2025.M39

2025L024G1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Agricultural Science

Ordinary Level

Monday 16 June Afternoon 2:00 - 4:30

300 marks

Examination Number

Date of Birth

For example, 3rd February 2005 is entered as 03 02 05

Centre Stamp

Instructions

There are **two** sections to this examination.

It is recommended that you spend about 50 minutes on Section **A** and 100 minutes on Section **B**.

Section **A** Answer **ten** questions from this section. There is internal choice in **four** questions.

Each question carries 10 marks.

Section **B** Answer any **four** questions from this section. There is internal choice in **two** questions.

Each question carries 50 marks.

Write your Examination Number and your Day, Month and Year of Birth in the boxes on the front cover.

Write your answers in blue or black pen. You may use pencil for sketches, graphs and diagrams only.

This examination booklet will be scanned and your work will be presented to an examiner on screen. All of your work should be presented in the answer areas, or on the given graphs, or diagrams. Anything that you write outside of these areas may not be seen by the examiner. You are not required to use all the space provided.

Write all answers into this booklet. There is extra space at the end of Section A and at the back of the booklet. If you need to use it, label any extra work clearly with the question number and part.

Section A — 100 marks

Answer any **ten** questions.

Each question carries 10 marks.

Question 1 Answer **either** (a) **or** (b).

(a) **(i)** Identify **any three** breeds **A**, **B**, **C** or **D** using the list below.

Jersey	Holstein Friesian	Charolais	Limousin

A

B

C

D

(ii) Name **one** beef breed from part (i) above.

Or

(b) Jack was trying to decide which bull to cross with his dairy cows.

Aberdeen Angus

Belgian Blue

(i) Identify with reason which bull Aberdeen Angus **or** Belgian Blue you would advise Jack to choose.

Bull:
Reason:

(ii) The Aberdeen Angus Bull is <u>polled</u>.
Identify the correct meaning of the underlined term by placing a tick (✓) in the correct box.

Double muscled	
Produces milk	
Has no horns	

(iii) State which bull is more likely to produce calves with E or U carcase conformation.

Question 2

Indicate if the following are true or false by placing a tick (✓) in the correct box.

The first one has been done as an example.

		True	False
Example	***Cows are in calf for 157 days***		✓
(a)	Steer is another name for a bull	☐	☐
(b)	The oestrous cycle length of a cow is 17 days	☐	☐
(c)	Brucellosis is a notifiable disease	☐	☐
(d)	Pneumonia is a common disease of calves	☐	☐
(e)	Protein is responsible for growth and repair in animals	☐	☐

Question 3

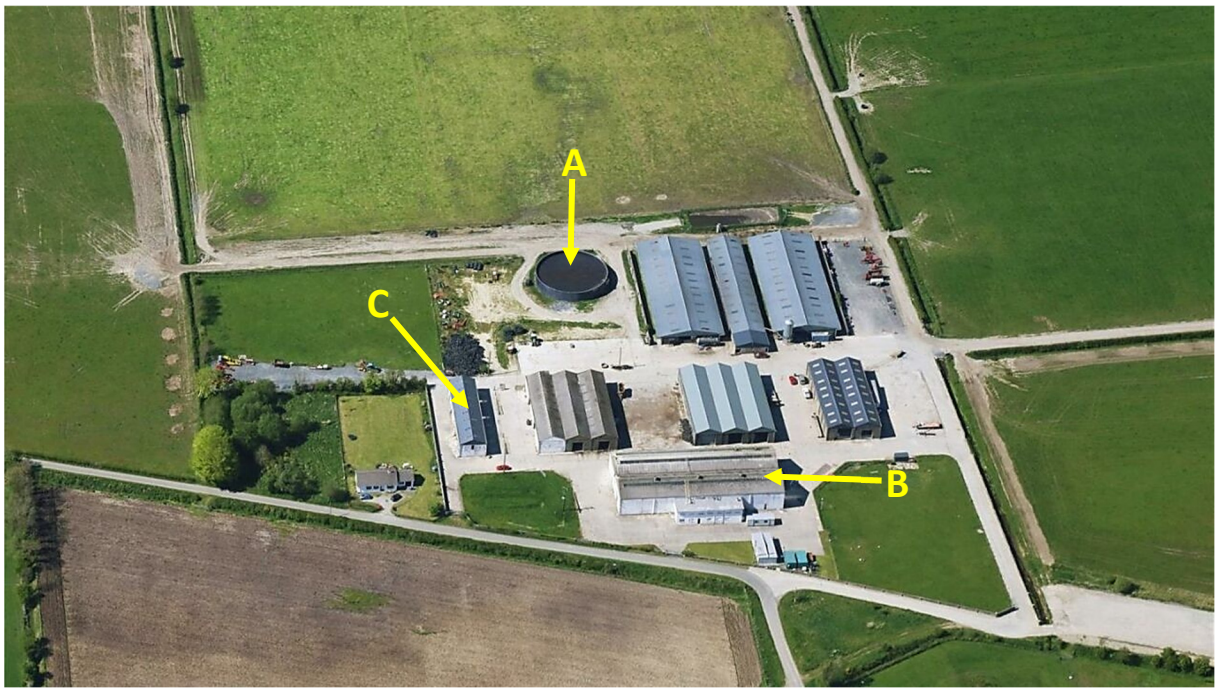
Listed below are some farm machinery.
Complete the table below by matching each farm machine from the list with the correct description of its use given in the table.

