KĀSIGA SCHOOL

DEHRADUN

Holiday Homework Summer Break 2020

Advanced Subsidiary Level

ENGLISH

1 In the following piece of nonfiction, the writer records his observations during a visit to the war-ravaged city of Stalingrad, Russia, in 1949.

(a)   Comment on the ways in which the writer uses language and style in the passage.

Across the street was the repaired Intourist Hotel where we were to stay. We were given two large rooms. Our windows looked out on acres of rubble, broken brick and concrete and pulverized1 plaster, and in the wreckage the strange dark weeds that always seem to grow in destroyed places. During the time we were in Stalingrad we grew more and more fascinated with this expanse of ruin, for it was not deserted. Underneath the rubble were cellars and holes, and in these holes many people lived. Stalingrad was a large city, and it had had apartment houses and many flats, and now has none except the new ones on the outskirts, and its population has to live some place. It lives in the cellars of the buildings where the apartments once were. We would watch out of the windows of our room, and from behind a slightly larger pile of rubble would suddenly appear a girl, going to work in the morning, putting the last little touches to her hair with a comb. She would be dressed neatly, in clean clothes, and she would swing out through the weeds on her way to work. How they could do it we have no idea. How they could live underground and still keep clean, and proud, and feminine. Housewives came out of other holes and went away to market, their heads covered with white headcloths, and market baskets on their arms. It was a strange and heroic travesty on modern living.

There was one rather terrifying exception. Directly behind the hotel, and in a place overlooked by our windows, there was a little garbage pile, where melon rinds, bones, potato peels, and such things were thrown out. And a few yards farther on, there was a little hummock2, like the entrance to a gopher3 hole. And every morning, early, out of this hole a young girl crawled. She had long legs and bare feet, and her arms were thin and stringy, and her hair was matted and filthy. She was covered with years of dirt, so that she looked very brown. And when she raised her face, it was one of the most beautiful faces we have ever seen. Her eyes were crafty, like the eyes of a fox, but they were not human. The face was well developed and not moronic. Somewhere in the terror of the fighting in the city, something had snapped, and she had retired to some comfort of forgetfulness. She squatted on her thighs and ate watermelon rinds and sucked the bones of other people's soup. She usually stayed there for about two hours before she got her stomach full. And then she went out in the weeds, and lay down, and went to sleep in the sun. Her face was of a chiselled loveliness, and on her long legs she moved with the grace of a wild animal. The other people who lived in the cellars of the lot rarely spoke to her. But one morning I saw a woman come out of another hole and give her half a loaf of bread. And the girl clutched at it almost snarlingly and held it against her chest. She looked like a half-wild dog at the woman who had given her the bread, and watched her suspiciously until she had gone back into her own cellar, and then she turned and buried her face in the slab of black bread, and like an animal she looked over the bread, her eyes twitching back and forth. And as she gnawed at the bread, one side of her ragged filthy shawl slipped away from her dirty young neck, and her hand automatically brought the shawl back, and patted it in place with a heart-breaking feminine gesture.

We wondered how many there might be like this, minds that could not tolerate living in the twentieth century any more, that had retired not to the hills, but into the ancient hills of the human past, into the old wilderness of pleasure, and pain, and self-preservation. It was a face to dream about for a long time.

1 *pulverized:* crushed or ground into a fine powder

2 *hummock:* a small, raised area on a piece of land

3 *gopher:* a burrowing rodent found in North and Central America

2 The following text is an extract from a nonfiction book about modern-day farming. (a) Comment on the ways the writer uses language and style in the extract.

Mid-April in Pennsylvania, USA, and spring is in full swing. Birds are singing and daffodils celebrate in rampant profusion outside the front door of the white clapboard farmhouse. I gaze from the childhood bedroom window of the late Rachel Carson, the mother of the modern environmental movement, and look across the Allegheny valley where she grew up. I picture the young girl being inspired by the natural world around her: picking fruit from apple orchards, wandering nearby woods and hillsides, making countless discoveries as she went. Peering out into the morning light, I see two enormous chimney stacks belching smoke into the blue sky. Carson grew up in a world where industry and countryside existed side by side. But during her lifetime lines became blurred and industrial methods found their way into farming, with devastating consequences.

In 1962 Rachel Carson was the first to raise the alarm about the peril facing food and the countryside. Her book Silent Spring shone a spotlight on the effects of spraying the countryside with chemicals, part of agriculture's new industrialised approach.

proach. I was on the last leg of a journey to see for myself the reality behind the marketing gloss of 'cheap' meat, to find out how the long tentacles of the global food system are wrapped around the food on our plate. I wanted to find out, half a century on, how things had changed, what notice we have taken, and what has happened to our food. It was a journey that had already taken me across continents, from the California haze to the bright lights of Shanghai, from South America's Pacific coast and rainforests to the beaches of Brittany. In the 1960s, Carson's clarion call1 was heard across the Atlantic by Peter Roberts, a dairy farmer from Hampshire, England. He was one of the first in Europe to talk about the invasion of intensive farming methods sweeping across from America. As he walked his fields and milked his cows, Roberts became uneasy at what was going on. He saw farm animals disappearing from the land into huge, windowless sheds, the farming press acting as cheerleader for the post-war agricultural revolution, his fellow farmers bombarded with messages ushering them along the industrial route. He felt something had to be done.

Angered by the institutionalised cruelty to animals on factory farms, Roberts approached the main animal charities of the day, urging them to get involved. He left disappointed: the charities were too busy focusing on cruelty to cats, dogs and horses. Despondent but undeterred, he shared his thoughts with a lawyer friend. 'Well Peter, at least you know where you stand,' the friend responded. 'You'll just have to take it up yourself.'

In 1967, Roberts founded the charity for which I now work: Compassion in World Farming. It was the autumn and the new organisation was run out of the family cottage; one man, his wife, Anna, and three small daughters against an industry driven by government policy, subsidised by taxpayers' money, guided

by agricultural advisers and supported by a profusion of chemical, pharmaceutical and equipment companies. The odds against making any impact were huge.

clarion call: a request for action

3. The passage which follows is from a nonfiction book about the science of predicting future events. In this chapter, the writer considers the reliability of weather forecasting. (a) Comment on the ways the writer uses language and style in the passage.

On Tuesday, August 23, 2005, an Air Force reconnaissance plane detected signs of a disturbance over the Bahamas. There were "several small vortices," it reported, spirals of wind rotating in a counter-clockwise motion from east to west—away from the expanse of the Atlantic and toward the United States. This disruption in wind patterns was hard to detect from clouds or from satellite data, but cargo ships were beginning to recognize it. The National Hurricane Center thought there was enough evidence to characterize the disturbance as a tropical cyclone, labelling it Tropical Depression Twelve. It was a "tricky" storm that might develop into something more serious or might just as easily dissipate; about half of all tropical depressions in the Atlantic Basin eventually become hurricanes.

