Comments

The candidate’s answers show comprehensive knowledge and understanding of the facts, concepts and principles in the Biology curriculum. He/she demonstrates proficient skills in questions related to scientific investigation, such as identifying features shown in photomicrographs and relating them to the knowledge learned (Paper 1 Q.2 and Q.5); analysing experimental results and their implications (Paper 1 Q.6; Paper 2 Q.4(b)); and selecting appropriate apparatus to assemble a workable setup (Paper 1 Q.7 (c)). He/she also handled the questions set on familiar (Paper 1 Q.8 and Q.9; Paper 2 Q.1(a)) and unfamiliar situations competently (Paper 1 Q.10). Finally, he/she is able to apply relevant knowledge and use scientific terminology to communicate ideas coherently and effectively in the essay questions (Paper 1 Q.11).
### SECTION B

Answer **ALL** questions. Write your answers in the spaces provided.

1. For each of the ear parts listed in column 1, select from column 2 one phrase that matches it. Put the appropriate letter in the space provided. (3 marks)

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear bones</td>
<td>A. Transmitting vibrations</td>
</tr>
<tr>
<td>Eustachian tube</td>
<td>B. Transmitting sound waves</td>
</tr>
<tr>
<td>Cochlea</td>
<td>C. Converting sound waves to vibrations</td>
</tr>
<tr>
<td></td>
<td>D. Converting vibrations to nerve impulses</td>
</tr>
<tr>
<td></td>
<td>E. Equalizing the air pressure on either side of the ear drum</td>
</tr>
</tbody>
</table>
2. The photomicrograph below shows the appearance of genetic materials at two different stages of the cell cycle:

![Photomicrograph showing cell at stage A and cell at stage B.]

(a) Label structure X shown in the photomicrograph. (1 mark)

(b) With reference to the appearance of the genetic materials shown in the photomicrograph, at which stage, A or B, is transcription more likely to take place? Explain your answer. (2 marks)

At stage A, as cell in stage A has not yet undergone division, it is in the interphase, where the cell replicates its organelles, preparing for cell division. Transcription is most likely taking place at stage A for protein synthesis of new organelles of the cell. While cell at B is already dividing and there is no longer synthesis of protein.

(c) In the space provided below, state the cause for the different outcomes of mitosis and meiosis. (2 marks)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Mitosis</th>
<th>Meiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of daughter cells</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>DNA content in daughter cells</td>
<td>2N</td>
<td>1N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitosis only undergoes 1 cell division, from prophase to telophase, while there is 2-times of division in meiosis, forming 4 daughter cells.</td>
</tr>
<tr>
<td>As in both mitosis and meiosis, genotype material only replicate once, the four daughter cells produced can only get 1/4 of the DNA in interphase while cells in meiosis can get 1/2 of DNA from the replicated 4N DNA of the mother cell.</td>
</tr>
</tbody>
</table>
3. The diagram below shows the feeding relationships among some organisms in a marine ecosystem:

(a) Write down the shortest food chain found in the diagram. (1 mark)

phytoplankton → fish → shark.

(b) In the space provided below, draw the pyramid of numbers for the food chain in (a). (2 marks)

Pyramid of numbers of the food chain

(c) Explain the shape of the pyramid of numbers drawn in (b). (3 marks)

The number of phytoplankton is in the largest amount as they have a very fast reproduction rate. Also as their body size is small but have to support the need of fish, they exist in a very large amount. Fish exists in a much smaller amount than phytoplankton but more than shark, as fish has a relatively faster reproduction rate than shark, and larger amount of fish is needed to support the great food consumption of shark due to their larger body size.

(d) Suggest two practical methods that allow you to confirm the feeding relationships among various organisms in this ecosystem. (2 marks)

Find the dry mass of different organisms. The feeding relationships should be arranged according to the decreasing dry mass of the organisms. Monitor 2 groups of different organisms over a long period of time, relationship of predation is shown when two groups of organisms experience regular fluctuations of number in period in one group's peaks following the other.
4. Roger is found to be suitable for donating blood to recipients with blood types different from his own. However, he cannot receive a blood transfusion from his parents. The blood types of his father and mother are A and B respectively.

