



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

FEBRUARY/MARCH 2011

MARKS: 150

TIME: 2½ hours

This question paper consists of 18 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

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

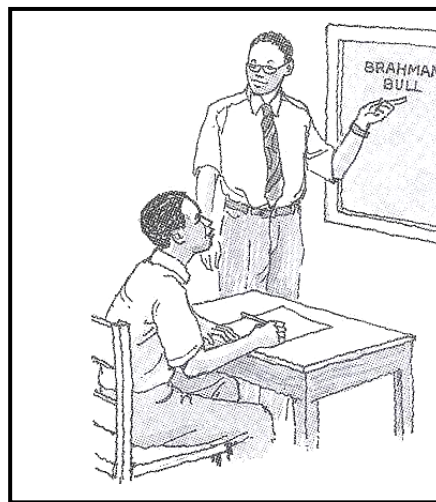
SECTION A**QUESTION 1**

- 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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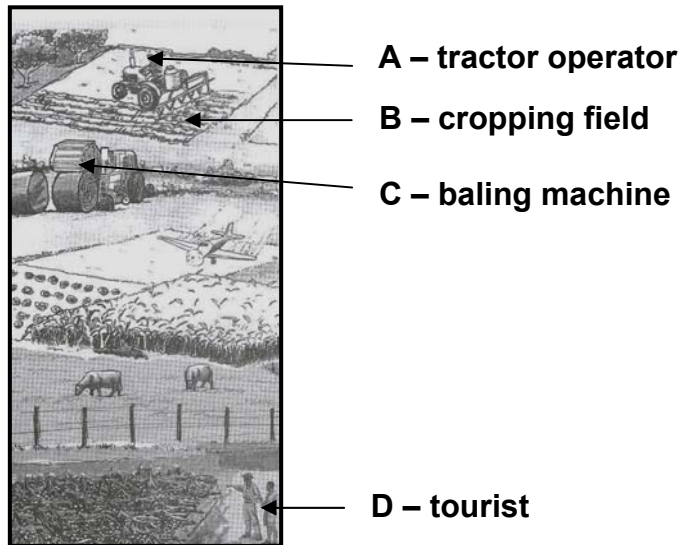
- 1.1.1 The illustration below depicts the following activity on a farm:



- A Motivation
B Leadership
C Training
D Coordination
- 1.1.2 The following is an example of a niche marketing approach where a farmer sells a product to a small segment of the market:
- A A commercial maize farmer sells maize to the local agricultural cooperative
B A fruit farmer sells fruit to grocery stores nationwide
C A dairy producer supplies dairy products to a franchise that operates nationwide
D A small egg producer sells egg white to a local cellar

- 1.1.3 The following component does NOT form part of the structure of a business plan:
- A General overview of the business
 - B Market information
 - C Cash flow statements
 - D Details of staff members
- 1.1.4 In a free-market system the price of any product tends to settle at a level where the amount demanded by the market and the amount supplied by the producers are equal. This statement refers to the ...
- A equilibrium price.
 - B price elasticity.
 - C law of demand.
 - D law of supply.
- 1.1.5 A factor in the cultivation of crops which makes it economically senseless for the farmer to try to increase the production by applying more and more fertiliser is ...
- A the limitations of soil.
 - B the physical properties of soil.
 - C unemployment in rural areas.
 - D the damage of produce during the harvesting process.
- 1.1.6 Efficient mechanisation in farming is a solution to ...
- A an increasing shortage of farm labour.
 - B lack of schooling/training amongst labourers.
 - C the cost of having labourers trained.
 - D the production of better products.
- 1.1.7 The legislation that recognises the deterioration of our natural resources as well as focuses on sustainable management of resources is the ...
- A National Water Act, 1998 (Act 36 of 1998).
 - B National Veld and Forest Fire Act, 1998 (Act 101 of 1998).
 - C Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).
 - D Sustainable Utilisation of Agricultural Resources Act (2003).

- 1.1.8 Which ONE of the factors labelled A to D in the diagram below is NOT an example of a production factor?