Roller	Tedder	Mower	Plough	Combine harvester

	Description	**Farm machine**
(a)	Harvesting cereal crops	
(b)	Cultivating soil in seedbed preparations	
(c)	Levelling land and compacting soil surface	
(d)	Cutting of grass for silage	
(e)	Drying out grass to reduce dry matter (DM) content	

Question 4

The following photograph shows the layout of a dairy farm.
Analyse the photograph and answer the questions that follow.



(a) Suggest **two** ways in which this farm allows for efficient labour.

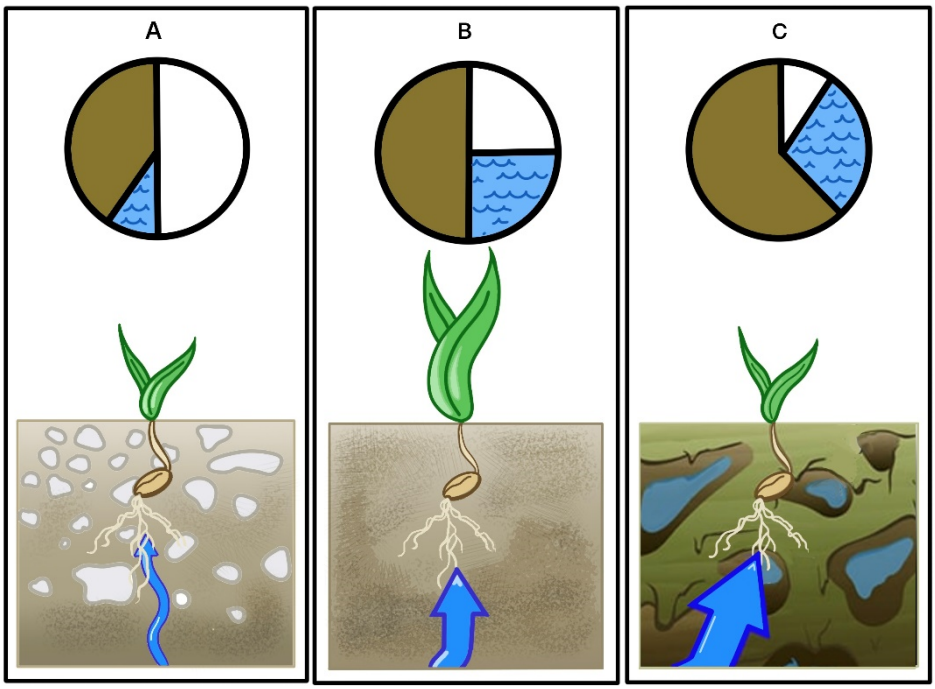
1.
2.

(b) Using the photograph above, identify which structure **A**, **B** or **C** is most suitable for slurry storage.

(c) Commonly used methods of grazing on dairy farms are paddock or strip grazing.
Suggest why this farm may be suited to either method of grazing.

Question 5

The diagram shows the effect of soil composition on the productivity of a crop.
Analyse the diagram and answer the questions that follow.



(a) Identify with reason which picture **A**, **B**, or **C** has the ideal soil composition.

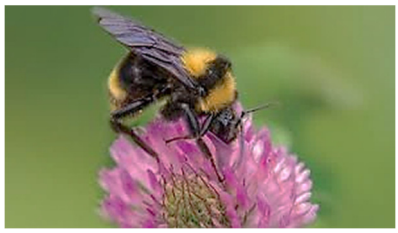
Picture:
Reason:

(b) Outline **one** reason why soil **C** has a high percentage of mineral and organic matter.

(c) Identify the conditions necessary for germination by placing a tick (✓) in the correct box.

Light, heat and oxygen	
Water, light and heat	
Water, heat and oxygen	

Question 6



There are over 102 native bee species in Ireland which play key roles in agriculture. However, their numbers have been in decline in recent years.

(a) Outline **two** roles bees play in agriculture.

1.
2.

(b) Briefly describe **two** reasons why bee numbers have been in decline in Ireland.

1.
2.

Question 7

(a) Identify **any three** plants shown in the table below using the list opposite.

Chicory	White clover
Perennial ryegrass	Nettle

A

B

C

D

(b) State which plant from part (a) above is not desired in a grassland sward.

Question 8

The photograph shows a farmer pouring fertiliser into a fertiliser spreader.
Analyse the photograph and answer the questions that follow.

(a) Suggest **two** precautions this farmer could take to reduce risks to his health.

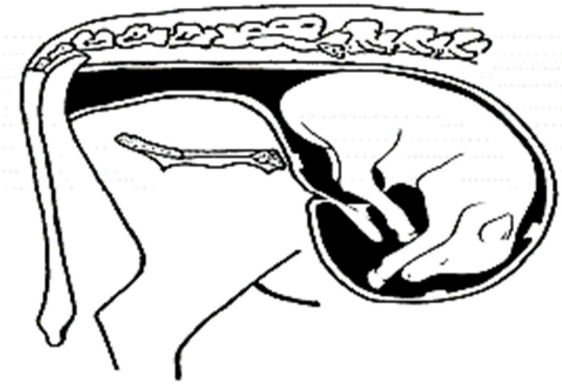
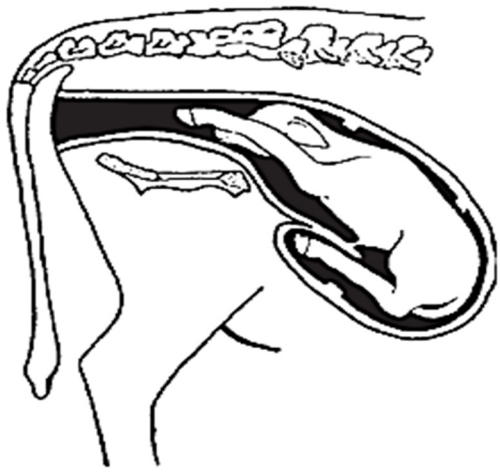
1.
2.