The depression strengthened quickly, however, and by Wednesday afternoon one of the Hurricane Center's computer models was already predicting a double landfall in the United States—a first one over southern Florida and a second that might "take the cyclone to New Orleans." The storm had gathered enough strength to become a hurricane and it was given a name, Katrina.

Katrina's first landfall—it passed just north of Miami and then zoomed through the Florida Everglades a few hours later as a Category 1 hurricane—had not been prolonged enough to threaten many lives. But it had also not been long enough to take much energy out of the storm. Instead, Katrina was gaining strength in the warm waters of the Gulf of Mexico. In the early hours of Saturday morning the forecast really took a turn for the worse: Katrina had become a Category 3 hurricane, on its way to being a Category 5. And its forecast track had gradually been moving westward, away from Florida and toward Mississippi and Louisiana. The computer models were now in agreement: the storm seemed bound for New Orleans.

A direct strike of a major hurricane on New Orleans had long been every weather forecaster's worst nightmare. The city presented a perfect set of circumstances that might contribute to the death and destruction there. On the one hand there was its geography: New Orleans does not border the Gulf of Mexico as much as sink into it. Much of the population lived below sea level and was counting on protection from an outdated system of levees1 and a set of natural barriers that had literally been washing away to sea. On the other hand there was its culture. New Orleans does many things well, but there are two things that it proudly refuses to do. New Orleans does not move quickly, and New Orleans does not place much faith in authority. If it did those things, New Orleans would not really be New Orleans. It would also have been much better prepared to deal with Katrina, since those are the exact two things you need to do when a hurricane threatens to strike.

The National Hurricane Center nailed its forecast of Katrina; it anticipated a potential hit on the city almost five days before the levees were breached, and concluded that some version of the nightmare scenario was probably more than forty-eight hours away. Twenty or thirty years ago, this advance warning would

almost certainly not have been possible, and fewer people would have been evacuated. The Hurricane Center's forecast, and the steady advances made in weather forecasting over the past few decades, undoubtedly saved many lives.

Not everyone listened to the forecast, however. About eighty-thousand New Orleanians—almost a fifth of the city's population at the time—failed to evacuate the city, and one-thousand-six-hundred of them died. Surveys of the survivors found that about two-thirds of them did not think the storm would be as bad as it was. Others had been confused by an unclear evacuation order; the city's mayor, Ray Nagin, waited almost twenty-four hours to call for a mandatory evacuation, despite pleas from other public officials. Still other residents—impoverished, elderly, or disconnected from the news—could not have fled even if they had wanted to.

Weather forecasting is one of the success stories in this book, a case of man and machine joining forces to understand and sometimes anticipate the complexities of nature. That we can sometimes predict nature's course, however, does not mean we can alter it. Nor does a forecast do much good if there is *no one willing to listen to it. The story of Katrina is one of human ingenuity and human error.*

1 levees: embankments

MATHEMATICS

1   The function $f : x \mapsto 5 + 3\cos(\frac{1}{2}x)$ is defined for $0 \leqslant x \leqslant 2\pi$.

   (i) Solve the equation $f(x) = 7$, giving your answer correct to 2 decimal places.   [3]

   (ii) Sketch the graph of $y = f(x)$.   [2]

   (iii) Explain why f has an inverse.   [1]

   (iv) Obtain an expression for $f^{-1}(x)$.   [3]

2   The function f is defined by $f : x \mapsto 2x^2 - 6x + 5$ for $x \in \mathbb{R}$.

   (i) Find the set of values of p for which the equation $f(x) = p$ has no real roots.   [3]

   The function g is defined by $g : x \mapsto 2x^2 - 6x + 5$ for $0 \leqslant x \leqslant 4$.

   (ii) Express $g(x)$ in the form $a(x + b)^2 + c$, where a, b and c are constants.   [3]

   (iii) Find the range of g.   [2]

   The function h is defined by $h : x \mapsto 2x^2 - 6x + 5$ for $k \leqslant x \leqslant 4$, where k is a constant.

   (iv) State the smallest value of k for which h has an inverse.   [1]

   (v) For this value of k, find an expression for $h^{-1}(x)$.   [3]

3
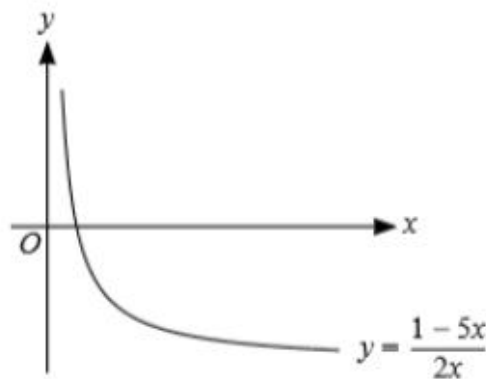
The diagram shows the graph of $y = f^{-1}(x)$, where f^{-1} is defined by $f^{-1}(x) = \dfrac{1-5x}{2x}$ for $0 < x \leqslant 2$.

   (i) Find an expression for $f(x)$ and state the domain of f.   [5]

   (ii) The function g is defined by $g(x) = \dfrac{1}{x}$ for $x \geqslant 1$. Find an expression for $f^{-1}g(x)$, giving your answer in the form $ax + b$, where a and b are constants to be found.   [2]

4　(i) Express $x^2 - 2x - 15$ in the form $(x + a)^2 + b$.　　　　　　　　[2]

The function f is defined for $p \leqslant x \leqslant q$, where p and q are positive constants, by

$$f : x \mapsto x^2 - 2x - 15.$$

The range of f is given by $c \leqslant f(x) \leqslant d$, where c and d are constants.

(ii) State the smallest possible value of c.　　　　　　　　[1]

For the case where $c = 9$ and $d = 65$,

(iii) find p and q,　　　　　　　　[4]

(iv) find an expression for $f^{-1}(x)$.　　　　　　　　[3]

5　The function $f : x \mapsto 6 - 4\cos(\tfrac{1}{2}x)$ is defined for $0 \leqslant x \leqslant 2\pi$.

(i) Find the exact value of x for which $f(x) = 4$.　　　　　　　　[3]

(ii) State the range of f.　　　　　　　　[2]

(iii) Sketch the graph of $y = f(x)$.　　　　　　　　[2]

(iv) Find an expression for $f^{-1}(x)$.　　　　　　　　[3]

Statistics

1　The following back-to-back stem-and-leaf diagram shows the times to load an application on 61 smartphones of type A and 43 smartphones of type B.