- A Tractor operator
B Cropping field
C Baling machine
D Tourist
- 1.1.9 The breeding system where the seeds from an individual plant are selected on the basis of phenotype, is completed and used for the next generation is known as ...
- A progeny selection.
B back-crossing.
C mass selection.
D double-crossing.
- 1.1.10 A ... is a strain in which all members have descended by self-fertilisation from a single homozygous individual which is genetically pure.
- A mutant
B monogerm
C pure line
D homologue

(10 x 2) (20)

- 1.2 Choose a description from COLUMN A that matches a concept/phrase in COLUMN B. 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 A farmer has a number of different production enterprises to spread the risk	A monohybrid crossing B genotype
1.2.2 The inner drive a person possesses	C diversification D dihybrid crossing
1.2.3 Crossing used to predict the two main qualitative characteristics in the offspring	E motivation F flexibility
1.2.4 Transfer of characteristics into a single plant variety from many other plant varieties	G back-crossing H mechanisation
1.2.5 Characteristics of an individual which are visible with the naked eye	I phenotype J leadership

(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 The production factor on a crop farm which could be describes as durable and indestructible.
- 1.3.2 The measurement that a manager uses to refer to the production output of the labour force
- 1.3.3 The person who has to plan, organise, motivate, make decisions and control the production process
- 1.3.4 The modern technique used to alter the genetic material of organisms in order to make them capable of producing new substances or performing new functions
- 1.3.5 Any organism that contains a new or altered gene

(5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in the following to make the 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 The development of a long-term plan of an enterprise, based on the weaknesses and strengths and predictions of future trends, requires a manager to develop a bureaucratic plan.

1.4.2 Financial planning of a farm ensures that the structures of the handling facilities are upgraded and modernised to increase productivity.

1.4.3 Boreholes, pumps and canals are examples of working capital.

1.4.4 The type of temporary labour that is employed for a period to erect a fence, is called permanent labour.

1.4.5 The genetic characteristic which overshadows another characteristic, is called a recessive characteristic or trait. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

QUESTION 2: AGRICULTURAL MANAGEMENT

2.1

KHAKIBOS MAKES THIS FARM PROFITABLE

Khakibos (*Tagetes minuta*) is a crop that has been grown by Flip and Miana Minnaar since 1990. The production of crops and essential oils started slowly, with the first exports of Highlands Essential Oils to Europe in 1995. This led to a booming frozen-herb operation called Icy Herb CC. Flip realised that to increase farming profit, one should take control of the value chain by adding value to the product. Consequently, the necessary equipment for distillation was bought.

After a number of European visits, they were encouraged to utilise part of their essential oil crop. Due to stiff competition in the market, a refrigeration plant was designed. Frozen herbs are packed in polystyrene containers which protect them from the effect of ambient room temperature.

[Source: *Farmers' Weekly*, 20 February 2009]

- 2.1.1 The production of khakibos has indeed made the farm profitable. Motivate this statement by giving THREE reasons. (3)
- 2.1.2 Name THREE factors/methods that could be considered in the setting of prices for the above-mentioned products from khakibos. (3)
- 2.1.3 Identify TWO business strategies applied in the scenario above to increase profits. (2)
- 2.1.4 Name TWO value-adding methods which were used for the khakibos. (2)

- 2.2 The table below indicates the prices that farmers received over two years at a fresh produce market in the city.

	Price of onions in R/kg per stipulated month			
	January	April	July	October
Year 1	3,60	4,20	5,50	2,70
Year 2	3,80	4,35	5,60	2,80

- 2.2.1 Give TWO possible reasons for the annual (from Year 1 to Year 2) increase in the price of onions. (2)
- 2.2.2 Give a possible reason for the low price of onions in October. (2)

2.2.3 Briefly explain why the price of onions was the highest in July. (2)

2.2.4 Name a suitable condition to store onions in order to avoid perishability. (1)

2.3 The table below shows data of the average number of layers that are laying eggs (%) in a farming district and data from actual averages of a number of layers (%) that are laying eggs at a specific farm.

Layer age (weeks)	21	22	23	25	26	28	31	32	40	48	60	65	70
Average % of layers that are laying eggs (%)	5	10	18	52	65	84	94	88	83	77	73	70	70
Actual average % of layers that are laying eggs (%)	0	5	10	40	55	75	80	82	78	72	68	65	60

2.3.1 Draw a line graph to reflect the values in the table above. Draw the layer age in weeks on the x-axis and the percentage of layers that are laying eggs on the y-axis. (4)

2.3.2 Indicate whether the farming enterprise producing these eggs (actual average) is more effective than the average of producers from that district. Give a reason to support your answer. (2)

2.3.3 The actual farmer above has 10 000 layers. Calculate the difference in the number of eggs produced per day by this farmer during the peak period at 32 weeks compared to the average for that district for the same number of layers. (3)

- 2.4 The budget below was extracted from a business plan of a small-scale farmer interested in a broiler production unit.

