



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2021

Biology

Sections A and B and Answerbook

Higher Level

Tuesday 15 June Afternoon 2:00 – 5:00

290 marks

Examination Number

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Day and Month of Birth

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For example, 3rd February
is entered as 0302

Centre Stamp

Instructions

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

Write your answers to all parts of the examination into this answerbook. This answerbook will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

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

There are three sections to this examination. Questions for Section **C** are supplied separately but your answers must be written in this answerbook.

It is recommended that you spend not more than 30 minutes on Section **A** and 30 minutes on Section **B**, leaving 120 minutes for Section **C**.

Section **A** Answer any **four** questions from this section.
Each question carries 20 marks.

Section **B** Answer any **one** question from this section.
Each question carries 30 marks.

Section **C** Answer any **three** questions from this section.
Each question carries 60 marks.

Section A

Answer any four questions.
Write your answers in the spaces provided.

1. Answer any **five** of the following parts (a) to (f):

(a) Identify **one** difference between fats and oils at room temperature.

(b) Triglycerides and phospholipids are two types of lipid.

Identify **one** difference between a triglyceride and a phospholipid.

(c) Identify **one** metabolic role for lipids in cells.

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(d) Name **one** fat-soluble vitamin present in food.

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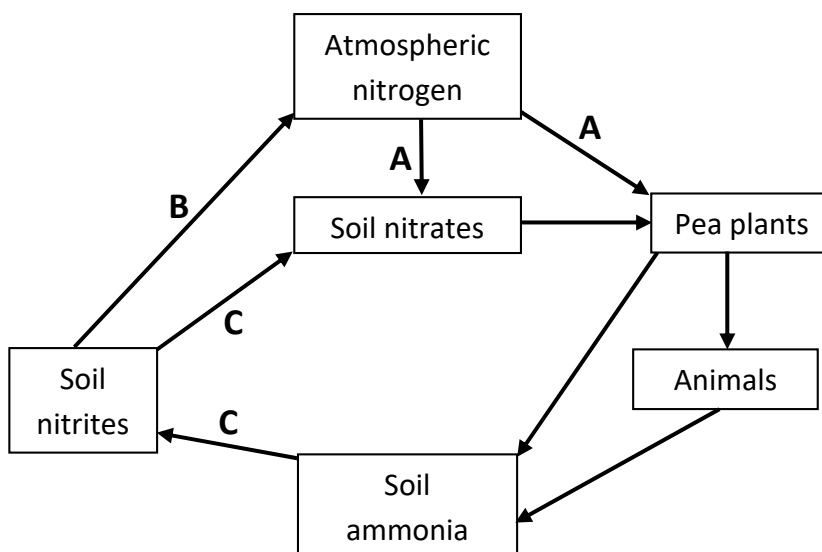
(e) Name **one** disorder associated with a deficiency of the vitamin named at part (d) above.

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(f) Name **one** element present in dissolved salts in food.

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2. The diagram below outlines some stages in the nitrogen cycle.



(a) Why do organisms need nitrogen?

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(b) Name the processes indicated at **A** and **B** in the diagram above.

A:
B:

(c) Name the type of bacteria involved in the process indicated by **C** in the diagram above.

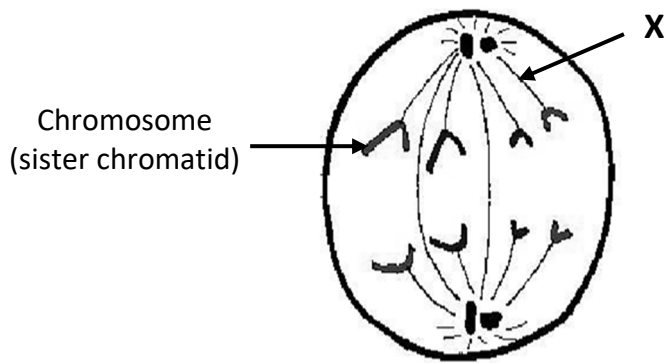
C:

(d) The application of fertilisers in agriculture can increase the amount of soil nitrates. Briefly describe **two** possible outcomes of this practice.

1.
2.

(e) On the diagram, place the letter **D** on **one** location where decomposers act.