	Type A		Type B	
(7)	9 7 6 6 4 3 3	2	1 3 5 8	(4)
(7)	5 5 4 4 2 2 2	3	0 4 4 5 6 6 6 6 7 8 8 9	(12)
(13)	9 9 8 8 8 7 6 6 4 3 2 2 0	4	0 1 1 2 3 6 8 8 9 9	(10)
(9)	6 5 5 4 3 2 1 1 0	5	2 5 6 6 9	(5)
(4)	9 7 3 0	6	1 3 8 9	(4)
(6)	8 7 4 4 1 0	7	5 7	(2)
(10)	7 6 6 6 5 3 3 2 1 0	8	1 2 4 4	(4)
(5)	8 6 5 5 5	9	0 6	(2)

Key:　3 | 2 | 1　means 0.23 seconds for type A and 0.21 seconds for type B.

(i) Find the median and quartiles for smartphones of type A.　　　　　　　　[3]

You are given that the median, lower quartile and upper quartile for smartphones of type B are 0.46 seconds, 0.36 seconds and 0.63 seconds respectively.

(ii) Represent the data by drawing a pair of box-and-whisker plots in a single diagram on graph paper.　　　　　　　　[3]

(iii) Compare the loading times for these two types of smartphone.　　　　　　　　[1]

2　On a certain day in spring, the heights of 200 daffodils are measured, correct to the nearest centimetre. The frequency distribution is given below.

Height (cm)	4 – 10	11 – 15	16 – 20	21 – 25	26 – 30
Frequency	22	32	78	40	28

(i) Draw a cumulative frequency graph to illustrate the data.　　　　　　　　[4]

(ii) 28% of these daffodils are of height h cm or more. Estimate h.　　　　　　　　[2]

3   A random sample of 25 people recorded the number of glasses of water they drank in a particular week. The results are shown below.

23	19	32	14	25
22	26	36	45	42
47	28	17	38	15
46	18	26	22	41
19	21	28	24	30

    (i) Draw a stem-and-leaf diagram to represent the data. [3]

    (ii) On graph paper draw a box-and-whisker plot to represent the data. [5]

4   It is given that $X \sim N(30, 49)$, $Y \sim N(30, 16)$ and $Z \sim N(50, 16)$. On a single diagram, with the horizontal axis going from 0 to 70, sketch three curves to represent the distributions of X, Y and Z. [3]

5   The following are the house prices in thousands of dollars, arranged in ascending order, for 51 houses from a certain area.

253 270 310 354 386 428 433 468 472 477 485 520 520 524 526 531 535
536 538 541 543 546 548 549 551 554 572 583 590 605 614 638 649 652
666 670 682 684 690 710 725 726 731 734 745 760 800 854 863 957 986

    (i) Draw a box-and-whisker plot to represent the data. [4]

An expensive house is defin d as a house which has a price that is more than 1.5 times the interquartile range above the upper quartile.

    (ii) For the above data, give the prices of the expensive houses. [2]

    (iii) Give one disadvantage of using a box-and-whisker plot rather than a stem-and-leaf diagram to represent this set of data. [1]

BUSINESS

MM 16 Points

Dear Students,

Project Work:

Research on the four/seven Ps of the Marketing Mix and then select any product (Physical product or Service) and relate how a firm uses all the four Ps of the selected product or what is the relationship of the 4 Ps with that product. In case of service 7Ps will be used.

The work should be submitted through a power point presentation. Good use of visuals will be appreciated.

Number of slides (Minimum 8 slides)

Rubrics for Presentation

CATEGORY	4	3	2	1
Sources	All sources (information and graphics) are accurately documented	All sources (information and graphics) are accurately documented, barring a few.	Many sources (information and graphics) are accurately documented.	Some sources are not accurately documented.
Diagrams & Illustrations	Diagrams and illustrations are neat, accurate and add to the reader\'s understanding of the topic.	Diagrams and illustrations are accurate and add to the reader\'s understanding of the topic.	Diagrams and illustrations are neat and accurate and sometimes add to the reader\'s understanding of the topic.	Diagrams and illustrations are not accurate OR do not add to the reader\'s understanding of the topic.
Quality of Information	Information clearly relates to the main topic. It includes several supporting details and/or examples.	Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.	Information clearly relates to the main topic. No details and/or examples are given.	Information has little or nothing to do with the main topic.
Slide Construction	The slides are clear with appropriate font size and colouring.	The slides are clear with appropriate font size but lack effective colouring.	The slides are clear with appropriate font size with no colouring.	The slides are not clear with a varying font size and colouring.

For any doubts/clarifications you may reach me at vikram@kasigaschool.com

PSYCHOLOGY

1. Design a lab experiment to investigate the effect of stress on reaction time.
   a. Identify, define, operationalise and manipulate the variables
   b. Chose an appropriate design
   c. Discuss sampling and tools in the experiment
   d. Explain the process and steps in the experiment
   e. Write strengths and weakness of the research method used.

2. Design an interview to study the Psychological impact of COVID 19 on adolescents
   Use a structured interview method with open and close ended questions.

ECONOMICS

Write 1000 to 1200 words on the following topics:

Project 1: ROLE OF THE GOVERNMENT IN A MIXED ECONOMY AND ECONOMIC EFFICIENCY: CURRENT ISSUES AND CHALLENGES

The main objective of this PROJECT is to reveal the relationship between the mixed economy and achieving economic efficiency. Learners need to analyse the said topic considering their own economy.

Project 2: Public Goods and Market failure
Learners need to explore different real life examples of pure public goods and how these generate the problem of market failure. In this light students should discuss the following question:
Are Public schools, Public hospitals, Public Museums, Public Transport considered as public goods?

Project 3: Money and hyperinflation: a functional relationship
Learners need to consider the following assigned country to make a report on the said project title:
Zimbabwe - Samprada
Bolivia – Kabir
 Brazil – Chetan
 Venezuela – Uday
 Argentina – Khushi
 Angola – Aayush
 Austria – Yash raj
 Peru – Harsh
 North Korea - Maanavi

Some standard instruction to prepare the report:
1. Font and font size: Times new Roman, 12
2. For headings font size: 14
3. Maximum no of pages: 15 (including the cover page)
4. Cover page information contains Title of the project, Name of the students, admission no, Class, and Subject
5. Submission date of the report: 4th July, 2020

PHYSICS

Topic: Laws of Motion

Make a PowerPoint presentation to include the following points (the submission is not the PowerPoint file, but the spoken presentation you will give, with the aid of the file):

- Define and use linear momentum
- State and apply each of Newton's laws of motion

The duration of the presentation should be 5-7 minutes. Include as many examples as you can, and try to make it interactive.