(a) What is Roger's blood type? (1 mark)

Blood type O.

(b) Given that:

\[ A^r \] represents the allele for producing antigen A on the surface of red blood cells
\[ B^r \] represents the allele for producing antigen B on the surface of red blood cells
\[ i \] represents the allele that does not lead to the production of any antigens on the surface of red blood cells

(i) Using the above symbols, state Roger's genotype. (1 mark)

\[ i \]

(ii) Using the above symbols, state the genotypes of his parents. (2 marks)

Father: \[ A^r i \]  
Mother: \[ B^r i \]

(c) Explain why Roger cannot receive blood transfusions from his parents. (3 marks)

As Roger has a blood type O, he has both antibodies against antigen A and antigen B, which exist on the surface of red blood cells from a person with blood type A and blood type B respectively. Therefore, with his father and mother having antigen A and B on their red blood cells respectively, immune response in Roger will be triggered because of the incompatibility of blood. Agglutination will be resulted, with red blood cells forming clumps by the action of antibodies, and may block blood vessels, leading to a lack of oxygen and nutrients to body cells like the brain and cause life risk in Roger.
**Photograph P**

- muscle fibre
- neurone R
- neuromuscular junction

(x 400)

**Photograph Q**

- S
- T
- part of muscle fibre

(x 4500)
5. On the opposite page, Photograph P shows several muscle fibres associated with the terminal parts of neurone R and Photograph Q shows the detailed structure of a neuromuscular junction.

(a) Which type of neurones does R belong to? Give a reason for your answer. (2 marks)

Motor neurone. As it is connected to the muscle fibres, which is the effector in many nervous responses. Only motor neurones are connected to muscle fibres with its axon end having the ability to release neurotransmitters in one direction to muscles. Therefore as R forms neuromuscular junction with the muscular fibre, it is a motor neurone.

(b) What is the functional relationship between S and T shown in Photograph Q? (2 marks)

S is the mitochondria and T is the neurotransmitters. S provides energy by respiration to the vesicles containing neurotransmitters to move across the axon to the junction and to burst and release the neurotransmitters. Energy produced from S is also used for the production of neurotransmitters.

(c) Describe how nerve impulses can be transmitted across the neuromuscular junction leading to muscle contraction. (3 marks)

When nerve impulses reaches the end of the axon of the motor neurone, neurotransmitters are stimulated to be produced. Vesicles containing them will move across the axon end to the edge of junction and burst to release the neurotransmitters under the presence of energy produced from respiration of mitochondria. Neurotransmitters then diffuse across the neuromuscular junction and reaching the muscular fibres. Receptors for neurotransmitters attaches to them and generate nerve impulse to the muscular fibres to cause them to contract.
6. The table below lists some historical developments about the discovery of the structure of cell membrane:

<table>
<thead>
<tr>
<th>Year</th>
<th>Scientists</th>
<th>Historical events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1895</td>
<td>Overton</td>
<td>Discovered that lipid-soluble substances could penetrate cells easily</td>
</tr>
<tr>
<td>1917</td>
<td>Langmuir</td>
<td>Discovered that the major component of cell membrane exhibited both water-loving and water-hating properties</td>
</tr>
<tr>
<td>1925</td>
<td>Gorter &amp; Grendal</td>
<td>Extracted lipids from the cell membrane of red blood cells and spread the lipids in a single layer on a water surface; found that the area of the layer was double the surface area of the cell membrane</td>
</tr>
<tr>
<td>1972</td>
<td>Singer &amp; Nicolson</td>
<td>Proposed the Fluid Mosaic Model to explain the structure of cell membranes</td>
</tr>
</tbody>
</table>

(a) What is the major component noted by Overton and Langmuir? (1 mark)

Phospholipid molecules.

(b) Gorter and Grendal proposed that the major component identified in (a) existed as a bilayer (Bilayer Model). With reference to the observation of Langmuir, suggest how this major component is oriented and arranged in the cell membrane. Explain your answer. (3 marks)

As a cell is facing a water environment both outside and inside the cell, therefore the water loving component of the cell membrane, the head of the molecules, which is the phosphate group in phospholipid, will be arranged facing the outside and inside the cell in a bilayer form. While the fatty acids and glycerol molecules of the water-hating component of the phospholipid molecules repel from water, they act as the water repelling tail and face towards each other as the middle layer of the phospholipid bilayer, so that in between the bilayer of cell membrane, is a non-polar environment.
(c) (i) The Bilayer Model proposed by Gorter and Grendal did not mention another major component of the cell membrane. What is this component? (1 mark)

Protein molecules.