(b) Orla noticed two warning signs on the fertiliser bags which identified it as an eye irritant and a fire risk.
Choose the **two** warning signs by placing a tick (✓) in the correct boxes to identify these signs.

Question 9 Answer **either** (a) **or** (b).

(a) The pictures below show calves presented in various positions leading up to birth. Analyse the pictures and answer the questions that follow.

A	B
	

(i) Identify with reason which picture **A** or **B** is the correct position for a calf at birth.

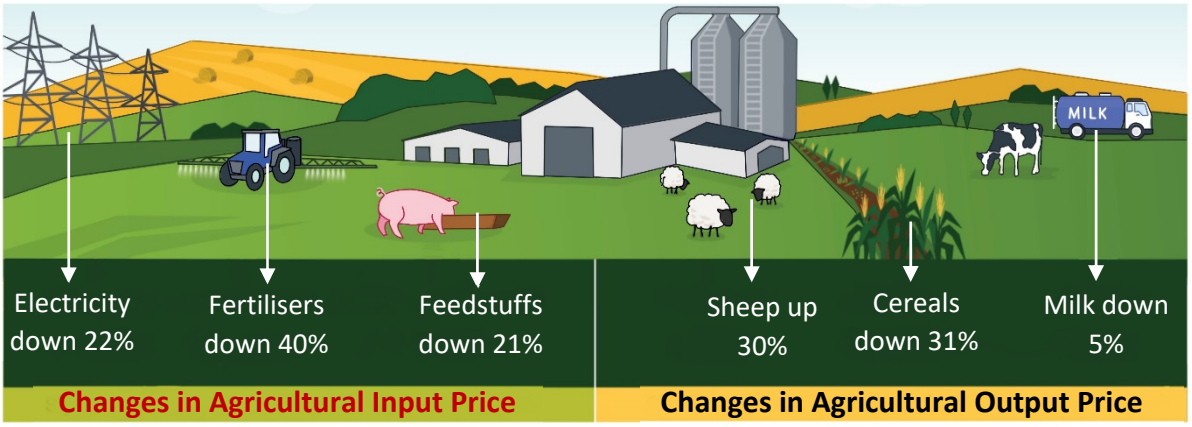
Picture:
Reason:

(ii) Briefly describe **two** management practices a farmer would carry out to the cow at calving time.

1.
2.

Or

(b) The picture shows the Agricultural Price Index for 12 months up to March 2024. Analyse the picture and answer the questions that follow.



(i) State if the input prices have increased **or** decreased.

(ii) Identify what your answer in part (i) above means for farmers by placing a tick (✓) in the correct box below.

Costs less to produce	
Cost the same to produce	
Costs more to produce	

(iii) Which agricultural enterprise's output price has increased?

(iv) Identify what your answer in part (iii) above means for farmers by placing a tick (✓) in the correct box below.

Increased profit	
Increased cost	

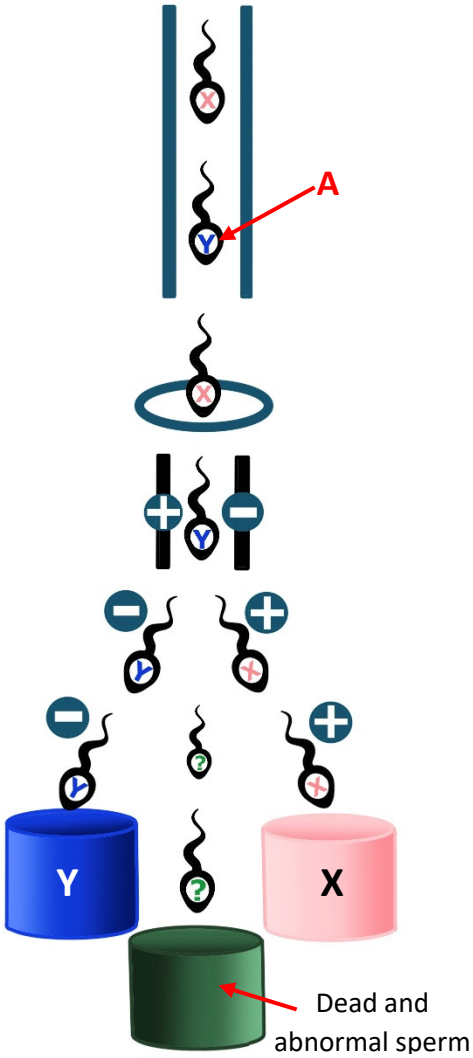
Question 10

The diagram shows the process of sex sorting bull semen. Analyse the picture and answer the questions that follow.

(a) Identify the sex cell labelled **A**.

(b) Identify which chromosome **X** or **Y** found in the sex cell is responsible for producing female calves by placing a tick (✓) in the correct box.

X	
Y	



(c) Outline **two** advantages of using sex sorted semen on farms.

1.
2.

Question 11 Answer **either** (a) **or** (b).

(a) Read the article and answer the questions that follow.

Lameness: Autumn time is peak risk period on dairy farms

Lameness can be a huge issue on Irish dairy farms in autumn, as spring calving cows are coming to the end of their lactation.

They are heavier in calf, are more tired, and are often walking on uneven or damaged surfaces. Cows walk longer distances, as more paddocks are used to extend the grazing season.

Recent studies show that lameness on Irish dairy farms costs in the region of €5,000 per 100-cow herd per year.