Estimated costs			Estimated returns		
Item	Amount		Item	Amount	
300 day-old chicks @ R5,00 each	1 500	00	Sale of 300 broilers @ R20,00 each	6 000	00
250 kg broiler mixed ration @ R3,50/kg	875	00			
Total cost			Total returns		
Profit/Loss					

- 2.4.1 Calculate the profit or loss of this broiler enterprise using the data supplied above, and indicate if it was a profit or loss. (4)
- 2.4.2 The farmer can buy a cheaper broiler ration from another company that sells feed at a price of R3,20/kg. Discuss how this will affect the profit or loss of the enterprise. (2)
- 2.4.3 The farmer is thinking of selling the live chickens to the local community. Suggest TWO ways to increase the value of these chickens. (2)
- 2.4.4 Indicate a possible item that will result in an income that this farmer did not include in this budget. (1)
- [35]**

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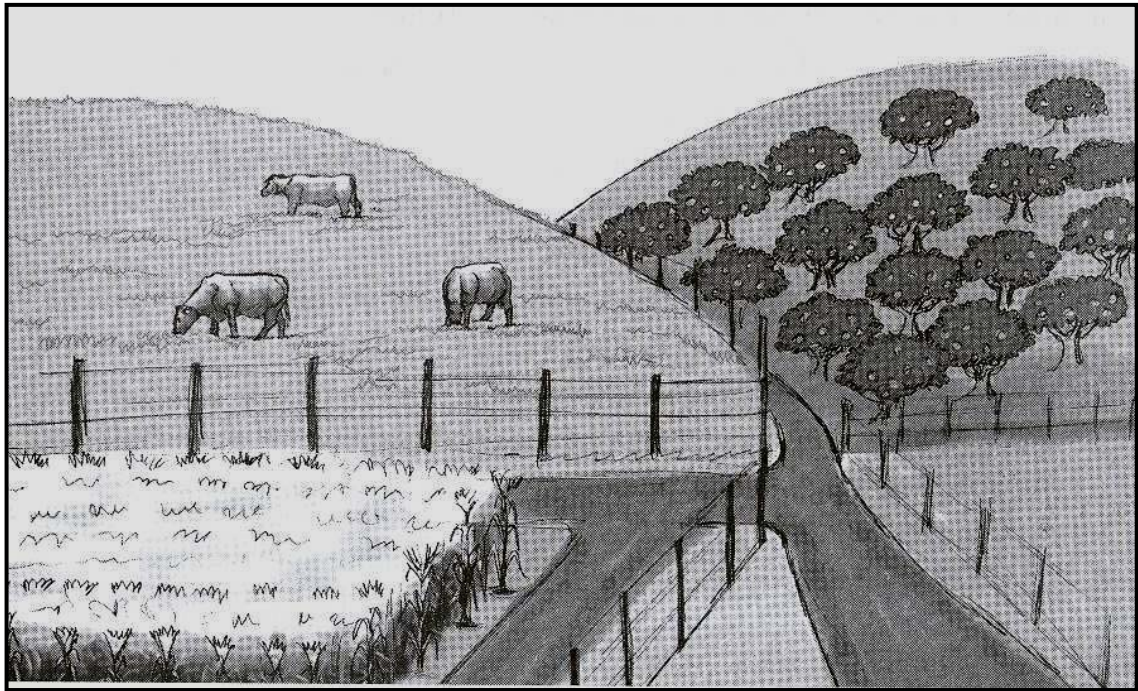
QUESTION 3: PRODUCTION FACTORS AND MANAGEMENT

3.1

CHALLENGES TO AGRICULTURAL FACTORS OF PRODUCTION

In many places the soil productivity has been improved by irrigation systems, careful use of fertilisers and good environmental management so that more products can be grown on the same amount, or even on less, land.

This has resulted in higher crop yields and reduced pressure on agricultural land, and because less land is required to produce what previously required a large area.