3. The diagram shows a nucleus of a diploid cell undergoing one stage of mitosis. Answer the following in relation to mitosis.



- (a) Name the stage of mitosis shown in the diagram.

- (b) Justify your answer at part (a) above.

- (c) Identify the part labelled **X** in the diagram.

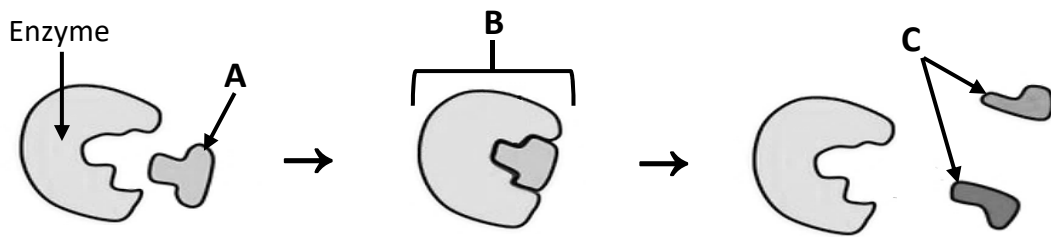
- (d) Explain the term *diploid*.

- (e) What is the diploid number of this cell?

- (f) Outline **one** function of mitosis in humans.

- (g) Give **one** example of a human cell not produced by mitosis.

4. A current theory of enzyme action is illustrated in the diagram below.



(a) Identify what is represented by each of the labels **A** and **B**.

A:
B:

(b) Which theory of enzyme action is illustrated by the diagram?

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(c) What type of metabolic reaction is illustrated by the diagram?

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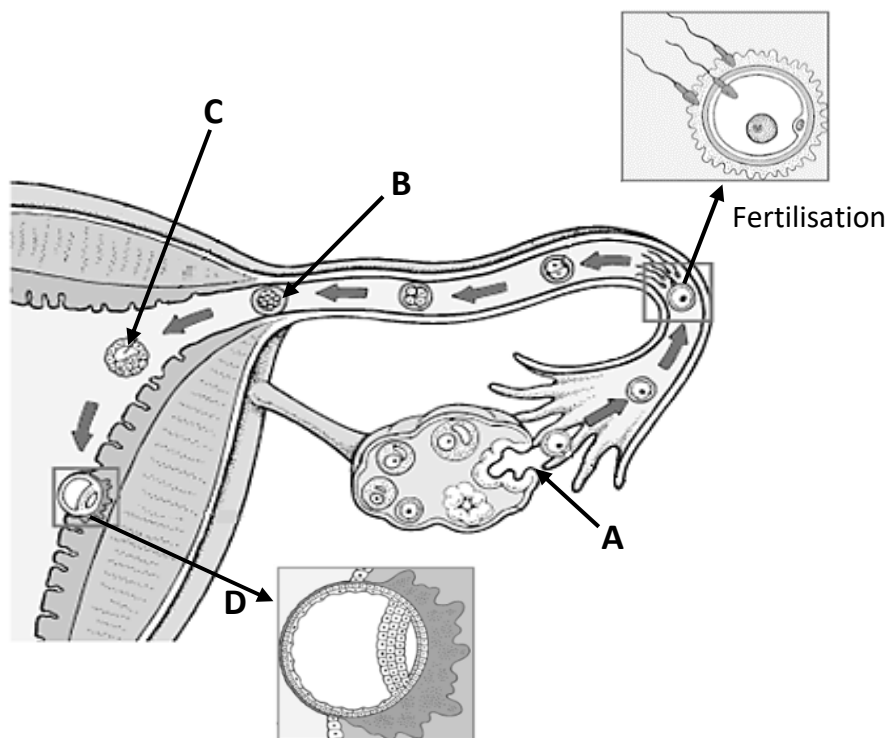
(d) Justify your answer at part (c) above.

(e) What is meant by specificity in relation to enzymes?

(f) Identify the cell organelle where enzymes are produced.

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5. The diagram shows some of the early stages in the development of a human embryo.



(a) Name the event that occurs at **A** in the diagram.

(b) Identify the hormone responsible for the event named at part (a) above.

(c) Identify the stages labelled **B** and **C** in the development of the embryo.