BIOLOGY

Cell Structure
Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Cell Structure
Sub Topic	Cell Structure
Booklet	Theory
Paper Type	Question Paper 1

Time Allowed :   **64   minutes**

Score   :   **/ 53**

Percentage   :   **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1   Fig. 2.1 is a transmission electron micrograph of cells from a spinach leaf.
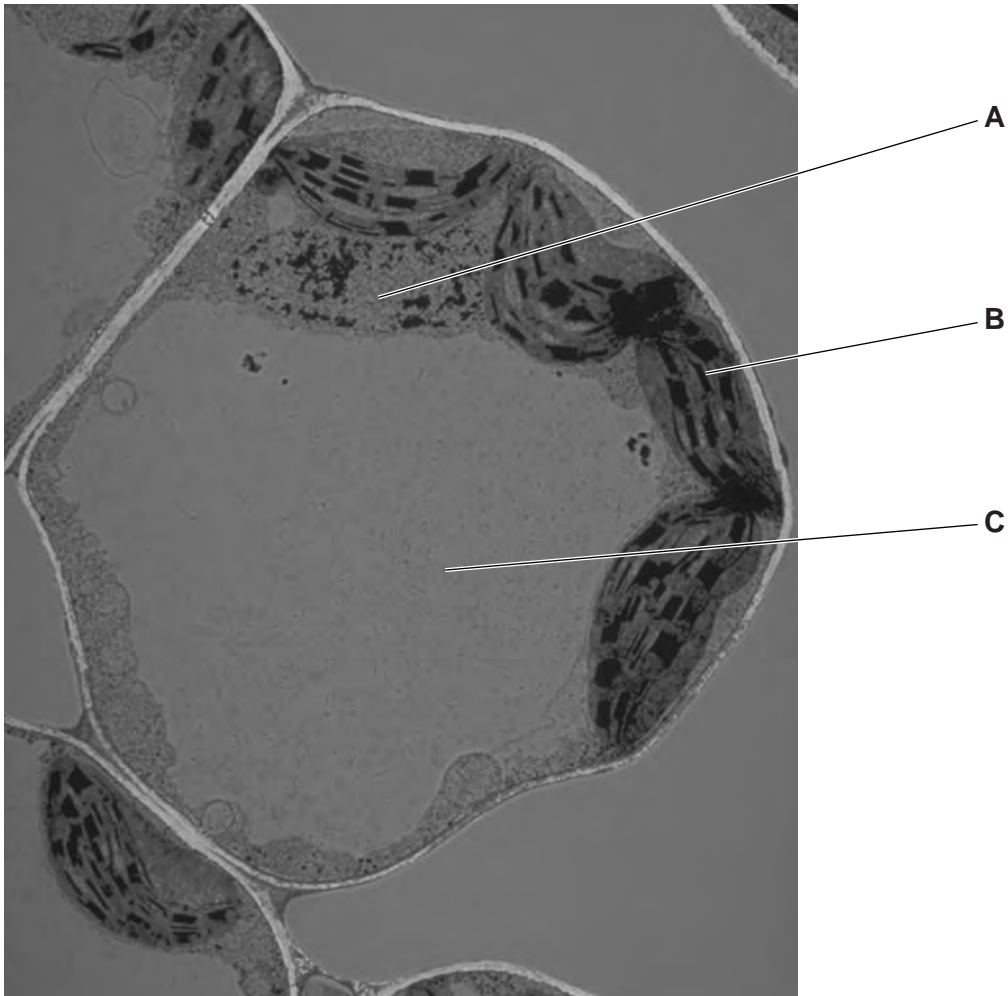
Fig. 2.1

(a) Name the organelles **A**, **B** and **C**.

A ....

B ....

C ....

[3]

(b) List two cell structures that could be present in animal cells that are not present in plant leaf cells.

1. ....

2. ....

[1]

(c) Water is transported up the stem, to the spinach leaf, in the xylem. Once it leaves the xylem it moves via the apoplast and symplast pathways, to reach the cells in Fig. 2.1.

Outline the differences between the apoplast and symplast pathways after the water has left the xylem.

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....[4]

(d) Water, containing dissolved mineral ions such as magnesium, enters spinach leaf cells.

(i) State **two** ways that water is used in the leaf cell.

1. ....

....

2. ....

....
[2]

(ii) State **one** role of magnesium ions in the leaf cell.

....[1]

[Total: 11]

2 Fig. 2.1 shows a drawing made from an electron micrograph of two adjacent cells in a leaf.
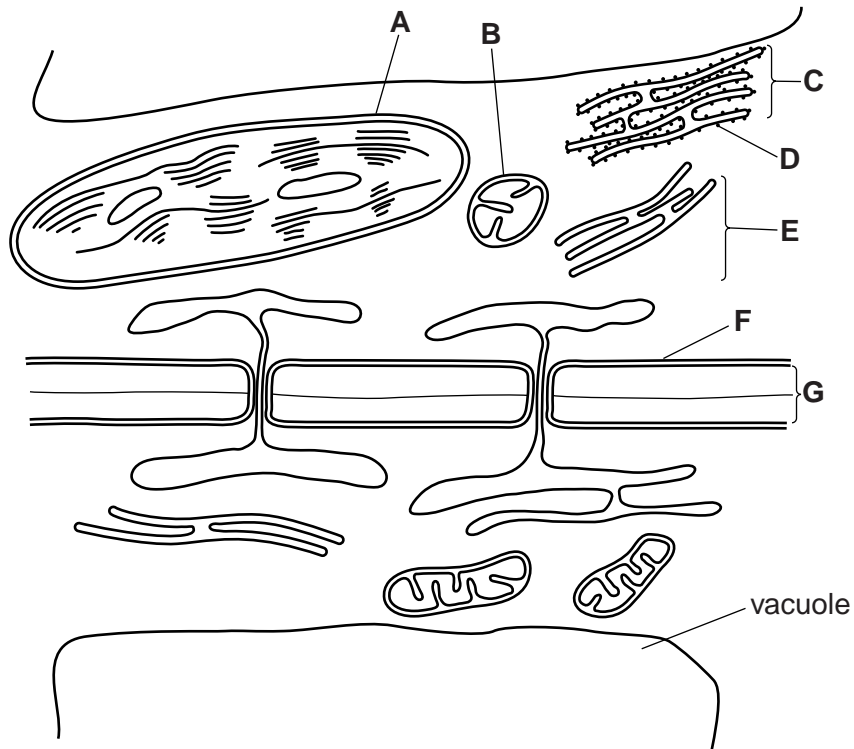
Fig. 2.1

(a) Structures **A** and **B** are both visible using the light microscope, but the internal detail of these organelles shown in Fig. 2.1 is only visible using the electron microscope.

Explain why the internal details of structures **A** and **B** are only visible when using the electron microscope and not when using the light microscope.

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.... [3]

(b) Name in full the structures labelled **C**, **D** and **E**.

C ....

D ....

E .... [3]

(c) State **one** role of vacuoles in plant cells.

.... [1]

(d) Structures **F** and **G** have very different permeability properties.

Explain how the composition of structures **F** and **G** determines the permeability properties of these structures.

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.... [4]

(e) Fig. 2.1 shows two plasmodesmata connecting the adjacent cells.

Describe the roles of plasmodesmata in transport in plants.