- 3.1.1 Indicate TWO factors of production in the picture above. (2)
- 3.1.2 Identify an economic characteristic of land as a production factor in the passage above. (1)
- 3.1.3 State a problem associated with land as a production factor as it is reflected in the passage above. (1)
- 3.1.4 State THREE provisions made to improve the productivity of land by referring to the passage above. (3)
- 3.1.5 The value of land for agricultural purposes depends on a number of factors. Name THREE such factors. (3)

3.2 The following table is an income statement of a farming enterprise:

FARM INCOME	RAND	FARM EXPENDITURE	VALUE RAND
Beef sales	85 000	Electricity and water	10 200
Dry beans	15 000	Bank charges	1 440
Maize sales	34 050	Marketing costs	19 283
		Feed	26 420
		Seed and seedlings	1 980
		Telephone	2 520
		Rent paid	4 000
		Contractor costs	1 500
		Livestock purchased	7 500
		Fertiliser and lime	12 370
		Weedicides and pesticides	15 000
		Hired transport	2 000
		Labour costs (wages)	55 400
		Fuel, oil and grease	29 376
		Insurance and licenses	10 560
		Repairs to fixed improvements	1 900
		Other crop costs	297
Total income	134 050	Total expenditure	201 746

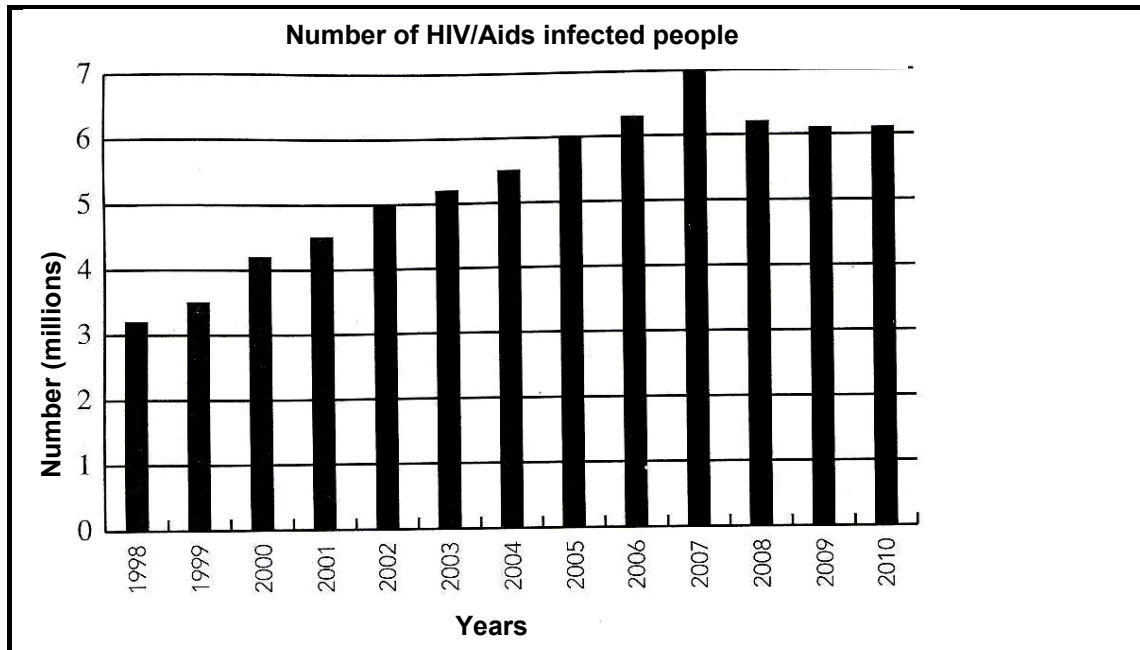
3.2.1 Overheads are general expenses and not related to one enterprise in particular. Fixed costs do not vary with the level of production, but variable costs are affected by the level of production.

Choose ONE example of each of the following cost items from the table above and explain your choice:

- (a) Overheads (2)
- (b) Variable costs (2)
- (c) Fixed costs (2)

3.2.2 Labour seems to be the largest expense of this farming enterprise. Suggest TWO ways to reduce this expense. (2)

- 3.3 The graph below illustrates the number of HIV/Aids infected people in South Africa between 1998 and 2010. The increased movement of people in the country has resulted in the spread of this disease in both rural and urban areas.