B:
C:

(d) What event is illustrated by **D** in the diagram?

(e) Name the **two** tissues involved in the formation of the placenta.

Tissue 1:
Tissue 2:

6. Indicate whether the following statements are true or false by placing a tick (✓) in the appropriate box in **each** case.

	True	False
(a) Adrenaline is secreted into the blood when experiencing a threat.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Plants are producers; however, they still need mitochondria.	<input type="checkbox"/>	<input type="checkbox"/>
(c) Neurotransmitters are transported in the blood.	<input type="checkbox"/>	<input type="checkbox"/>
(d) A potato is a root modified to store food.	<input type="checkbox"/>	<input type="checkbox"/>
(e) Tissue culture involves growing cells on an artificial medium.	<input type="checkbox"/>	<input type="checkbox"/>
(f) There are four bones in the middle ear.	<input type="checkbox"/>	<input type="checkbox"/>
(g) Monocotyledonous plants are almost always herbaceous.	<input type="checkbox"/>	<input type="checkbox"/>

7. In the case of **each** of the following pairs of terms, clearly distinguish between the first term and second term by writing a brief sentence about each.

(a) Carpal and tarsal.

(b) Tendon and ligament.

(c) Biceps and triceps.

(d) Osteoblast and osteoclast.

(e) Axial skeleton and appendicular skeleton.

Section B

Answer any one question.

Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

8. (a) Answer parts (i) and (ii) in relation to the principles of experimentation.

(i) Where are the results of an investigation normally reported and published?

(ii) Explain why random selection is important in experimental design.

(b) Answer the following in relation to some laboratory investigations that you carried out.

(i) When conducting qualitative food tests:

1. What reagent or chemicals did you use to test for the presence of protein?

2. What colour indicates the presence of protein in a food sample?

(ii) When isolating DNA from a plant tissue:

1. Why did you chop the tissue?

2. Why did you add salt to the chopped tissue?

3. Why did you add washing up liquid to the chopped tissue and salt?

4. The solution of washing-up liquid, chopped tissue and salt was then heated to 60°C for 15 minutes.

Describe how the DNA was then isolated from this solution.

9. (a) (i) What is meant by enzyme denaturation?

--

(ii) Other than temperature, give **one** condition that will denature an enzyme.

--

(b) Answer parts (i) and (ii) in relation to a laboratory activity to investigate heat denaturation of an named enzyme.

Name of enzyme:

(i) Describe how the enzyme was treated in the test investigation **and** in the control.

Test:

Control:

(ii) Compare the results of the test investigation to that of the control.

Test:

Control:

Answer parts (iii) and (iv) in relation to a laboratory investigation on the effect of temperature on the rate of activity of a named enzyme.

Name of enzyme:

(iii) How did you measure the rate of enzyme activity?

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(iv) Label the axes below **and** draw a curve to show how the rate of enzyme activity varies with temperature.



10. (a) (i) Is leaf yeast a unicellular or a multicellular organism?

(ii) Name the type of asexual reproduction in yeast.

(b) In an investigation on the growth of leaf yeasts, three malt agar plates were setup as shown in the table and stored in an incubator at 25°C for 7 days.

Plate	Investigation setup	Results after 7 days
A	Unopened	0 colonies
B	5 leaf discs from an ash tree from a quiet rural setting	10 colonies
C	5 leaf discs from an ash tree from a busy urban setting	4 colonies

(i) What is the purpose of malt in these plates?

(ii) Why was the underside of the leaf facing the agar?

(iii) What is the purpose of plate **A** in this investigation?

(iv) Identify the colour of the leaf yeast colonies on plate **B**.

(v) Suggest **one** reason for the difference in results between plates **B** and **C**.

(vi) Describe **two** aseptic techniques that were carried out in this investigation to prevent growth of other microbes.

1.
2.

(vii) State **one** correct disposal method for these plates after the investigation.

Answerbook for Section C

Instructions

Questions for Section C are supplied separately.

