electricity and water.'

Farmer B: 'I work on a cash basis and will not borrow money to pay for any improvements on my farm. I try to save money by using second-hand parts and scrap metal parts lying on my farm. I always try to use the cheapest possible means to complete a task. My farm workers had to build their own homes from materials on the farm, again saving me money.'

- 3.3.1 Briefly describe the management approaches of farmer A and farmer B above. (2)
- 3.3.2 Identify the farmer that would have the most motivated workforce. Give a reason to support your answer. (2)

3.4 The illustration below indicates how production factors are coordinated for effective agricultural production.



3.4.1 Identify the letter (A–F), that represents each of the following:

- (a) Farm manager (1)
- (b) Farm labourer (1)
- (c) Movable capital (1)
- (d) Fixed capital (1)
- (e) A production factor subjected to the law of diminishing returns (1)

3.4.2 Identify the main management principle that is reflected in the picture above. Give a reason to support your answer. (2)

3.4.3 Identify TWO entrepreneurial skills that are visible in the picture above, which represent the combination of production factors in a farming operation. (2)

3.4.4 Identify the person or party that will reap the largest benefits from the increase in turnover in the farming operation. (1)

3.5

LABOUR MANAGEMENT

You are a farm manager on a dairy farm. The following workers have to do specific tasks on the farm and they should be given tasks according to their experience and expertise.

**A**

Has a driver's license, is literate and has some milking experience

**B**

Has ten years' experience in milking, calf rearing and irrigation

**C**

Very experienced in agricultural technology; highly literate; unsuitable for normal farm labour

**D**

Experienced in driving tractors, does not have a license, can operate different irrigation equipment

**E**

Has experience in milking and cleaning the milking parlour, but lacks experience in irrigation

Write down the letter (A–E) that represents the person that will be the MOST appropriate for each of the following farm tasks:

- 3.5.1 Weaning of calves (1)
- 3.5.2 Delivering milk in an urban area close to the farm using a trailer (1)
- 3.5.3 Cultivating land with an old tractor which has been scrapped from the road (1)
- 3.5.4 Maintaining milking equipment in a hygienic condition (1)
- 3.5.5 Change the pipes to irrigate the lucerne field (1)

3.6 Labour legislation impacts on farm workers.

3.6.1 Briefly describe the basic implication of each of the following Labour Acts on farm workers:

- (a) Labour Relations Act, 1995 (Act 66 of 1995) (1)
- (b) Occupational Health and Safety Act, 1993 (Act 85 of 1993) (1)

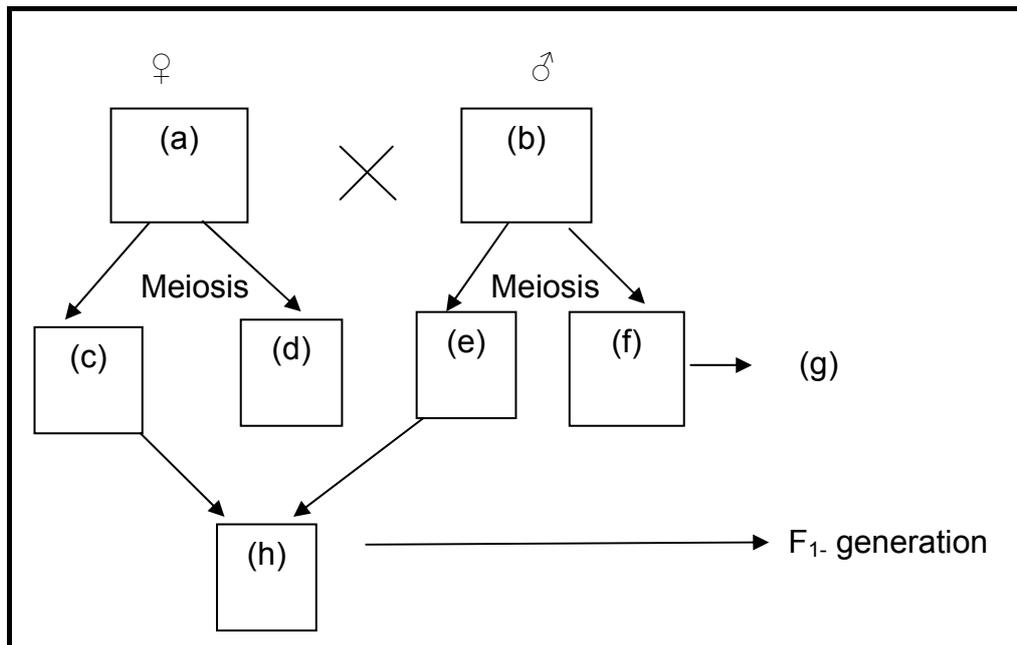
3.6.2 Name the appropriate legislation (Act) that applies to employees and employers who are injured, disabled or killed because of an accident at a workplace. (1)

[35]

Start this question on a NEW page.

