Section:

2.1 Cell Division

2.2 DNA, Genes and Chromosomes

2.3 Enzymes
1. Name the substance on which we grow microbes. (1)

2. Describe three conditions which microbes require for growth. (3)

3. Describe the meaning of the term ‘aseptic technique’. (1)

4. Explain why aseptic techniques are required when growing colonies of microbes. (1)

5. During the brewing of beer, ingredients including yeast and malted barley are added to a fermentation vessel. How does sterilising the fermentation vessel before the raw materials are added help to provide optimum conditions for the yeast? (1)

6. The diagram shows an industrial fermenter. It is fitted with a number of taps which allow substances to be added or removed.

(a) Which of the taps, A, B, C, D or E, would open to:
   (i) add nutrients to the mixture? (3)
   (ii) remove waste gases?
   (iii) drain off the products?

(b) When the vessel is empty, it is treated to destroy residual spores of fungi and bacteria. How could this be done? (1)

7. Explain why containers are sterilised before being used for making yoghurt. (1)

8. Describe the procedure used in laboratories to grow colonies of microbes. (2)
1. State the two uses for the new cells produced from cell division.  
2. What effect does cell division have on the number of cells in the body?  
3. Name the structure within a cell which controls cell division.  
4. Below is a diagram of a human cell. Name the structure labelled X.  

5. Complete the following sentences by deleting the incorrect word from each pair to create a correct sentence.
   
   The number of chromosomes in the new cells produced by cell division will be 
   the same as/half that of the parent cell.
   
   During cell division each parent cell produces two/four new cells.
   
   The cells produced by cell division will be different/identical to each other.  

6. Cell division can be described as a controlled cycle. What might occur if cell division is uncontrolled?  

7. An onion cell contains 16 chromosomes. It divides to form two new cells, which then divide again. How many chromosomes will these new cells have?
1. The diagrams below show six stages of a cell process.

   The stages are shown in pairs. The diagrams in each pair are in the correct order. The three pairs of diagrams are NOT in the correct order.

   (a) Name the process shown in the diagrams.

   ____________________________________________________________ (1)

   (b) Write the letters of each pair in the order in which they occur in this process.

   1. ____________ 2. ______________ 3. ____________ (1)

   (c) Name the cell structure which controls this process

   ____________________________________________________________ (1)

2. A cell can divide to produce two daughter cells. Each daughter cell grows and then divides. The beginning of these divisions is shown in the diagram below.

   ![](diagram.png)

   1st division
   1st generation
   2nd division
   2nd generation

   Calculate the number of cells in the 4th generation.

   Answer: __________ cells (1)
3. The diagram below shows some of the stages in cell division occurring in the cells of a plant root. Describe the stages of cells division (mitosis) shown in the cells labelled X, Y, and Z.

4. Describe the meaning of the term 'diploid cell'

5. Typical timings of the stages of mitosis are shown in the table below.

<table>
<thead>
<tr>
<th>Stage</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (minutes)</td>
<td>88</td>
<td>33</td>
<td>25</td>
<td>54</td>
</tr>
</tbody>
</table>

What percentage of the total time for mitosis is taken by stage C?

Answer: _____________%
1. The diagrams below show stages in mitosis (cell division).

(a) Copy and complete the table below to place the stages in the order in which they occur.

<table>
<thead>
<tr>
<th>Order</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) What name is given to the thread-like structures labelled X?  

2. Scientists can grow liver tissue in the laboratory. This is done by making a few liver cells divide by mitosis to form a large mass of cells. Why is it important that the daughter cells contain the same number of chromosomes as the original mother cells?  

3. A cell divides every 20 minutes. How many cells would be produced from one original cell at the end of two hours?

Answer: ___________ cells
4. Stages of mitosis are shown in their correct order in the diagrams below.

(a) Label the spindle on one of the diagrams. (1)
(b) Stage C would be followed by stage D. Describe what would happen in stage D. (1)
(c) Where in a cell would structure X normally be found? (1)
(d) Explain the importance of structure X. (1)

5. Below is a list of events which occur during mitosis.
   Complete the table below to show the order in which these events take place.

**List of events**
A. Chromatids separate
B. Two nuclei are formed
C. Chromosomes replicate
D. Chromatids move to opposite ends of the cell
E. Chromosomes visible as pairs of chromatids
F. Cells divides
G. Chromatids line up along the middle of cell
H. Two identical cells are formed

<table>
<thead>
<tr>
<th>Order</th>
<th>Letter</th>
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<td></td>
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<td>1</td>
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<td>8</td>
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</tbody>
</table>
6. The diagram below represents chromosomes at one stage of cell division.

(a) Name the structure labelled P. (1)

(b) Describe what happens to the chromosomes at the next stage of cell division. (1)

(c) This cell contains 8 chromosomes.
   
   (i) How many chromosomes will be present in each daughter cell when cell division is complete? (1)

   (ii) Why is it important that each daughter cell has this number of chromosomes? (1)

7. Below is a flow diagram which describes some of the stages of cell division.

   **Stage 1** - Chromosomes become visible as pairs of chromatids

   **Stage 2**

   **Stage 3** - The spindle fibres contract pulling the chromatids of each chromosome to opposite poles of the cell.

   **Stage 4** - A nuclear membrane forms around each nucleus.

   **Stage 5**

Describe what occurs at stages 2 and 5. (2)
1. Complete the passage below using the words from below:

chromosomes  genes  DNA  nucleus  (4)

........................................... are found in the .......................................... of a cell. They are threadlike structures made up of a chemical called ........................................ Each chromosome is made up of sections of DNA called ........................................ Genes control different characteristics in living things.

2. Below is a diagram of a cell and the structures found within its nucleus. Using the words below to name the parts labelled 1, 2, 3 and 4.
Cell Biology - Unit 2
DNA and the production of protein

Homework 6

1. How many strands make up a molecule of DNA? (1)

2. Name the 4 different types of bases found in DNA (4)

3. The bases found in a molecule of DNA are said to complimentary. What does this mean? (1)

4. The diagram below shows a molecule of DNA. Name the parts labelled A and B with the correct names of the structures.

![DNA Diagram](image)
5. The diagram shows part of a single strand of DNA.

\[
\begin{array}{c}
T \\
G \\
A \\
C \\
A \\
\end{array}
\]

Draw the complimentary strand with the bases in the correct order.

\[
\begin{array}{c}
\text{Draw here} \\
\text{Draw here} \\
\text{Draw here} \\
\text{Draw here} \\
\text{Draw here} \\
\end{array}
\]

6. Name the nucleic acid needed to make proteins from DNA. (1)

7. Explain how proteins are made from DNA. (2)

8. What determines the sequence of amino acids in a protein? (1)
Cell Biology - Unit 2

Enzymes - Homework 7

1. What is the function of an enzyme? (1)

2. Describe two features of enzymes. (1)

3. All living cells require enzymes. What would happen to chemical reactions in a cell if enzymes were not present? (1)

4. What is a substrate? (1)

5. Enzymes can be described as being specific. Explain the meaning of the term 'specific'. (1)

6. Enzymes can be involved in both build-up and break down reactions. Give an example of an enzyme involved in each type of reaction. (2)

7. Enzymes are used frequently in biotechnological industries. Name two examples of these uses and describe their purpose. (2)