(ii) With reference to the Fluid Mosaic Model, briefly describe the orientation of this component in the cell membrane. (2 marks)

In the fluid mosaic model, it is stated that protein molecules are interspersed among phospholipid molecules in a mosaic pattern. Also, the cell membrane is fluid in nature, so the protein molecules can move laterally in the phospholipid bilayer.

(d) Models are often used by scientists to explain their findings. Complete the following table to elaborate on the aspects of the nature of science involved in the use of scientific models. (2 marks)

<table>
<thead>
<tr>
<th>Nature of science</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science is evidence based</td>
<td>Based on the observations and results obtained from various experiments, scientific models can be built regarding the evidence shown from experiments.</td>
</tr>
<tr>
<td>Science is usually being represented by theories which is sometimes hard to picture.</td>
<td>Models are used to simulate an invisible structure or illustrate a theory.</td>
</tr>
</tbody>
</table>
7. Hydrogen peroxide is a by-product of some metabolic reactions inside our body. If it were allowed to accumulate, it would kill our cells. Fortunately, we have an enzyme called catalase which speeds up the breakdown of hydrogen peroxide into water and oxygen. A student planned to investigate the effect of temperature on the activity of catalase. Below are the steps the student has drafted for his investigation:

(1) Extract catalase from an animal organ.
(2) Mix 5 mL 0.1% hydrogen peroxide solution with 1 mL catalase extract.
(3) Place the mixture in a water bath set at 0°C.
(4) Measure and record the volume of oxygen gas released in the first 5 minutes.
(5) Repeat steps (2) to (4) with the water bath set at 20°C, 40°C and 60°C.

(a) Suggest an animal organ in which catalase is present in great abundance and from which the enzyme can be obtained. Explain why this organ has so much catalase. (2 marks)

Liver. Liver is responsible for detoxification. As hydrogen peroxide is toxic to organisms, liver contains large amounts of catalase to actively breakdown the harmful materials into safe products to maintain health.

(b) The student has missed out an important step in his drafted procedure. What is it? Explain the importance of this step. (2 marks)

Grind the extract of liver in cool water. This is to increase the surface area of the extract so that collisions between catalase and hydrogen peroxide molecules increases to speed up the rate of reaction. It is grinded in cool water so to prevent heat in grinding action from denaturing the catalase.
(c) You are provided with the following apparatus and materials:

measuring cylinder, boiling tube, one-hole stopper, glass tubing, rubber tubing, pipette, ink, water, trough, clip

Choose the appropriate apparatus and materials to assemble a set-up for measuring the rate of oxygen production. Draw the set-up in the space below. (3 marks)

Set-up for measuring the rate of oxygen production
8. In a health check, Lisa was found to have glucose in her urine. She undertook a further check in which she has fasted for 12 hours before a blood sample was taken for examination. The results of the blood tests are shown below:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Results</th>
<th>Normal range</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose</td>
<td>8.4</td>
<td>4-6</td>
<td>mmol L(^{-1})</td>
</tr>
<tr>
<td>Insulin</td>
<td>0.2</td>
<td>3-32</td>
<td>(\mu U) mL(^{-1})</td>
</tr>
<tr>
<td>Glucagon</td>
<td>130</td>
<td>20-100</td>
<td>(\mu g) L(^{-1})</td>
</tr>
</tbody>
</table>

(a) State the type of diabetes Lisa is suffering from. (1 mark)

**Type 1 diabetes.**

(l) With reference to the production and actions of the two hormones, account for the results of Lisa's blood tests.

(i) **Insulin** (3 marks)

Insulin is responsible in stimulating the uptake of glucose by body cell and the conversion of glucose in blood into glycogen for storage. The very low level of insulin in blood indicated that excess glucose in blood cannot be oxidised by body cell or converted to glycogen for storage in liver. Therefore the blood glucose level of Lisa remains on a high level.