(Adapted from Agriland, 2024)

(i) State which type of dairy production system is described in the article by placing a tick (✓) in the correct box.

Spring calving	
Autumn calving	

(ii) Outline **two** causes of lameness in cows.

1.
2.

(iii) Calculate the annual cost of lameness per cow on Irish dairy farms.

Calculation:

Or

(b) Technology on farms to improve animal welfare and save labour is moving at a fast pace.

(i) The picture shows bulls on rubber slats.
Briefly outline **two** ways that the rubber slats improve animal welfare.

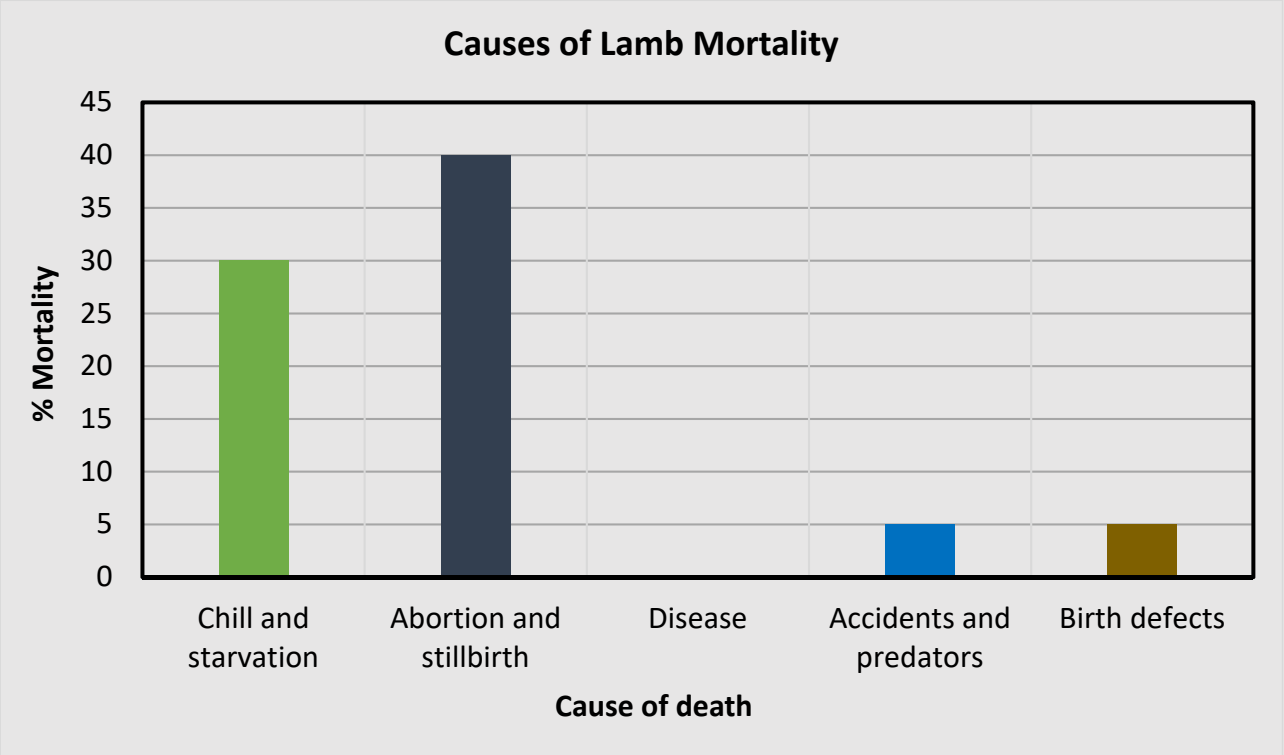
1.
2.

(ii) Apart from animal welfare, outline **two** benefits of slats in animal housing.

1.
2.

Question 12 Answer **either** (a) **or** (b).

(a) The graph shows the main causes of lamb mortality (death) on Irish sheep farms. Analyse the graph and answer the questions that follow.



(Adapted from Dairygoldagri.ie)

(i) Identify the main cause of lamb mortality.

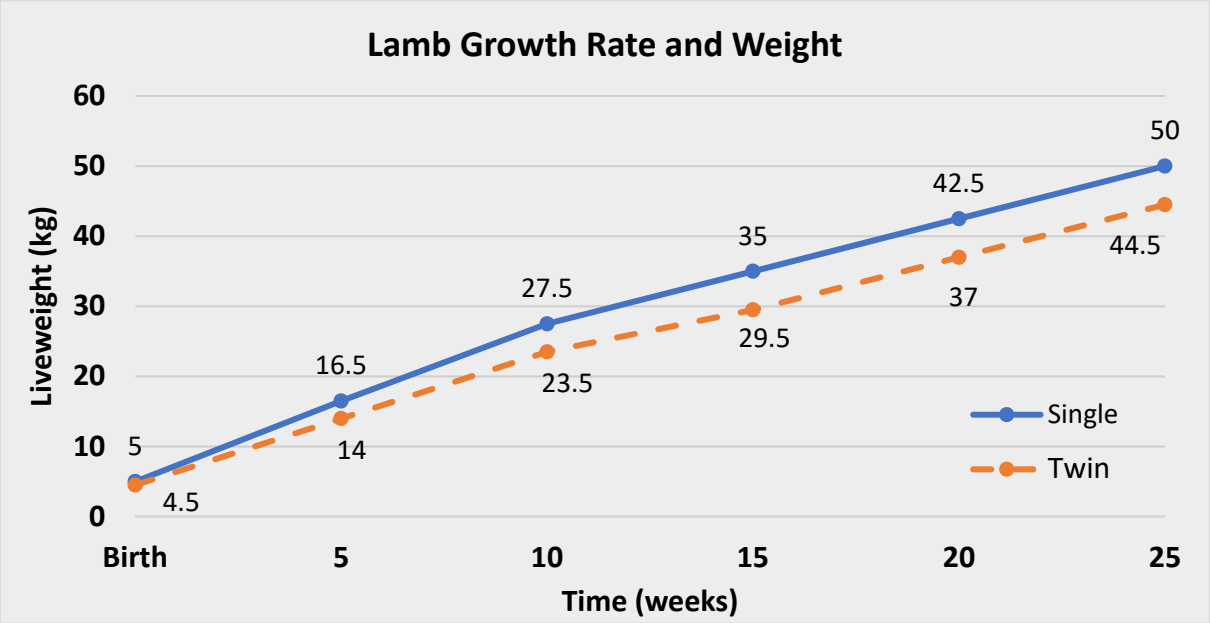
(ii) Complete the graph above to show that 20% of lambs die due to disease.

