NAME TEACHER

**NQA**

Nayland Qualification Authority

**Level Two Biology, 2014**

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| 91156 : **Demonstrate understanding of life processes at the cellular level**  Credits: 4 |

### Suggested Time: 70 minutes

**Instructions**

* Answer all questions in the spaces provided.
* You must hand this examination paper to the supervisor at the end of the examination.
* Check that this paper has all 10 pages numbered and in the correct order.

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| Achievement Criteria. (for assessors only) | | | | | |
| Achievement | | Achievement  with Merit | | Achievement  with Excellence | |
| Demonstrate understanding of life processes at the cellular level |  | Demonstrate in-depth understanding of life processes at the cellular level |  | Demonstrate comprehensive understanding of life processes at the cellular level |  |
| Overall Level of performance: | | | |  | |

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You are advised to spend 60 minutes answering the questions in this booklet.

Assessor’s use only

**QUESTION ONE: PHOTOSYNTHESIS**

Through the process of photosynthesis, plants provide a source of food for nearly all other life forms on Earth. Over centuries, biologists have worked to understand this process on a cellular level so that they could maximise the rate of photosynthesis of some plants and reduce the success of other plants.

(a) Describe the process of photosynthesis

(b) Relate the structure of the chloroplast to its function in a plant cell. You may use a labelled diagram in your answer.

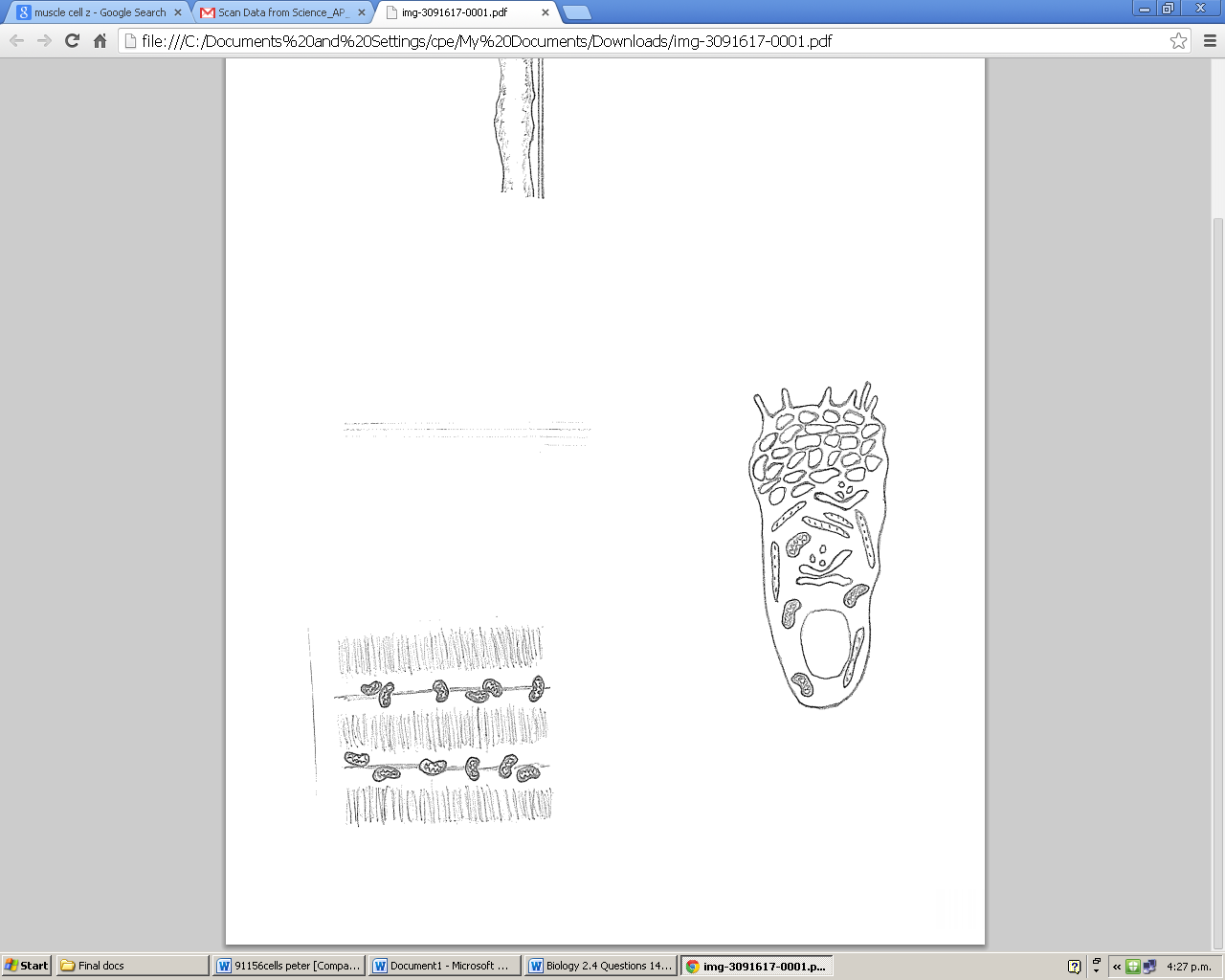
(c) Discuss why changes in the following conditions can both improve or inhibit the rate of enzyme catalysed reactions in photosynthesis:

Assessor’s use only

* Temperature
* Substrate concentration
* Chemical herbicides

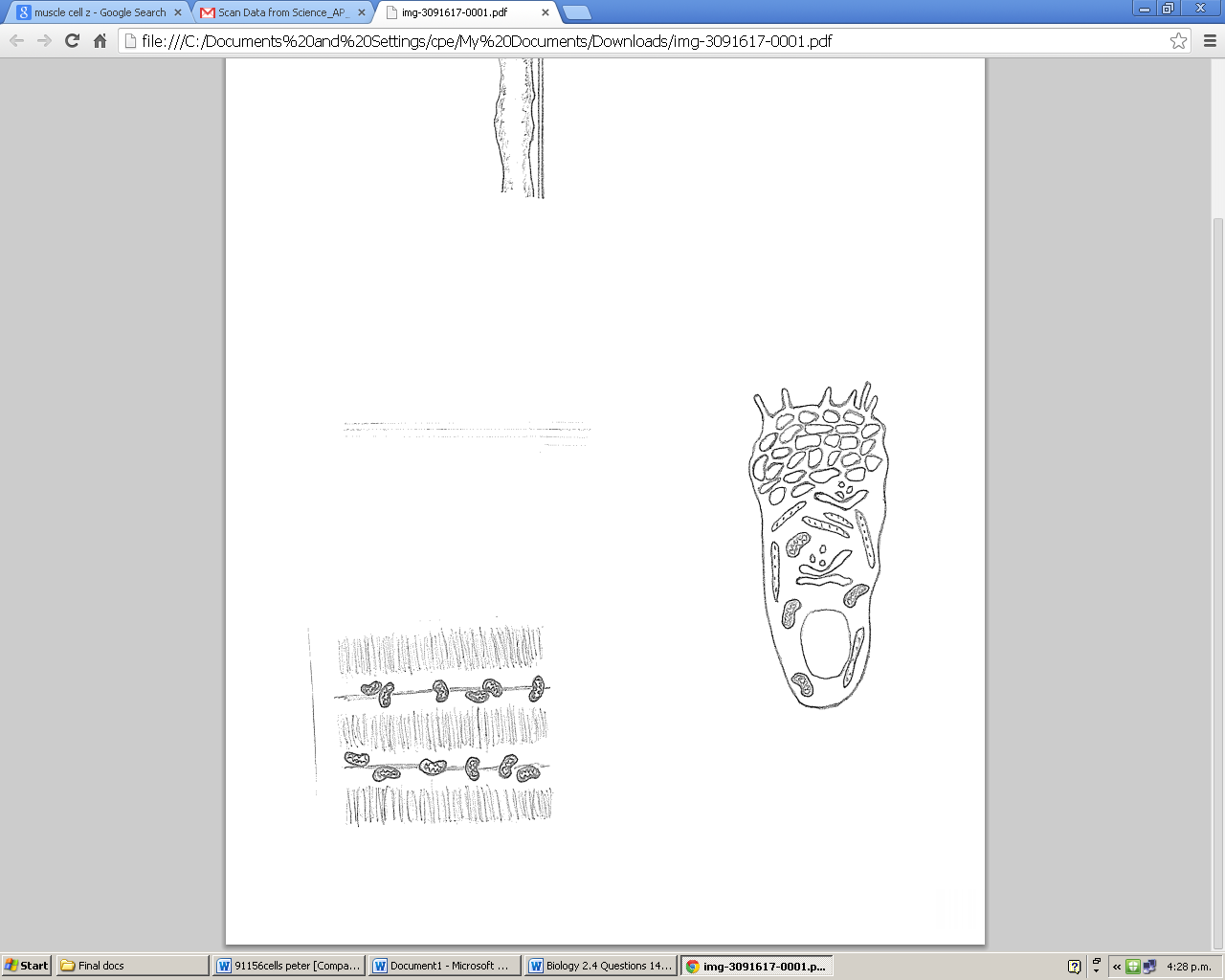
**QUESTION TWO: MITOCHONDRIA**

Assessor’s use only



Internal structure of

skeletal muscle cells



A goblet cell

mitochondria

muscle fibres

mucus vesicles

Goblet cells are found in the lining of the intestine. Their job is to continually produce and secrete mucus via exocytosis, a form of active transport, to ensure the lining is protected.

Skeletal muscle cells are responsible for the movement and locomotion of an organism.

Goblet cells and skeletal muscle cells are two cell types which require mitochondria to carry out their specific functions.

(a) Describe the life process carried out by the mitochondria.

(b) Relate the structure of the mitochondria to its function in an animal cell. You may use a labelled diagram in your answer.

Assessor’s use only

(c) Discuss the similarities and differences between how these two types of cells make use of mitochondria to carry out their specific functions.