- 3.3.1 Identify the year in which approximately seven million people were HIV positive. (1)
- 3.3.2 Indicate the number of HIV infected people in South Africa in 2005. (1)
- 3.3.3 Describe the possible impact on the availability and productivity of farm labour with reference to the graph above. (3)
- 3.3.4 Suggest THREE measures that a farmer or farm manager can take to limit the impact of HIV/Aids on the agricultural labour force. (3)

3.4

A family owns three hectares of arable land, with access to irrigation, where vegetables are planted. The water is pumped from a borehole to a reservoir. Close to the homestead this family also keeps pigs and broiler chickens on a small scale. To increase the market price of the products, all the practices on this farm are in line with organic farming practices. The family employs some local people to assist in some practices in peak periods through the year. A local builder will be used soon to strengthen the present reservoir and the same man has indicated that he can erect fences for this family after their harvest has been sold.

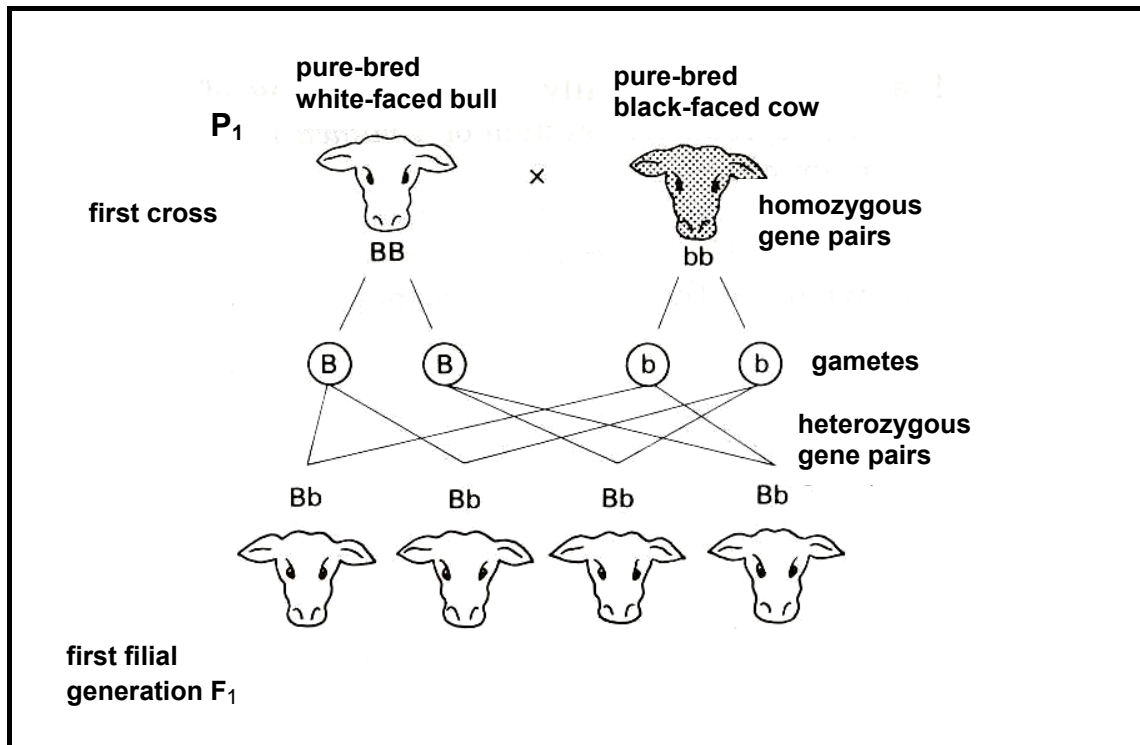


- 3.4.1 Select THREE fixed-capital items from the case study above. (3)
- 3.4.2 Name TWO ways in which the productivity of this agricultural land is increased by the family above. (2)
- 3.4.3 Briefly explain a measure that was implemented to reduce the risk in this small-scale agricultural enterprise. (2)
- 3.4.4 Describe fertilisation practices that would be followed in the vegetable garden by referring to the information provided. (2)
- [35]**

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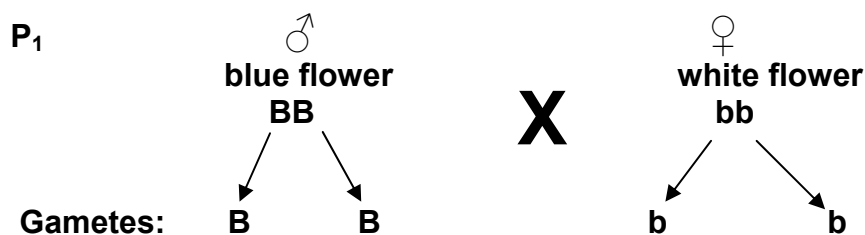
QUESTION 4: BASIC AGRICULTURAL GENETICS

- 4.1 The schematic representation below represents the crossing between a pure-bred white-faced bull and a pure-bred black-faced cow.