(iii) Outline **two** ways farmers can reduce mortality from chill and starvation.

1.
2.

Or

(b) The graph shows the lamb growth rate and weight of two lambs on Lucy's farm. Analyse the graph and answer the questions that follow.



(i) Identify which lamb (single or twin) had a higher growth rate over the 25 weeks.

(ii) Outline **one** reason why the twin lamb had a lower birth weight.

(iii) Predict which lamb will have a higher weight at slaughter.

(iv) Identify the ideal slaughter weight of lambs by placing a tick (✓) in the correct box.

32kg	42kg	22kg

Additional writing space for **Section A**.
Label all work clearly with the question number and part.

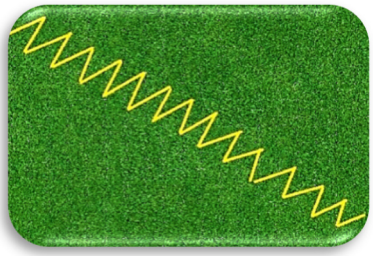
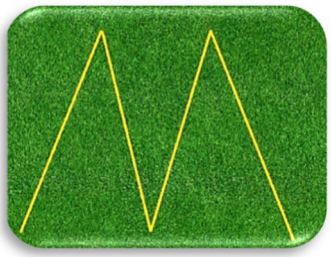
Section B — 200 marks

Answer any **four** questions.

Each question carries 50 marks.

Question 13

(a) Mia wants to take soil samples from a newly purchased field for analysis.
Study the pictures and answer the questions that follow.

A	B	C
		

(i) Identify which method of soil sampling **A**, **B** or **C** she should carry out and explain **one** reason why she should use this method.

Method:
Reason:

(ii) Advise Mia on how many samples she should take.

(iii) Name the piece of equipment Mia should use to take the soil samples.

(b) Mia wanted to determine the soil texture of her new field.
Describe with the aid of a labelled diagram how she carried out the investigation.

Named method:

Labelled diagram:

(c) The results of Mia's investigation are shown in the table below.
Analyse the table and answer the questions that follow.

Sand	Silt	Clay
33%	33%	34%

(i) Identify the soil type in Mia's field by placing a tick (✓) in the correct box.

Clay soil	
Sandy soil	
Loam soil	

(ii) Outline **two** characteristics of the soil you have identified in part (i) above.

1.
2.

(iii) List **three** crops that would grow in Mia's field.

1.
2.
3.

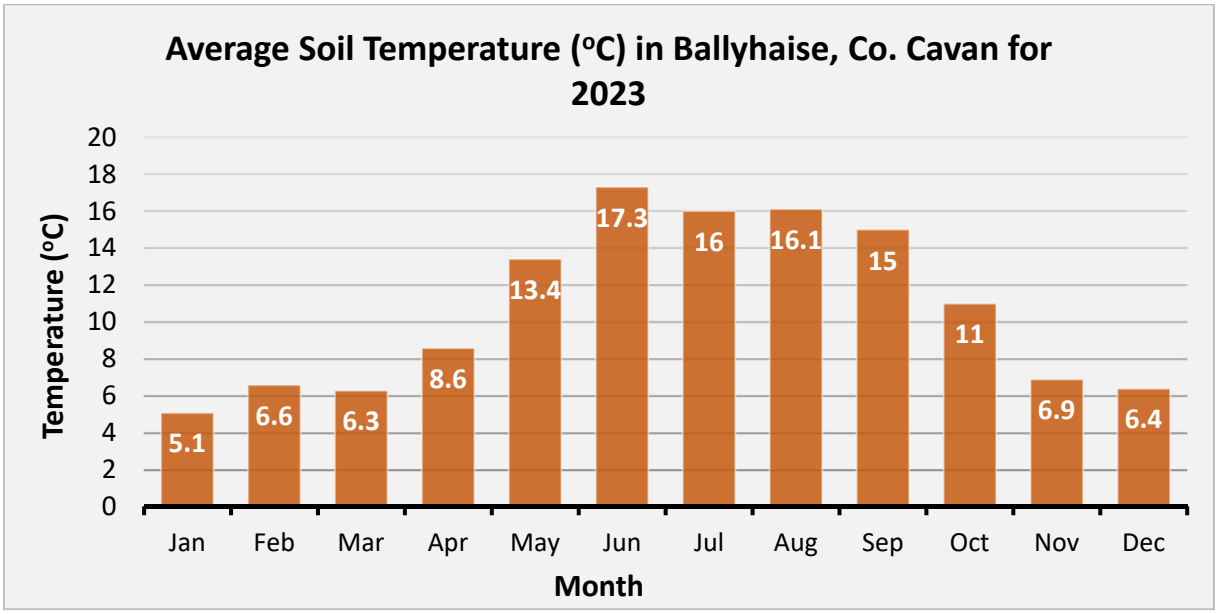
(iv) Regular liming of a soil is a very important practice.
Advise Mia on the importance of liming her soil under the headings that follow.