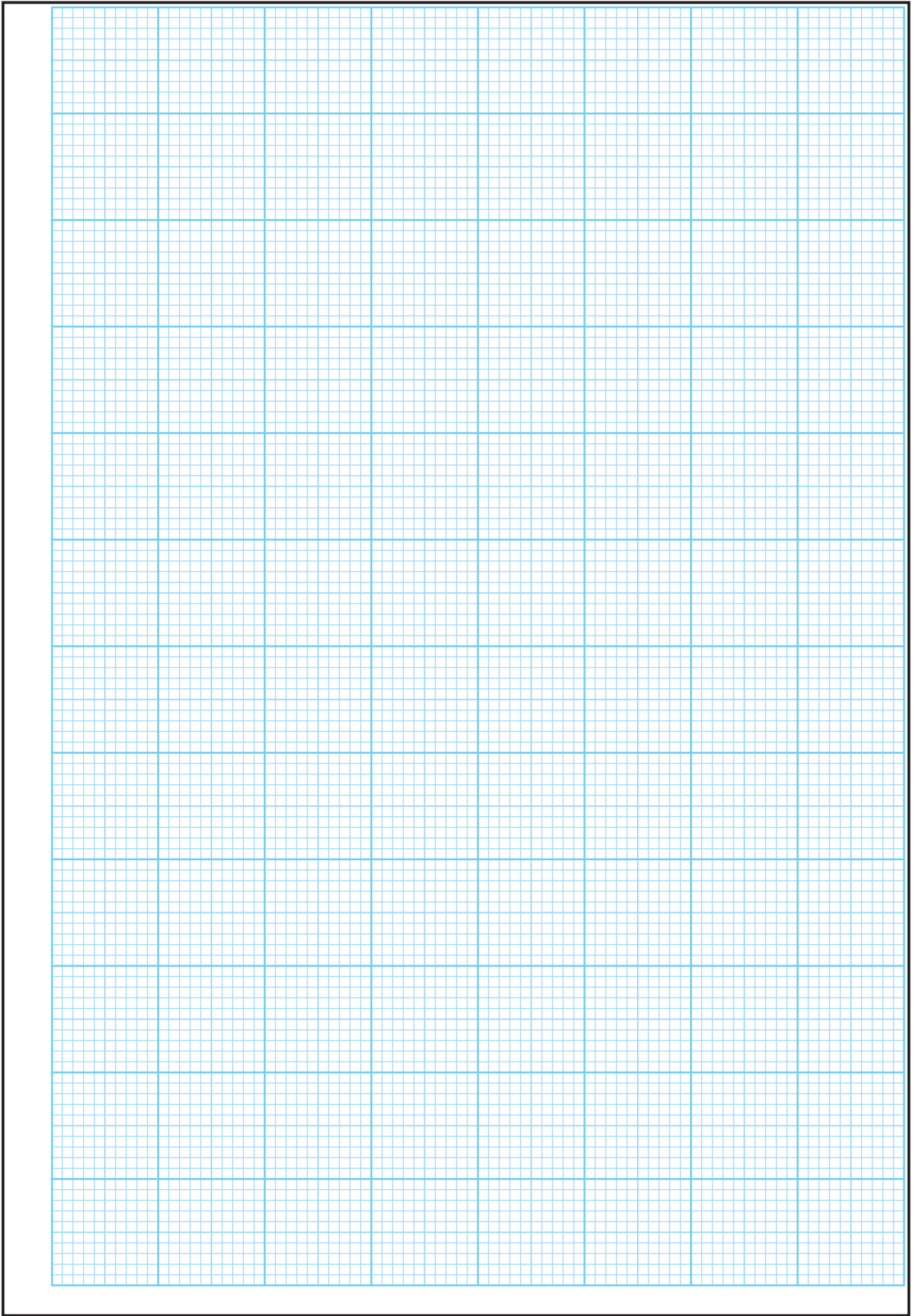
Start each question on a new page. Write the question number in the box at the top of each page. Use the left-hand column to label each part, as shown below.

Part <i>Cuid</i>	Question <i>Ceist</i>	0 4	Start each question on a new page <i>Cuir tús le gach ceist ar leathanach nua</i>
(a)			
(b)(i)			
(b)(ii)			

There are four pages of graph paper on the next four pages of this answerbook. On pages with graph paper, the box for the question number is at the bottom of the page.