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.... [3]

[Total: 14]

3 Fig. 1.1 is a diagram of an electron micrograph of a plant cell.
Fig. 1.2 is a diagram of an electron micrograph of an animal cell.
Both diagrams are incomplete.
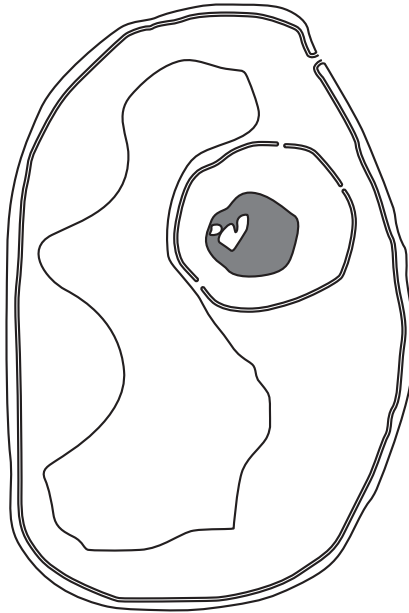
Fig. 1.1
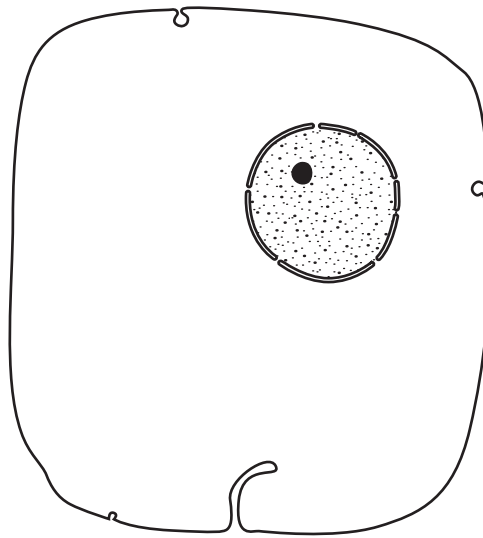
Fig. 1.2

(a) Explain how Fig. 1.1 can be identified as a plant cell.

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....[2]
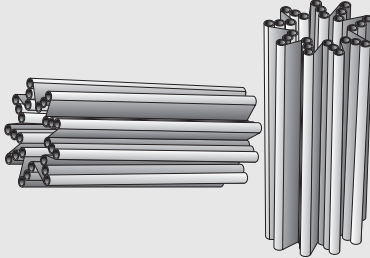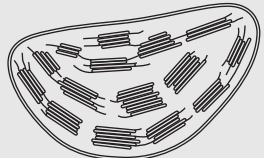
(b) Some organelles are missing from Figs 1.1 and 1.2. Information about these organelles is shown in the shaded boxes in Table 1.1.

Complete the empty boxes in Table 1.1 by adding the correct information below each column heading.

Table 1.1

name of organelle	diagram of organelle(s) as seen under the electron microscope (not to scale)	one function of organelle	cell type(s) in which organelle is located
mitochondrion			animal and plant
		assemble microtubules to produce the mitotic spindle	
rough endoplasmic reticulum		protein synthesis	
Golgi apparatus			animal and plant
		photosynthesis	plant only

[8]

[Total: 10]

4 Fig. 1.1 is a drawing made from an electron micrograph of a mammalian liver cell.
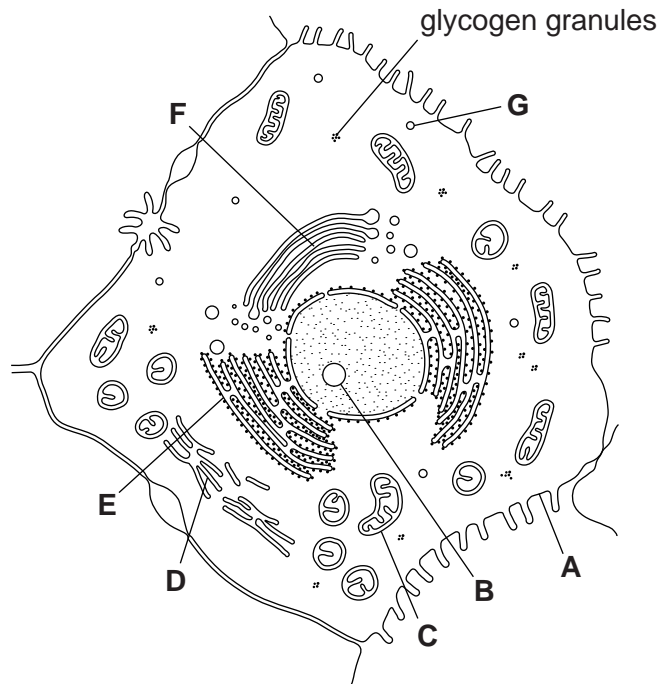
Fig. 1.1

(a) Complete the table by naming the structures **B** to **G** and stating **one** function of each.
The first one (**A**) has been completed for you.

	name of organelle	function
A	cell surface membrane	controls movement of substances into and out of the cell
B		
C		
D		
E		
F		
G		

[6]

(b) As shown in Fig. 1.1, liver cells contain many storage granules of glycogen.

Describe the molecular structure of glycogen **and** explain how this structure makes it suitable for storage.

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.... [4]

[Total: 10]