- 4.1.1 Identify the dominant trait or characteristic in this crossing. Give a reason to support your answer. (2)
- 4.1.2 Explain the possible percentage of black-faced offspring if the same bull above in P₁ is used with its own daughters from the F₁-generation. (2)
- 4.1.3 Compare the chromosome number of the somatic (normal) body cells with that of the gametes in the illustration above. (2)

- 4.2 The blue lily (*Agapanthus africanus*) is an annual and ornamental plant that has two species that bear either blue (B) or white (b) flowers. The following schematic representation shows the crossing from P₁ to F₂:



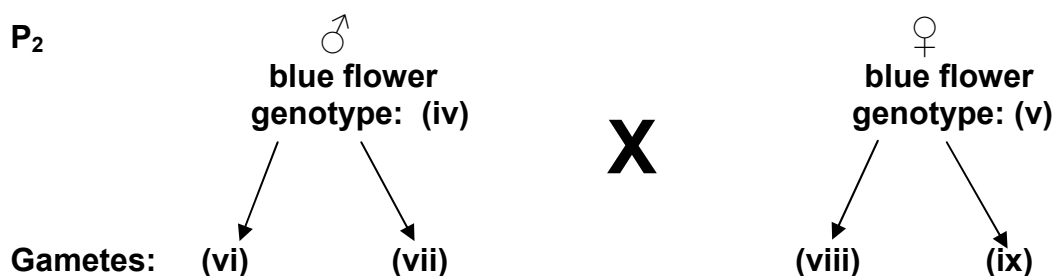
	B	B
b	Bb	(i)
b	(ii)	Bb

F₁-generation:

Phenotypic ratio: 100% are blue flowers

Genotypic ratio: (iii)

SELF-POLLINATION



...
...

F₂-generation:

Phenotypic ratio: ...% are blue flowers and ... % are white flowers

Genotypic ratio: ...% are BB; ... % are Bb and ... % are bb

- 4.2.1 Indicate the genotypes represented by labels (i) and (ii) above. (2)
- 4.2.2 Identify the genotypic ratio as a percentage of each genotype in the F₁-generation above. (2)
- 4.2.3 Determine the genotypic ratio as percentages of each genotype in the F₂-generation above. (3)
- 4.2.4 Indicate the percentage of white flowers in the F₂-generation. (1)

- 4.3 A dairy farmer wants his heifer calves to increase the production capacity of his dairy herd. Draw a Punnet square to indicate the probability of having a heifer calf in the offspring. (4)
- 4.4 A cattle farmer with a herd of 200 cows determines the weight of all the animals on a regular basis. The table below shows the weaning mass for the first year (TABLE A) and for the third year (TABLE B).

TABLE A:

The weaning mass of the calves in the first year	
Weight in kg (weaning mass)	Total number of calves
210	30
220	40
230	70
240	20
250	10

TABLE B:

The weaning mass of the calves after three years	
Weight in kg (weaning mass)	Total number of calves
210	20
220	40
230	100
240	30
250	10

- 4.4.1 Draw a bar graph to show the difference in variation in the first year and third year of the calves' weaning mass. (6)
- 4.4.2 According to TABLE A, which calves would you select for future breeding purposes? (1)
- 4.4.3 Name THREE factors that have an influence on the variation of the weaning mass of the calves. (3)

4.5

GROWING BT COTTON IN KWAZULU-NATAL

Velaphi Mlambo, a smallholder farmer on the Makhathini flats in KwaZulu-Natal, says that since he changed to genetically engineered cotton he has increased his cotton yield by 25%.

He has had to spray insecticides only three times instead of the usual fifteen times. 'I have been planting Bt cotton for three years. I am a cash-crop farmer and owe the bank no money. I will continue to plant Bt cotton. It earns me more money.'



- 4.5.1 Give a reason why scientists want to make crops resistant to herbicides. (2)
- 4.5.2 Velaphi says: 'I have been planting Bt cotton for three years ... It earns me more money.' Justify this statement. (2)
- 4.5.3 Name other potential benefits of genetically modified crops. (3)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

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