Assessor’s use only

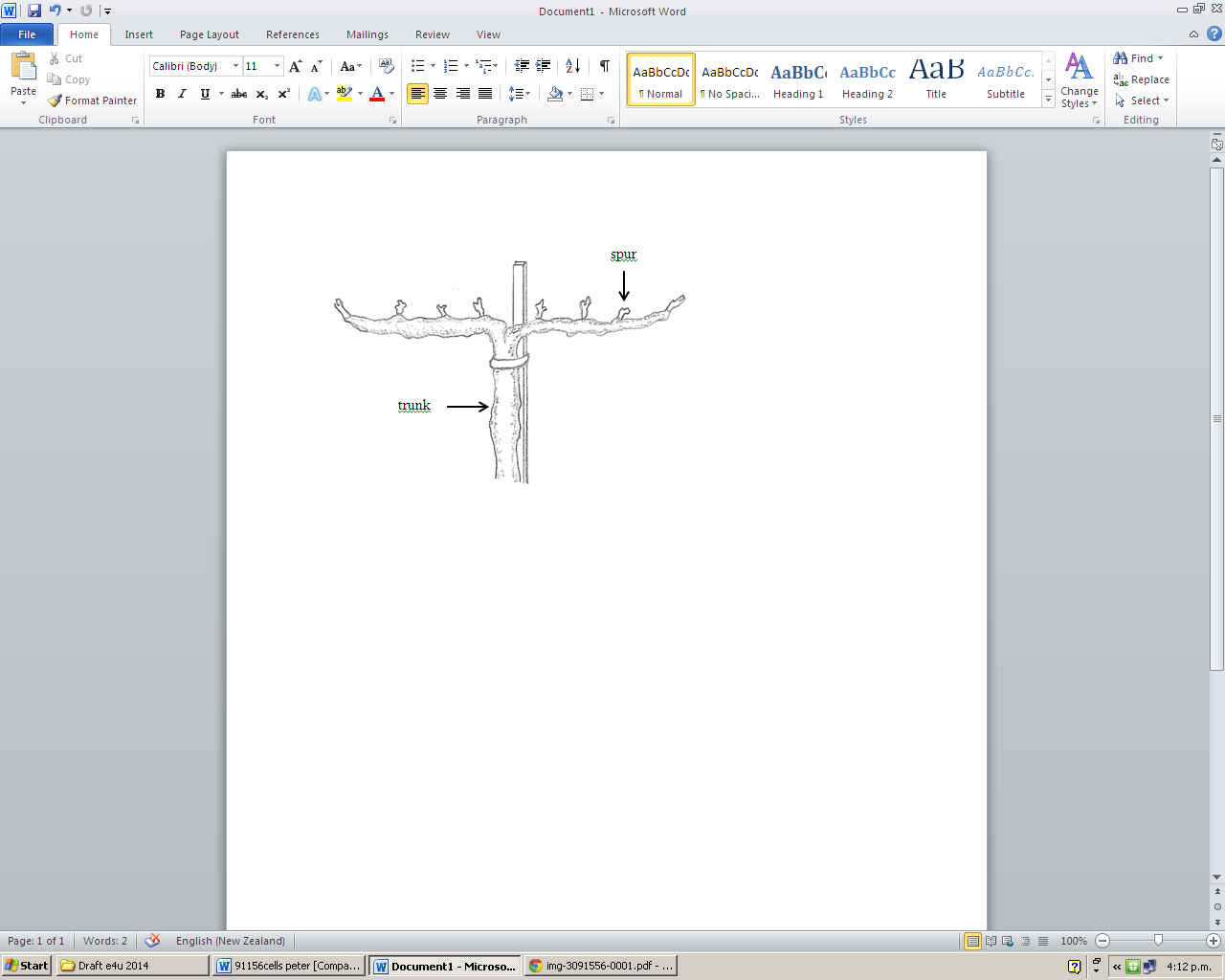
In your answer:

* Explain how diffusion, osmosis and active transport relate to the successful functioning of these cells.
* Give reasons for the specific abundance and distribution of mitochondria in each type of cell.

Assessor’s use only

**QUESTION THREE: CELL CYCLE**

Assessor’s use only



Following each summer’s harvest grape vines are pruned back to leave just the mature supportive trunk and several spurs. After a dormant period of no growth, new leafy vines grow from these spurs in spring.

(a) Describe the role of **mitosis** in grape vines.

(b) DNA **replication** is necessary for plant growth. Explain the **semi-conservative** nature of DNA replication and its importance to growing grape vines.

(c) Discuss how the annual pruning of grape vines relies on an understanding of how factors such as temperature and light intensity affect cell division.

In your answer include:

* Reasons why spurs remain dormant throughout winter and grow rapidly in summer.
* Justify why it is beneficial for cells in the spurs of the grape vine to have a faster cell cycle than cells in the trunk.

Assessor’s use only

Assessor’s use only

Extra paper for continuation of answers if required.

Assessor’s use only

Clearly number the question