(ii) **Glucagon** (3 marks)

Glucagon is responsible for stimulating the conversion of glycogen stored in liver into glucose released in blood in liver. However, with an abnormally high level of glucagon resulting much glycogen in liver is broken down and converted into glucose in liver. Glucose then flow in blood, contributing the high level of glucose in blood of Lisa.

(c) Suggest two dietary habits that Lisa should establish. (2 marks)

She should take diet with low content of simple sugar like sucrose etc. She should take diet containing complex carbohydrates instead and divide the meals into smaller regular sessions.
9. The photographs below show the appearance of the leaves of a well-watered potted plant at 9 am and 1 pm on a sunny day in summer.

Photograph X (9 am)  Photograph Y (1 pm)

(a) Briefly describe how the appearance of the leaves shown in photograph X is maintained. (2 marks)

The leaves in photograph X is supported mainly by the turgidity of the walled cells. Therefore a lower light intensity at 9 am causes stomata to open in a smaller extent. Less water is lost through the stomata by evaporation. The transpiration rate is small, and cells in leaves remain turgid and push against each other for support.

(b) Suggest an explanation for the appearance of the leaves at 1 pm (Photograph Y). (3 marks)

At 1 pm, the light intensity is larger in the afternoon of summer, this cause the stomata in leaves to open wider. This facilitates more water vapour in the air spaces of leaves to diffuse out of the stomata. Transpiration rate is fast and the water potential of mesophyll cells decreases. The flaccid cells causes the leaves to wilt as a result of lack of turgidity for support.

(c) With reference to the appearance of the leaves in the two photographs, which one is more effective for photosynthesis? Explain your answer. (4 marks)

Leaves in photograph X. As leaves are fully supported and stretched out instead of those in Y, which are wilted and folded up, the surface area for the leaves in X to receive sunlight is greater. With more light energy can be captured by the chlorophyll of the leaves, a more efficient photosynthetic process can be carried out, and more NADPH is produced, facilitating the Calvin cycle to be carried out and to produce more glucose. Hence the photosynthesis is more effective in X.
10. Fossil records suggest that camels in Africa and Asia and llamas in South America evolved from a common ancestor 6 million years ago. The diagram below shows the possible migration routes of the common ancestor at the time before the continents were separated and the locations (shaded areas) where the camels and llamas are found at present:

![Map showing migration routes and current locations of camels and llamas.]

Camel in Africa  Camel in Asia  Llama in South America

(a) Based on the information given, draw a diagram to show the evolutionary tree of the three animals.

(2 marks)

Evolutionary tree of camels in Africa and Asia and llamas in South America

Camel in Asia  Camel in Africa  Llama in South America

Common ancestor
(b) Explain how the common ancestor might have given rise to the two different animal species (camels and llamas) in the above case.

The migration of the common ancestor spread its population in different places on Earth. When continents separated, there is a great difference in climates in different continents. As the south of Asia and Africa are quite close geographically, they share more similar environment than with South Africa. The difference in climate give rise to different needs of behaviour of the ancestor stock. With Asia and Africa drier than llama, ancestors need a body structure that can store up water for survival, while those in South Africa don't.

(c) Suggest another way to establish the evolutionary relationship among the above animals. (1 mark)

To compare the animal's differences in their amino acid sequences.

(d) Give two limitations of fossil records as evidence for evolution. (2 marks)

Fossils may be damaged during the movement of earth crust. Some fossils are located in inaccessible areas which cannot be examined and cause missing links in fossil records on their back in Africa and Asia. Hence those who can store water can survive the drought more successfully than those who cannot store water. The variations which survive better has a greater chance in reproducing and passing the genetic make up for having body structure to store water to the offspring. With the accumulation of variation favourable to the environment and passing on to many generations over years, new species of llama and camel evolved, which can no longer breed with each other to produce fertile offspring. The geographical isolation causes the 2 different species as the groups evolve separately and variations are selected by different natural environment.
For the following question, candidates are required to present their answer in essay form. Criteria for marking will include relevant content, logical presentation and clarity of expression.