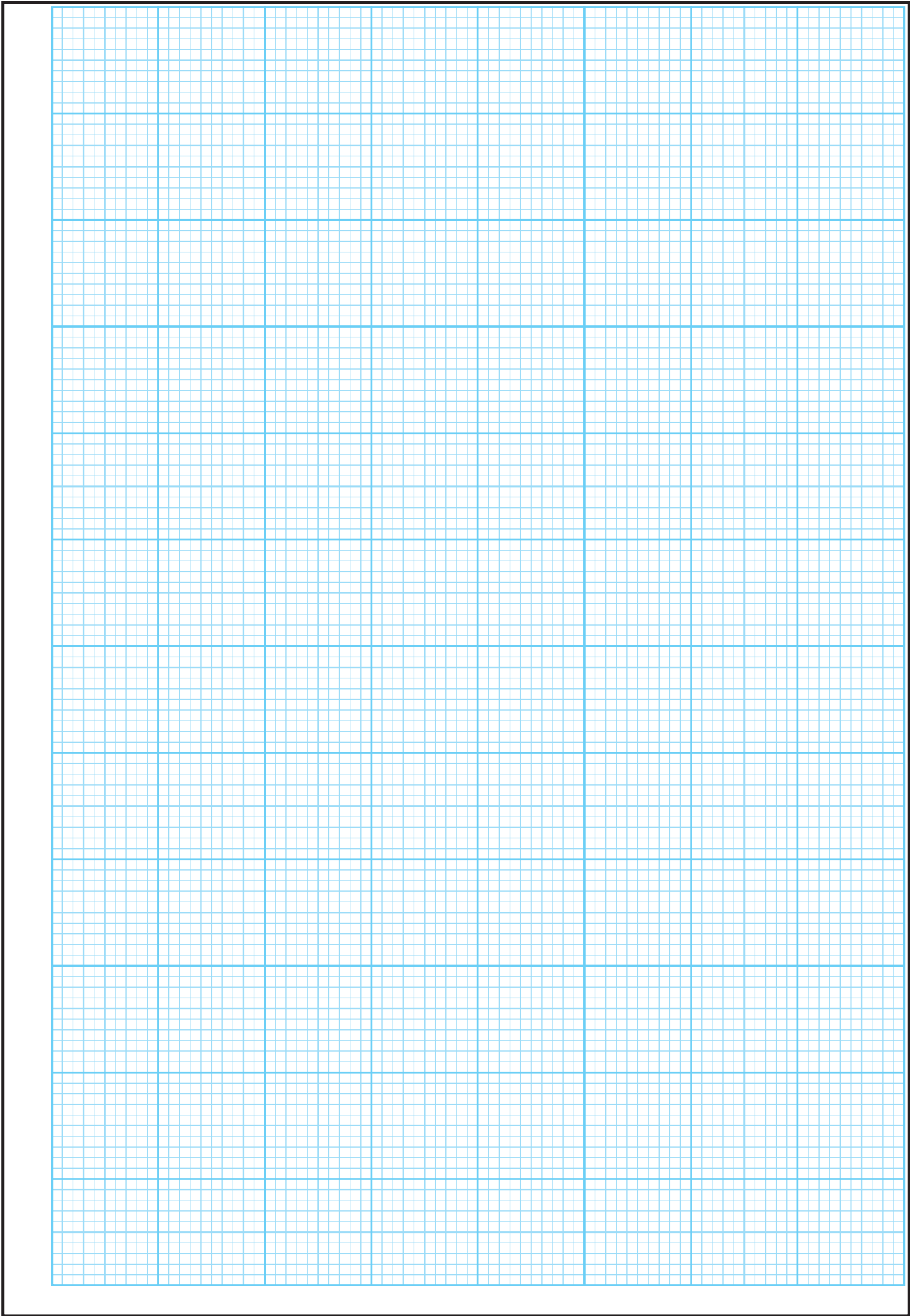
You do not need to use all of the pages in this answerbook. If you run out of space in this answerbook, you may ask the superintendent for more paper or graph paper.