5   Fig. 1.1 shows electron micrographs of some eukaryotic cell organelles.

A

B

C

D
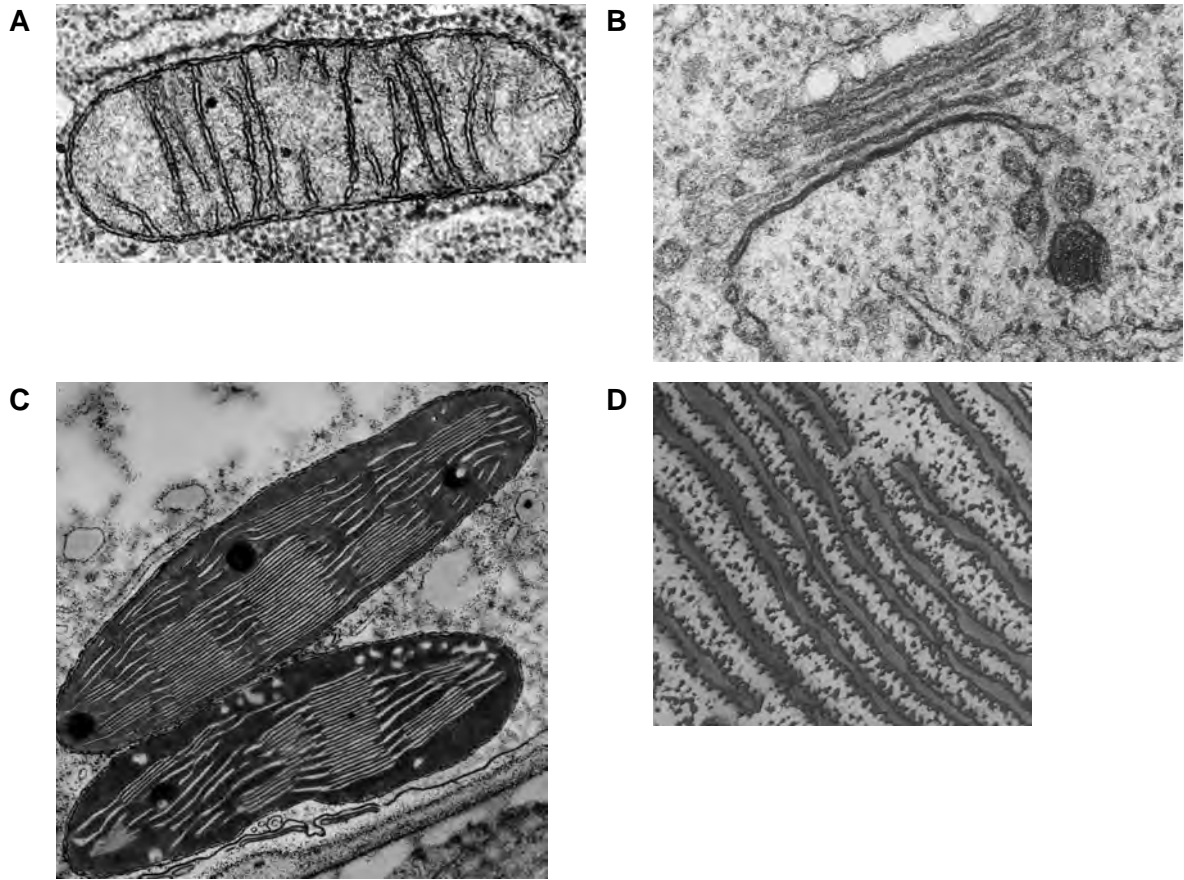
Fig. 1.1

For each of the organelles **A**, **B**, **C** and **D**, shown in Fig. 1.1, state the name and function of each.

A *name* ....

function...

B *name* ....

function...

C *name* ....

function...

D *name* ....

function...[8]

[Total: 8]

Replication and division of nuclei and cells
Question Paper 3

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	The Mitotic Cell Cycle
Sub Topic	Replication and division of nuclei and cells
Booklet	Theory
Paper Type	Question Paper 3

Time Allowed :   70 minutes

Score   :   / 58

Percentage :   /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 Fig. 2.1 is a diagram of pair of homologous chromosomes during meiosis.
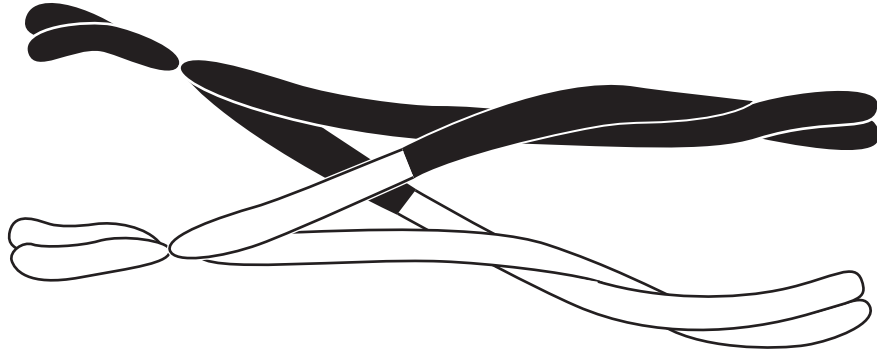
Fig. 2.1

(a) State what stage of meiosis is shown.

....[1]

(b) Describe what has occurred between the two homologous chromosomes.

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....[3]

(c) Explain how this can lead to variation.

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....[2]

(d) Describe **two** other sources of variation that are possible as a result of meiosis.

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....[4]

[Total: 10]

2   Fig. 1.1 shows drawings of a cell at various stages in the mitotic cell cycle.

A

B

C

D

E

Fig. 1.1

(a) List the letters shown in Fig. 1.1 in the order in which these stages occur during a mitotic cell cycle. The first stage has been entered for you.

A   …..…   …..…   …..…   …..…   [1]

(b) Explain what is happening in stage **D** in Fig. 1.1.

....

....

....

....[2]

(c) Describe in outline what happens to the DNA in the nucleus during stage **A** in Fig. 1.1.

....

....

....

....

....

....[3]

(d) State the importance of mitosis in the growth of a multicellular organism, such as a flowering plant or a mammal.

....[1]

[Total : 7]

3 **(a)** A student cut thin sections of a root tip of *Allium cepa* and stained them to show chromosomes. A photomicrograph of part of one of these sections is shown in Fig. 4.1.
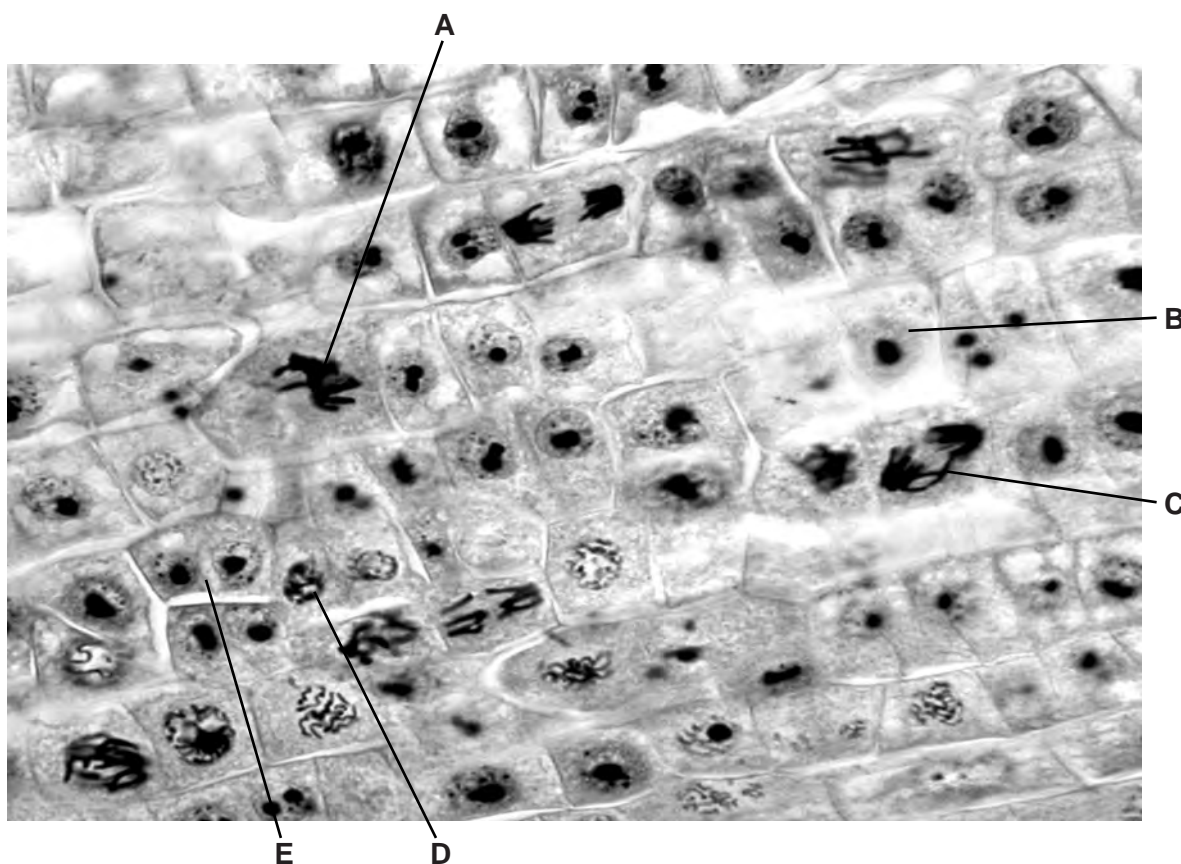
Fig. 4.1