11. Although both arteries and veins are blood vessels, they are very different in their structure. Discuss how their structural differences are related to the different ways of maintaining blood flow inside the blood vessels. (11 marks)

Firstly, arteries are with thick wall of fibrous tissue while walls of veins are thinner with less fibrous tissue. The thick wall of arteries allow them to recoil when under a high blood pressure, which will not be experienced in veins as the blood pressure in veins is low after travelling a long distance. Also, the arteries is with a three muscular wall while that of veins is not muscular and is thinner. This is because a thick muscular wall of arteries enable it to regulate its inner diameter to withstand high blood pressure and allow blood to flow through. However, as blood pressure in veins is low, it does not require this thick muscular wall.

The lumen of arteries is smaller, while that of veins is larger. The veins are having a larger lumen to facilitate blood flow in little resistance as the blood pressure is low and without the powerful and rhythmic pumping force provided from the heart in arteries. Due to the force from heart, arteries lumens can be smaller.

Valves are present in veins but absent in arteries. As the blood pressure in veins is low, there might be chance for blood to flow backward during the contraction of surrounding skeletal muscles to push the blood forward. Therefore valve is present and will close whenever the front part's pressure is larger than the part behind when muscles are contracting.
Therefore blood can flow forward in one direction only and prevent backflow of blood. While a powerful pumping force is already supplied by the heart, blood in arteries will flow forward anyway and there will be no chance for blood to flow backward. Therefore no valves are required in arteries.
END OF PAPER

Sources of materials used in this paper will be acknowledged in the Examination Report and Question Papers published by the Hong Kong Examinations and Assessment Authority at a later stage.

Answers written in the margins will not be marked.
Do not write on this page.

Answers written on this page will not be marked.
### 2015 DSE (C)

香港考试及评核局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

香港中学文凭考试
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

### 答題簿

**ANSWER BOOK**

**考生須知**

(一) 宣布開考後，考生須首先在第1頁之適當位置填寫考生編號，並在第1、3及5頁之適當位置貼上電腦條碼。

(二) 每題(非指分題)必須另起新頁作答，並須在每一頁的相應試題編號方格填寫「X」號，以表示選答的題號(見下例)。

(三) 紙張兩面均應使用，並應每行書寫。不可在各頁邊界以外位置書寫。寫於邊界以外的答案，將不予評閱。

(四) 如有需要，可要求派發方格紙及補充答題紙。每一紙張均須填寫考生編號、填空試題編號方格、貼上電腦條碼，並用繩絆於簿內。

(五) 試場主任宣布停筆後，考生不會獲得額外時間貼上電腦條碼及填寫試題編號方格。

### INSTRUCTIONS

1. After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.
2. Start each question (not part of a question) on a new page. Put 'X' in the corresponding question number box on each page to indicate the appropriate question number (see the example below).
3. Write on both sides using each line. Do not write in the margins. Answers written in the margins will not be marked.
4. Graph paper and supplementary answer sheets will be supplied on request. Write your Candidate Number, mark the question number box and stick a barcode label on each sheet, and fasten them with string INSIDE this book.
5. No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

### Example:

試題編號 Question No. = 3

<table>
<thead>
<tr>
<th>試題編號 Question No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>試題編號 Question No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
</tr>
</tbody>
</table>
4i) The number of sperm present in semen. The structural features of sperm.

4ii) LH in high concentration in blood will cause ovulation and
the rising level of FSH indicates that follicles are developing.
By monitoring the level of both hormones, it can be known if any follicles can become mature and if
mature follicles
ris released from the ovary to the oviduct, indicating
ovulation takes place and known if fertilization is possible
to occur in Judy.

2) To check if Judy’s oviducts are blocked or not, which may
be a cause for no fertilization can take place, contributing
in the failure of being pregnant, as sperm cannot meet the ovum.