Soil pH:

Time to take full effect:

Question 14

(a) The graph below shows the average monthly soil temperatures in Ballyhaise Agricultural College, Co. Cavan for 2023.
Analyse the graph and answer the questions that follow.



(Adapted from Met.ie)

(i) Grass needs a minimum temperature of 6 °C for growth.
Identify which month you would expect to see grass beginning to grow on a farm in Cavan.

(ii) Explain the impacts of **two** named weather conditions on the planting of a named tillage crop.

Named tillage crop:

Named weather condition	Impact
1.	
2.	

(iii) Ireland experienced higher than average rainfall in spring 2024.
Explain how this might impact a farmer's spring grazing plan for their animals.

(b) A group of fifth year Agricultural Science students decided to investigate how temperature affects the percentage germination of seeds.

- They planted 100 barley seeds in a polytunnel and another 100 barley seeds outdoors on school grounds.
- They monitored the growth of the seeds over 4 weeks.

(i) State a suitable hypothesis for the investigation.

(ii) An independent and dependent variable from this investigation are shown in the table below.
Identify each variable by placing a tick (✓) in the correct box.

Variables	Independent	Dependent
Temperature		
Percentage germination		

(iii) After four weeks the students counted the number of seeds that had germinated. The results are shown in the table opposite.

Location	Number of seeds germinated
Polytunnel	89
Outdoor	63

Outline a conclusion based on the results shown in the table.

(iv) Calculate the percentage germination of the barley seeds grown in the polytunnel.

$$\% \text{ Germination} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds sown}} \times 100$$

Calculation:

(c) The students chose certified seed for their investigation. Certified seed has a guaranteed germination rate.

% minimum germination for certified seed	
75%	
85%	
95%	

(i) Choose the correct minimum germination rate for certified seed by placing a tick (✓) in the correct box opposite.

(ii) Describe **two** other characteristics of certified seed.

1.
2.

(iii) The photographs below **J**, **K** and **L** show three common crops grown in Ireland. Identify any **two** of these crops, using the following list.

Maize	Oilseed rape	Wheat

J

K

L

Question 15 Answer both (a) **and** (b) with **either** (c) **or** (d).

(a) Read the article and answer the questions that follow.

MILKBOT – A milk vending machine

A north Clare dairy farm sells their value-added milk called Moo'ghna Milk to local people through a milk vending machine MILKBOT.

The 70-cow herd are milked at 6am every morning. Milk is sterilised and pasteurised prior to leaving the farm and is ready to go in vending machines by 8:30am. This artisan product costs €1.70 per litre from their vending machine.

Moo'ghna Milk is pasteurised but not homogenised, and it contains its full fat content when sold to customers. The milk generally has a fat content close to 4.7% and a protein content of around 3.7%.

The use of glass bottles, or bottles brought by the customers themselves, has had positive effects for the environment with a significant local reduction of the amount of plastic packaging being used.

(Adapted from Independent.ie, 2023)

(i) Explain the underlined terms.

Value added:
Artisan product:

(ii) Briefly explain **one** way this business is environmentally friendly.

(iii) Identify the meaning of pasteurisation by placing a tick (✓) in the correct box.

Heating milk at high temperatures for short amount of time and cooling rapidly to kill bacteria	
Removal of water from milk to make dairy products such as butter and cheese	
Filtering milk to remove dirt particles before it enters the bulk tank	

(b) To produce milk for human consumption it must be of the highest standard.

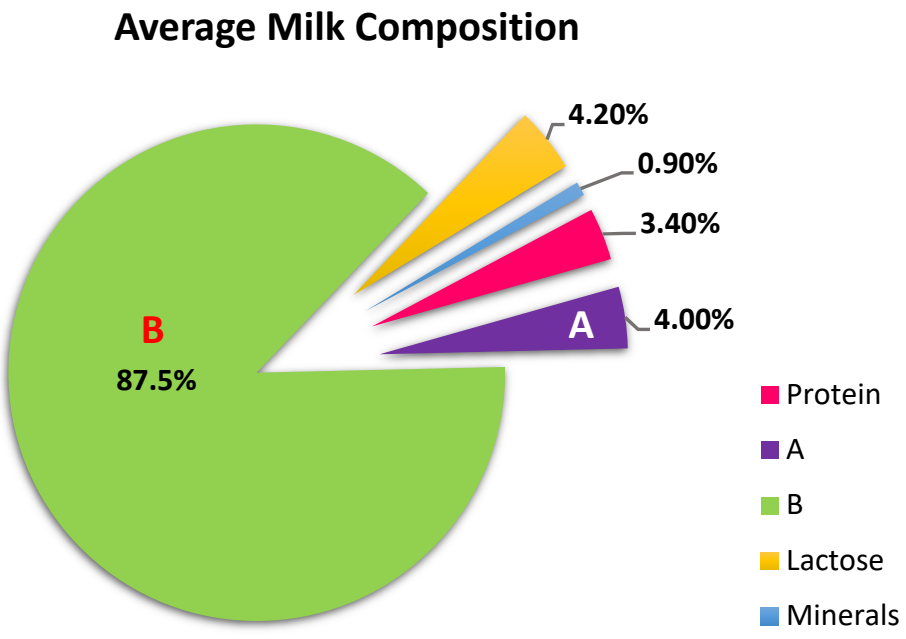
(i) List **three** factors that affect milk quality.