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



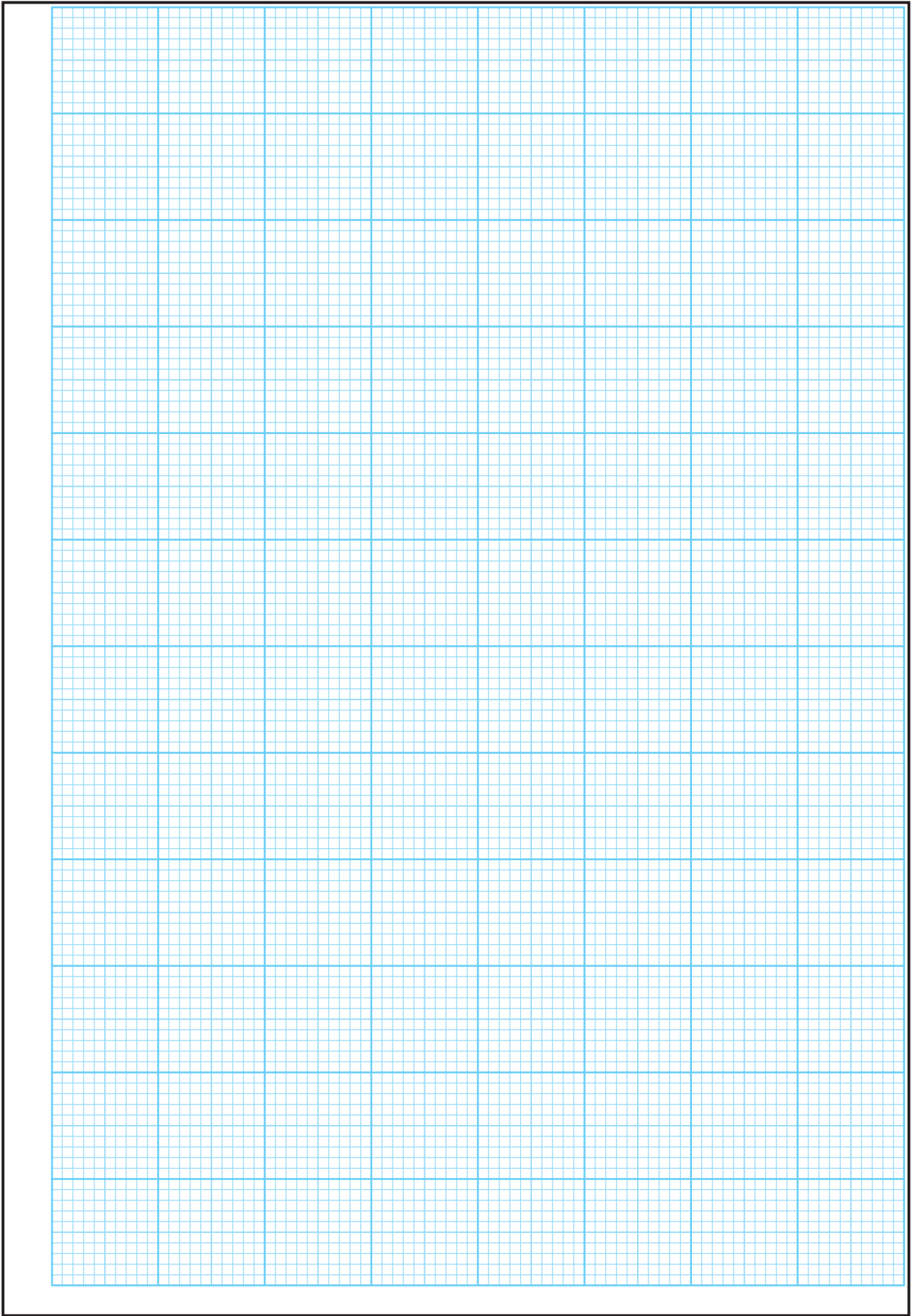
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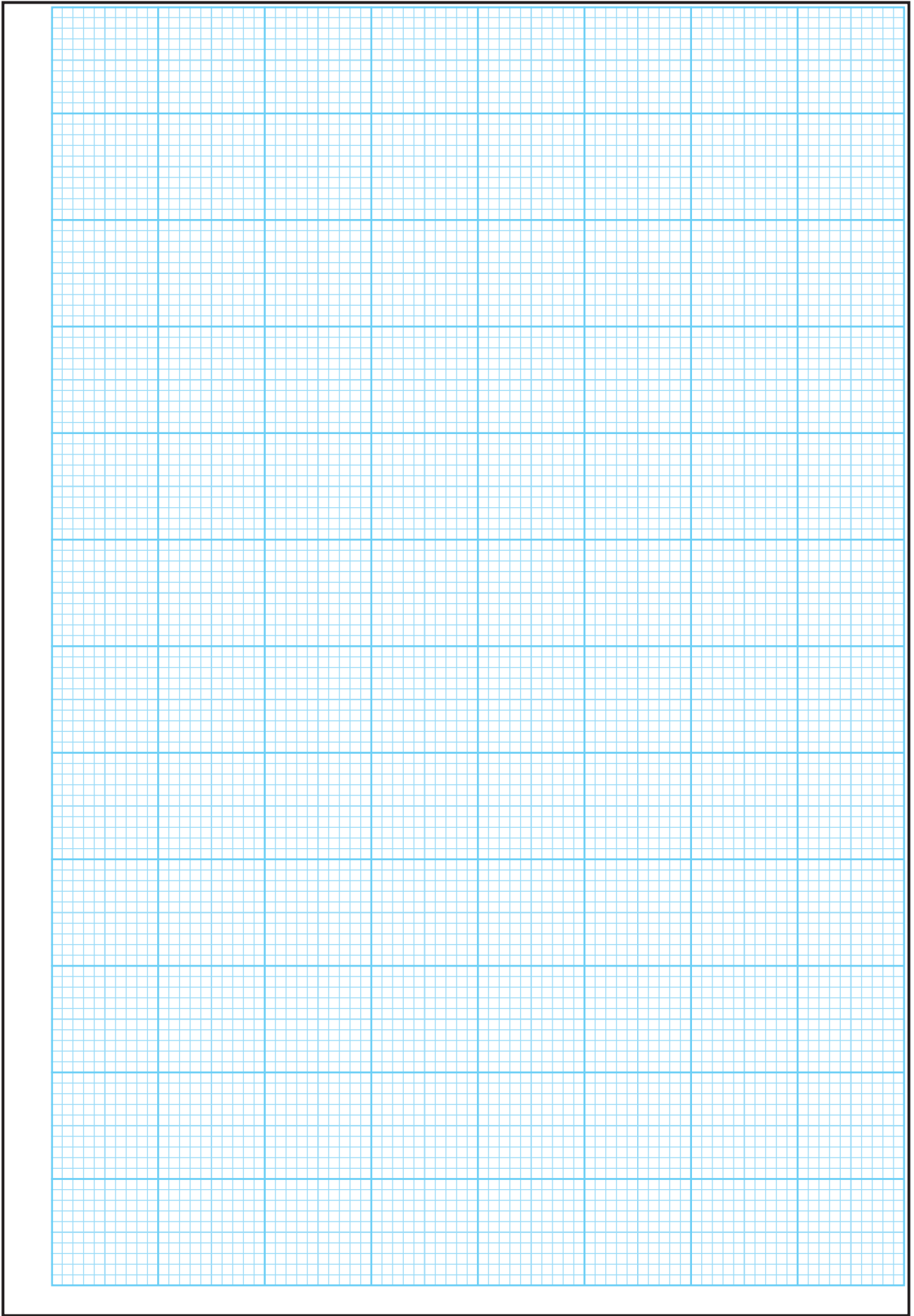
Question





Question





Question

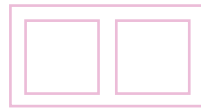
The image shows two adjacent rectangular boxes with a pink border. Each box is currently empty, intended for the student to write a question number and a corresponding part number.

Start each question on a new page

Part

A large table with a black border, consisting of 20 rows and 2 columns. The left column is narrow and is aligned with the 'Part' label above. The right column is wide and contains horizontal blue lines for writing. The entire table area is intended for the student to write their questions and answers.

Question



Start each question on a new page

Part

Part	

Question

Two empty rectangular boxes side-by-side, outlined in pink, intended for marking questions.

Start each question on a new page

Part

A large grid area with a vertical line on the left side, creating a column for 'Part'. The rest of the grid is filled with horizontal blue lines for writing.

Do not write on this page

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Tuesday 15 June

Afternoon 2:00 – 5:00