3ii) When fertilization of male and female gametes successfully
takes place, the fertilized zygote will release a hormone,
human choriocarcinoma gonadotropin so to prevent the yellow body
in ovary from degenerating. Yellow body will remain secreting high
level of estrogen and progesterone, which maintain the
thickness of uterine lining for zygotes. Implantation and so
no uterine lining is shed to give menstruation.
(1) No uterine lining is shed as it has to be prepared for the implantation of the zygote, richly supplied with blood and nutrients. Therefore, no menstruation is a sign that fertilization successfully takes place and a zygote is formed, which is known as being pregnant.

b) Cardiac output can be increased by the increased concentration of adrenaline in blood and the increased stimulation of nerve impulse from cardio-acceleratory centre in the medulla oblongata along the sympathetic nerve to the Sinoatrial node (SA node).

vi) A decrease in blood supply to muscles enable a largest oxygen supply to muscle cells for aerobic respiration to release energy in a form of ATP for intense muscle contraction. The increased oxygen supply is also useful in oxidizing the large amount of lactic acid accumulating in muscle due to its anaerobic respiration in a greater rate to prevent muscle fatigue. A greater blood supply can maintain a steep concentration gradient for the diffusion of carbon dioxide to it can be transported away from muscles more rapidly.
ii) An increase of blood flow to the blood capillaries near the skin surface is to increase the rate of heat loss from the body to the surrounding by radiation, conduction and convection. This is the action of vasodilation, to prevent heat generated from the intense contraction of muscles from accumulating on the body and cause the body to be overheated, which will disrupt normal functioning of enzymes and metabolism.
(1) Children with SCID have little functional white blood cells as most are destroyed by the toxin accumulating in it. With this low white blood cell count in blood, when pathogens enter the body, immune response carried out by white blood cells cannot be carried out rapidly and efficiently. Lymphocytes like help T cells, B cells, plasma cells and the cells for combating pathogens like helper T cells and antibodies is in small amount in blood only. While insufficient in eliminating pathogens in body, pathogens multiply and cause fatal damage to the children’s body.

(2) Cells from bone marrow has the large potential in developing into blood cells like white blood cells. They can multiply by mitotic cell division to form a large amount of genetically modified white blood cells after being inserted with the functional ADA gene. Therefore it is more efficient in supplying healthy white blood cells to the patient where healthy white blood cells replace the abnormal ones. While white blood cells cannot undergo mitotic cell division itself, there is negligible effect to the patient even the functional gene is inserted as the number of functional white blood cells are still in small amount.
iii) The gene of interest, which is the ADA functional gene, is cut out by a specific restriction enzyme. Plasmids from harbour bacterial or virus is also extracted and cut with the same restriction enzyme. The complementary sticky ends of plasmid and desired gene is joint by DNA ligase. The recombinant plasmids are introduced to the culture of host cell. After screening out those taken up the recombinant plasmids, the host cells are allowed to perfect and fuse with the bone marrow cells in which the nucleus and gene material are fused together. The bone marrow cell then acquire the normal ADA gene and is introduced back to N2a, dividing and differentiating into functional white blood cells.

IV) The host cells might gain the pathogenic ability when a new gene is taken up by it than cause serious infection to the patient, as the host cells are introduced to the patients' body in gene therapy.

5) The desired gene to be amplified is heated up to 90°C to denature it so the hydrogen bond between the double helix is overcome and the DNA become a single strand. Then the temperature is lowered to 55°C, which is the optimum temperature for the attachment of primer complementarily to
the DNA strands for querying the regions to be amplified. Then the
temperature is raised back to 70°C when heat-stable DNA polymerase
is added for the optimum temperature of the enzyme to help
in the attachment of free nucleotides onto the DNA strands.
This completes one cycle of PCR.

ii) (1) When the temperature is raised back to 70°C for the
addition of free nucleotides onto the DNA strands to be
amplified.

(2) DNA polymerase B. As from the graph, the relative activity of
B manters at a quite stable and high percentage of nearly
100% even when temperature increases from 50°C to 100°C.
However, A shows a drastic drop of activity when temperature
exceed 60°C. As in PCR, high temperature is involved, which is
around 70°C for addition of free nucleotides and for
PCR cycles to take place continuously, the enzyme must stand
for 90°C for the denaturation of double stranded DNA molecule.
B shows its heat-stable quality and is able to withstand high
temperature up to 90°C. So B is more suitable to be used in
PCR.
PCR is used to amplify small amount of DNA left in crime scenes for identifying the criminal among the suspects in forensic science. This helps to solve crimes.