1.
2.
3.

(ii) John and Jackie carry out many tests on the cows and milk to ensure the milk meets the highest standard.
State **one** disease the cows are tested for and **one** milk quality test that could be carried out on the farm.

Disease:
Milk quality test:

(iii) The chart shows the typical composition of cow's milk.



Identify **A** and **B** in the chart above of the composition of milk.

	Component
A	
B	

(c) Describe with the aid of a labelled diagram how to investigate the quality of a milk sample over time.

Labelled diagram:

Or

(d) **(i)** The photographs below show four stages of calf nutrition from birth to six weeks old. Place each step in the correct order by matching the correct letter to the number in the box.

A

Calves on milk replacer

B

Calf on hay

C

Calf on grass

D

Calf fed colostrum

1		2		3		4	

(ii) Explain the importance of each of the following in the calf's diet:

Colostrum	
Hay	

Question 16

(a) Winter months can be hard on beef farms due to harsh weather conditions.

(i) Identify **three** things that make the housing in the photograph suitable for beef animals.

1.
2.
3.

(ii) Outline **two** welfare factors taken into consideration when housing beef animals.

1.
2.

(iii) Briefly describe **two** safety considerations taken when housing beef animals.

1.
2.

(b) Silage is a major component of the beef animal's diet for the winter so it is essential that it is good quality. Tom wanted to test the quality of silage on the farm and carried out a test for Dry Matter (DM).

Describe with the aid of a labelled diagram how he would determine the % DM of his silage.

Labelled diagram:

(c) **(i)** The DM% of typical forage crops is shown below in the table.
Identify which DM% represents Tom's silage, by placing a tick (✓) in the correct box.

25%	
45%	
65%	

(ii) Apart from DM, list **two** factors that affect the quality of silage.

1.
2.

(iii) State **two** other feedstuffs (apart from silage) that could be fed to the beef animals during the winter.

1.
2.

Question 17 Answer both (a) **and** (b) with **either** (c) **or** (d).

Good soil conditions are important for crop production. Earthworms have an important role in creating and maintain good soil conditions.

(a) **(i)** Outline **three** advantages of earthworms in soils.

1.
2.
3.

(ii) Outline **two** ways farmers can increase the earthworm population in their soil.

1.
2.

(b) Flocculation occurs in soils.

(i) Identify which of the following statements best describes flocculation placing a tick (✓) in the correct box.

Process during which soil particles in a solution contact and stick together, forming clusters or clumps of a larger size	
Reducing air spaces in soil	
Leaching of minerals causes formation of an iron pan in the B horizon	

(ii) Describe how a student would show that flocculation has occurred in a soil by arranging the steps of the investigation shown below in the correct order.

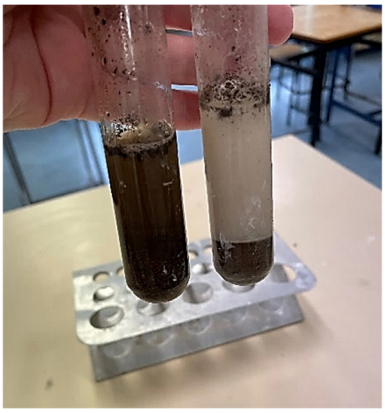
A

Add calcium carbonate to one of the test tubes

B

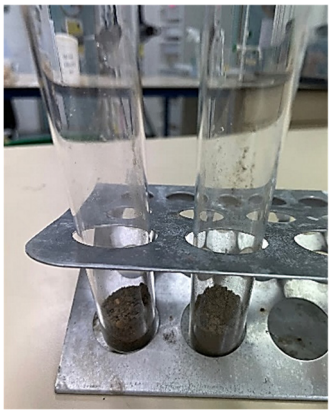
Add water to each test tube, then stopper and shake the test tubes

C



Leave to settle, one test tube stays muddy, while one test tube goes clear

D



Add clay soil to two test tubes

1		2		3		4	

(iii) Identify **one** control variable used in the investigation shown in part (ii) above.

(iv) State if the results of the investigation in part (ii) above are qualitative **or** quantitative.

(c) The table below describes the functions of four plant nutrients.
Using the list of minerals provided, match each mineral to its correct description.

Nitrogen	Phosphorus	Calcium	Magnesium

Description of mineral function	**Name of mineral**
Involved in chlorophyll production	
Production of amino acids, which produce proteins for growth and repair in plants	
Seed formation and development	
Cell wall formation	

Or

(d) For a livestock enterprise you have studied state **two** different named systems of production.
For each system identify a suitable breed of dam (female) and explain a reason for your choice.

Livestock enterprise:

	Production system 1:	Production system 2:
Breed of dam		
Reason for choice		

Question 18

(a) Aaron wanted to improve the calving rate on his suckler beef farm.
He learned that body condition score (BCS) has an effect on cows going in calf and calving period.
Analyse the table below and answer the questions that follow.

Body condition score (BCS)	% of cows that went in calf at first service	Expected calving period
1	35	24 weeks
2	55	12 weeks
3	70	9 weeks
4	65	12 weeks
5	50	15 weeks

(i) Explain the underlined term.

(ii) Using the information in the table above, identify which BCS gives the highest % of cows going in calf at first service.

(iii) Outline **two** advantages of having a shorter calving period for his suckler herd.

1.
2.