Table 4.1 shows the behaviour of chromosomes and the changes that occur to the nuclear envelope during a mitotic cell cycle in the root tip of *A. cepa*.

Complete Table 4.1.

Table 4.1

name of stage	cell in Fig. 4.1	behaviour of chromosomes	nuclear envelope
	B	chromosomes uncoiled, may be replicating	intact
prophase			intact, but then breaks down
metaphase			not present
anaphase		chromosomes / chromatids, moving to opposite poles	
telophase		chromosomes uncoiling	

[5]

(b) Explain why the growth of roots, such as those of *A. cepa*, involves mitosis and **not** meiosis.

....

....

....

....

....

....

....[3]

(c) State two processes, **other than growth**, in which mitosis is involved.

1. ....

2. ....

[2]

[Total: 10]

4   Fig. 1.1 is a photomicrograph of plant root cells near the growing tip. Some of the cells are

undergoing mitosis.
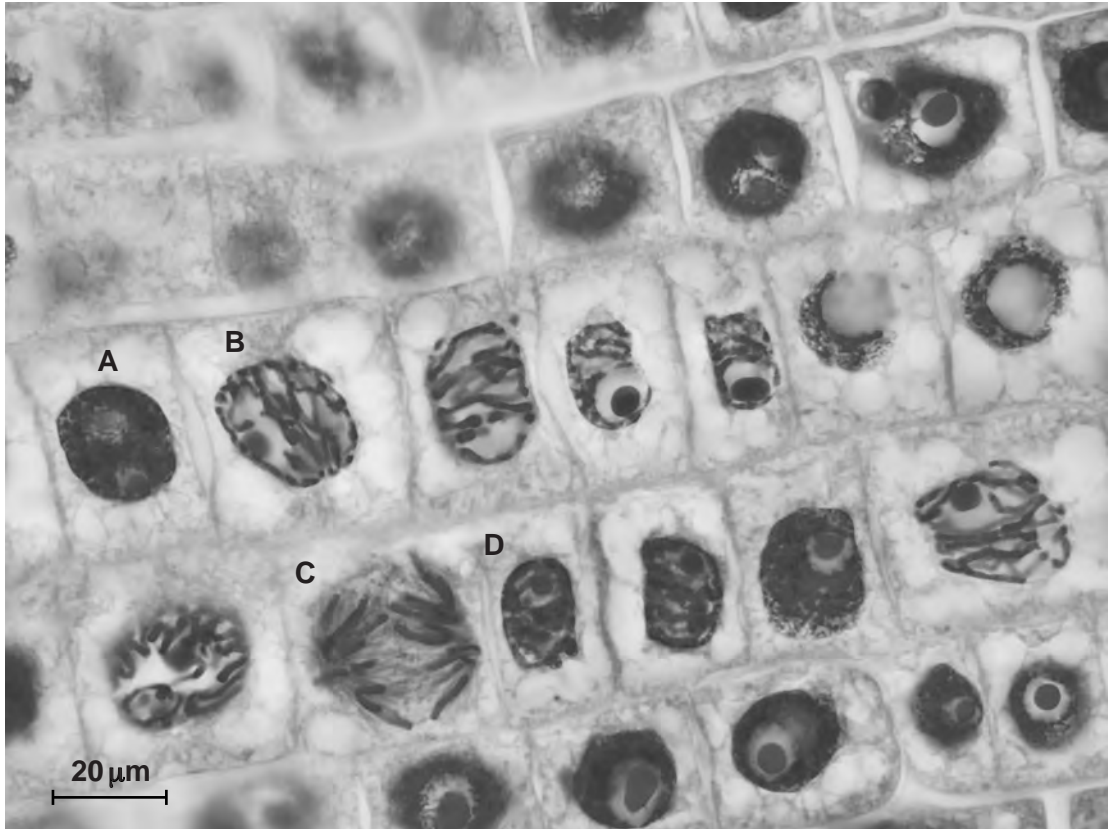
Fig. 1.1

(a) State **one** feature, visible in Fig. 1.1, which indicates that the section is taken from plant
tissue and not animal tissue.

....

....[1]

(b) State the letter, **A** to **D**, of the cell in Fig. 1.1 which is in:

(i)   prophase ....

(ii) anaphase. ....   [2]

(c) Describe two events occurring in cell **B**.

1. ....

....

2. ....

....

[2]

(d) (i) Describe the role of mitosis in a growing plant root tip.

....

....

....

....

.... [2]

(ii) Mutations can sometimes occur in cells which are rapidly dividing.

Outline how a mutation can cause an altered polypeptide to be produced.

....

....

....

....

....

....

.... [2]

(e) Calculate the magnification of Fig. 1.1.

Show your working and give your answer to the nearest whole number.

magnification × ....