QUESTION 4: BASIC AGRICULTURAL GENETICS

4.1 The breeding of a black (BB) male farm animal and a white (WW) female farm animal gave rise to heterozygous grey offspring in the F₁-generation. The same offspring of the F₁-generation were allowed to breed through inbreeding and their offspring of the F₂-generation had a phenotypic ratio of 1 : 2 : 1.



4.1.1 Complete the diagram by filling in the missing genotype in the blocks labelled (a), (b), (c), (e), (g) and (h). Redraw the diagram in the ANSWER BOOK. (6)

4.1.2 Suggest the type of dominance that is described above. (1)

- 4.1.3 Motivate your answer to QUESTION 4.1.2 by giving TWO reasons. (2)
- 4.1.4 Identify the organ in the body where the process of meiosis occurs. (1)

4.2 Bb represents a black-furred farm animal and bb represents a farm animal with white fur. The Punnet square below represents the genotypes of the offspring. Black is the dominant trait.

		FEMALE	
		♀	
MALE	♂	b	b
	B	Bb	Bb
	b	bb	bb

- 4.2.1 Identify the phenotype(s) visible in the offspring. (2)
- 4.2.2 Identify the gender of the heterozygous parent. (1)
- 4.2.3 Calculate the percentage of the offspring that is heterozygous black. (2)

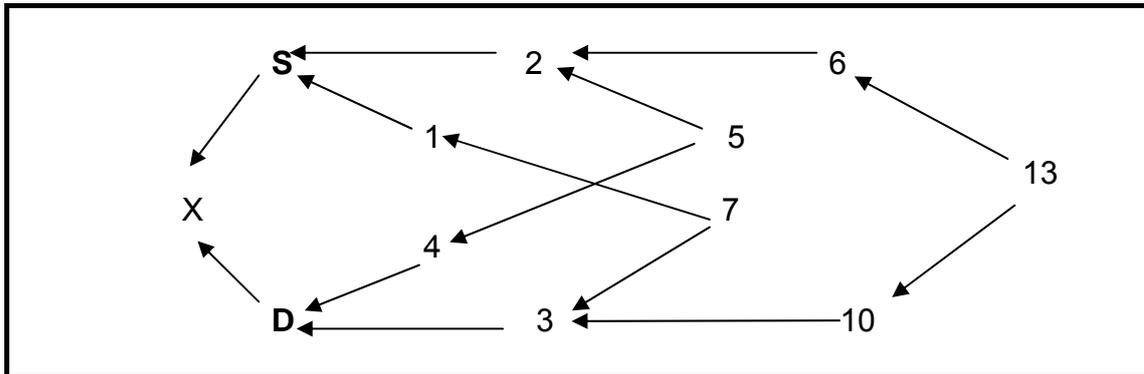
4.3

INDIGENOUS CATTLE BREEDS OF SOUTH AFRICA

The Nguni Innovation Project launched in 2004 in the different provinces will reintroduce the Nguni cattle to emerging livestock farmers. These animals can survive in our country because they are resistant to a number of diseases, parasites and extreme heat conditions.

- 4.3.1 Deduce a reason from the passage above suggesting that Nguni cattle are indigenous. (1)
- 4.3.2 Name THREE adapting qualities of Nguni cattle that make it possible for them to survive in the extreme conditions of our country. (3)

4.4 The flow chart below is a schematic representation of line breeding.



4.4.1 Identify THREE common ancestors of individuals **S** and **D** in the schematic representation above. (3)

4.4.2 Explain THREE ways in which livestock farmers could benefit from upgrading by using a purebred breed in their commercial crossbred herd. (3)

4.5 Name FOUR selection methods used by animal breeders. (4)

4.6 **IMPROVING SORGHUM THE GENETICALLY MODIFIED (GM) WAY**

Africa's scientists are developing a genetically modified (GM) super strain of the staple grain sorghum that they say will be vitamin-packed to help fight malnutrition. The objective of the project is to produce seeds of nutritionally improved cultivars of sorghum, appropriate for planting.

Biotech crops have sparked controversy in Africa, where some countries, despite having trouble growing food, have refused GM food aid or insisted it be milled before distribution to avoid contamination of local seed stocks. Anti-GM activists say GM foods risk destabilising the environment and food production.

[Adapted from *Cape Argus*, 2005]

4.6.1 Identify TWO reasons for developing this genetically modified sorghum in Africa. (2)

4.6.2 Describe TWO superior abilities that the GM sorghum would have compared to normal sorghum cultivars. (2)

4.6.3 Indicate TWO dangers of using GM cultivars. (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

ANSWER SHEET

CENTRE NUMBER:

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EXAMINATION NUMBER:

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SECTION A

QUESTION 1.1

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

QUESTION 1.2

1.2.1	
1.2.2	
1.2.3	
1.2.4	
1.2.5	

(5 x 2) (10)

QUESTION 1.3

1.3.1 _____

1.3.2 _____

1.3.3 _____

1.3.4 _____

1.3.5 _____

(5 x 2) (10)

QUESTION 1.4

1.4.1 _____

1.4.2 _____

1.4.3 _____

1.4.4 _____

1.4.5 _____

(5 x 1) (5)

TOTAL SECTION A: 45