(b) Aaron wants each cow on his farm to have one calf every 12 months.

(i) Calculate **X,** the window of time available to Aaron to get his cows in calf again using the data below.

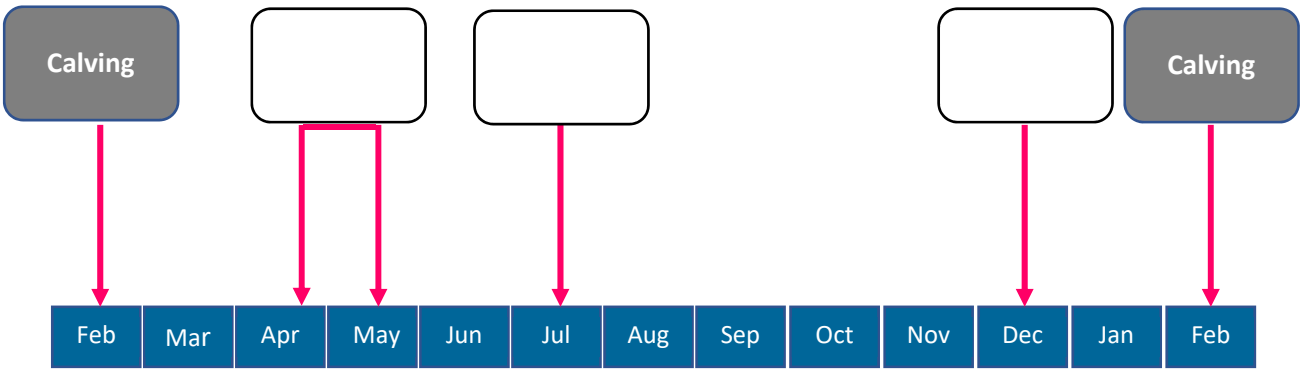
285 day gestation + **X** = **365 days**

Calculation:

(ii) The timeline below shows a calendar year for a spring calving suckler herd.

Insert the letters **A**, **B** and **C** on the timeline below to indicate when each of the following events take place for a spring calving suckler cow.

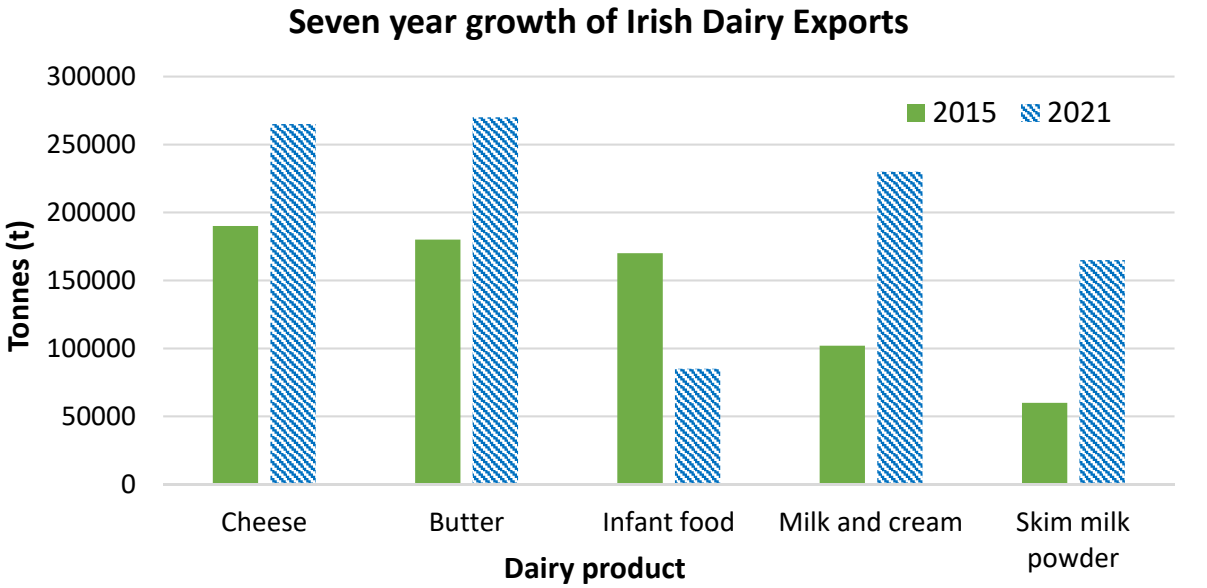
A	B	C
Drying off	Weaning off	Mating



(iii) Draw a labelled diagram of the leader follower grazing system that is often used on suckler farms.

Labelled diagram:

(c) The graph below shows Irish Dairy Exports for 2015 and 2021.
Analyse the graph and answer the questions that follow.



(Bord Bia, 2024)

(i) Identify the dairy product which decreased in exports between 2015 and 2021.

(ii) Using the graph, estimate the value of Irish butter exports to Ireland in 2021.

(iii) Irish butter is made from milk from grass fed cows.
Describe **two** characteristics of butter or another dairy product based on a grass-fed diet.

1.
2.

Additional writing space for **Section B**.
Label all work clearly with the question number and part.

Acknowledgements

Image(s)

Page 3	progressivegenetics.ie; agriland.ie; donedeal.ie; State Examinations Commission
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Text

Page 13 Harnet, H. *Lameness: Autumn time is peak risk period on dairy farms.* https://www.agriland.ie/farming-news/lameness-autumn-time-is-the-peak-risk-period-on-dairy farms (29 Sept 2024).

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Leaving Certificate – Ordinary Level

Agricultural Science

Monday 16 June

Afternoon 2:00 - 4:30