[2]

[Total: 11]

5 Fig. 1.1 shows a cell of a female fruit fly, *Drosophila melanogaster*, during a stage of mitosis.
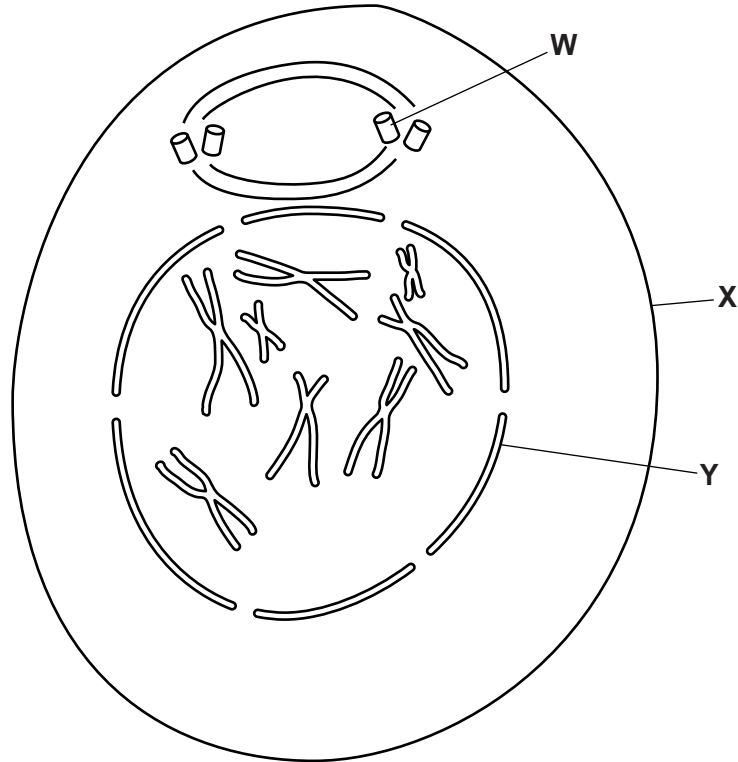
Fig. 1.1

(a) (i) Name the stage of mitosis shown in Fig. 1.1.

....[1]

(ii) Shade a pair of homologous chromosomes. [1]

(iii) Name the structure labelled **W** and state its function.

....

....

....[2]

(b) State what happens to structure **X** and to structure **Y** between the stage shown in Fig. 1.1 and the end of cell division.

....

....

....

....

....

....

....

....[3]

[Total: 7]

6 Fig. 1.1 is a diagram of a transverse section through a vein.

magnification × 35

Fig. 1.1

(a) Calculate the actual diameter of the vein marked by the line **X**–**Y**.

Show your working and give your answer in millimetres (mm).

answer .... mm [2]

(b) The presence of a valve would help to confirm that the blood vessel in Fig. 1.1 is a vein and not an artery.

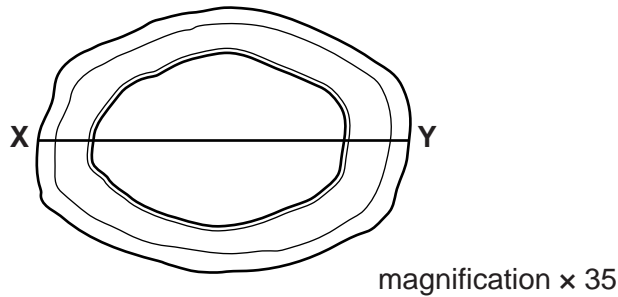Describe three structural features of the blood vessel shown in Fig. 1.1 that would help to identify it as a vein and **not** as an artery.

1. ....

....

....

2. ....

....

....

3. ....

....

....[3]

(c) Explain how the following structural features of a capillary are related to its function.

(i) The capillary wall is composed of a single layer of squamous epithelial cells.

....

....[1]

(ii) The diameter of the capillary lumen is approximately 8 μm.

....

....[1]

(d) The inner lining of arteries and veins is composed of a layer of epithelial cells supported by a layer of elastic and connective tissue. The epithelial cells are capable of cell division by mitosis.

(i) State the role of mitosis in cell division of epithelial cells.

....

....

....

....[2]

(ii) Explain why the epithelial cells undergo mitosis and **not** meiosis.

....

....

....

....[2]

(e) Fig. 1.2 is a diagram of a cell in late prophase of mitosis.
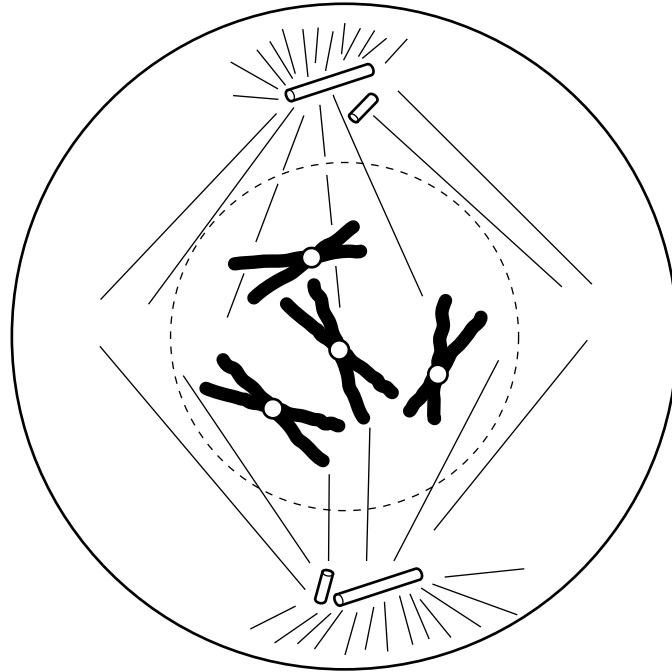

Fig. 1.2

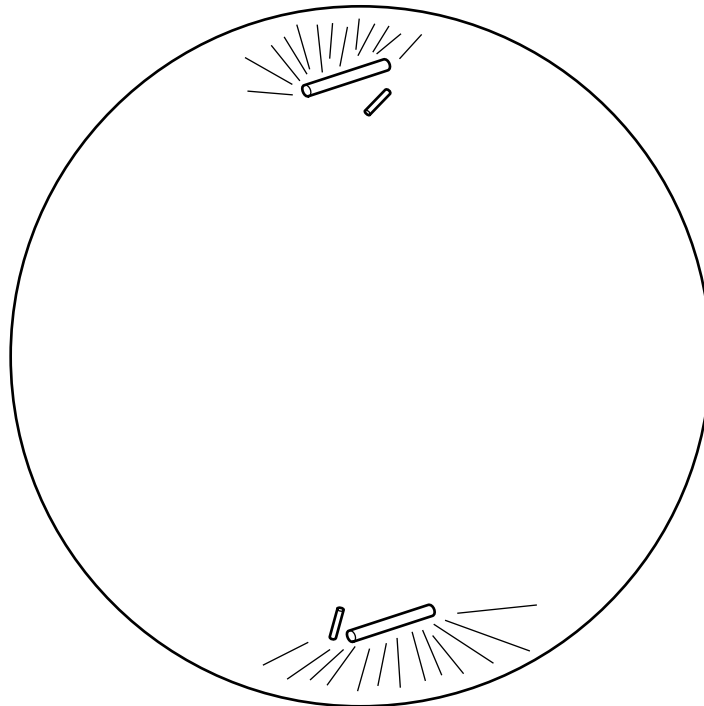Complete Fig. 1.3 to show the **same cell** in the **anaphase** stage of mitosis.

Fig. 1.3

[2]

[Total: 13]