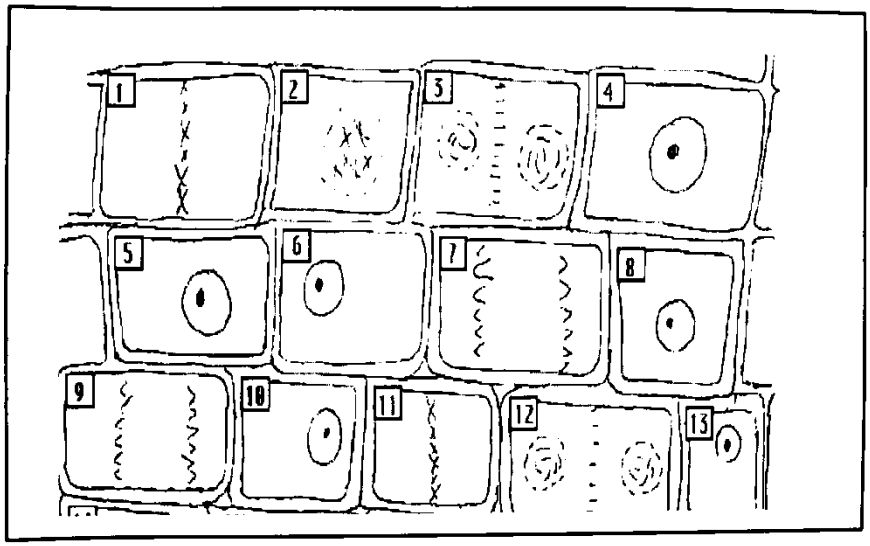
Grade 10 – Life at the Molecular, Cellular and Tissue Level (Open-ended questions)

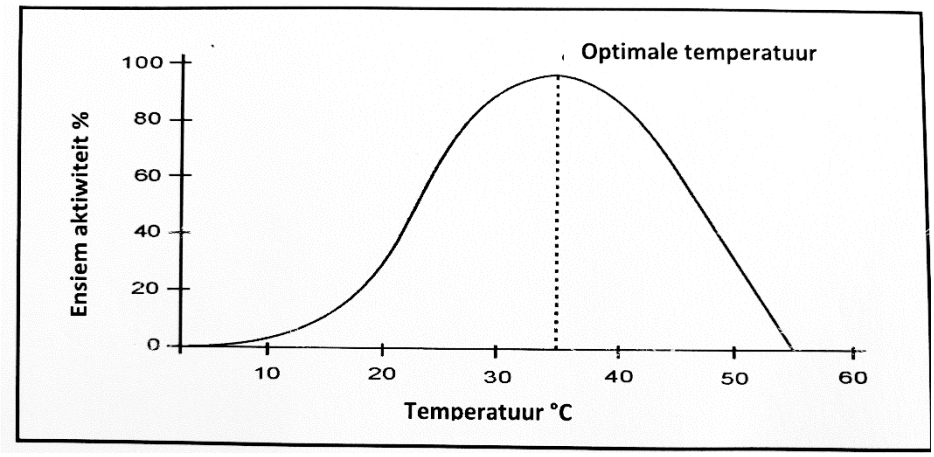
1. The diagram below shows various phases of mitosis in an onion root system.



Identify ALL die cells by die phase they represent. Write ONLY the NUMBER(S) next to the corresponding phase's QUESTION NUMBER, e.g. 1.4.6) 1, 4, 16

1.1	Interphase	4, 5, 6, 8, 10, 13,	
1.2	Prophase	2,	
1.3	Metaphase	1, 11	
1.4	Anaphase	7, 9	
1.5	Telophase	3, 12	**[13x1=13]**

2. Study the graph below and answer the questions that follow.



2.1 Provide the optimal temperature (°C) on the graph. (1)
35°C

2.2 At what temperature is enzyme activity at its lowest? (1)
0-5°C

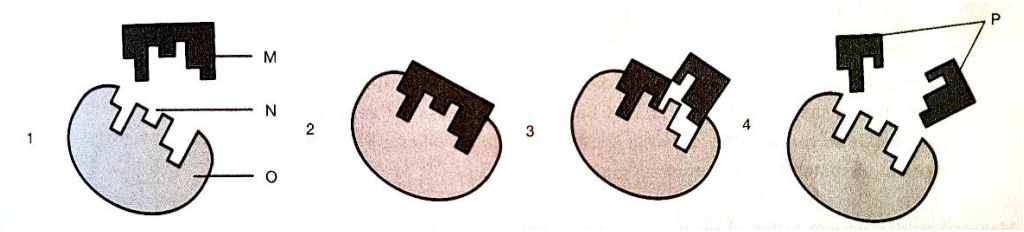
2.3 Identify the: (2)

a) Independent variable
Enzyme activity
b) Dependent variable
Temperature

2.4 Explain shortly what the graph shows. (2)
The graph displays the effect of temperature on enzyme activity.

[6]

3. Study the diagram below and answer the questions that follow.



3.1 Provide labels for M, N, O and P respectively. (4)
M: Substrate
N: Active region
O: Enzyme
P: Product

3.2 Provide two functions of enzymes. (2)

- **Act as catalyst for anabolic reactions**
- **Act as catalyst for catabolic reactions**

3.3 If an enzyme is heated too much, it denatures. What does this mean? (2)
The protein loses its form and function.

3.4 Distinguish between anabolism and catabolism. (4)

- **Anabolism is constructive metabolism; compounds are formed**
- **Catabolism is destructive metabolism; compounds are broken down**

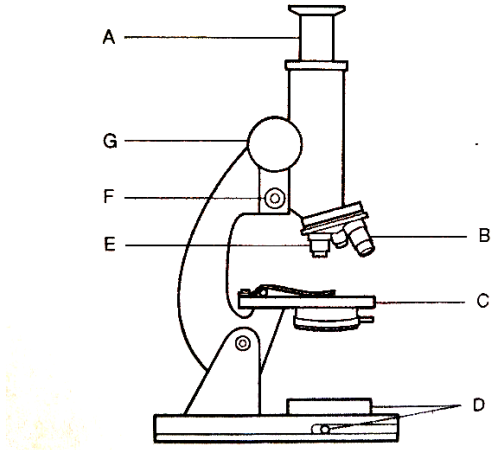
[10]

4. You are asked to prepare a wet mount of an onion epidermis on ‘n slide and then to look at the cells first at low magnification and then high magnification. To prepare your wet mount you place a piece of onion epidermis in a drop of water on the slide.

4.1 What is the name of the piece of glass you place on top of the specimen? (1)
Cover slip

4.2 How do you prevent air bubbles from forming under the glass? (2)
Using a dissection needle, lower the cover slip onto the specimen at an angle to push out air bubbles

4.3 You must follow certain steps to observe the onion epidermal cells with low and then high magnification. The parts of the microscope are labelled A-G below.



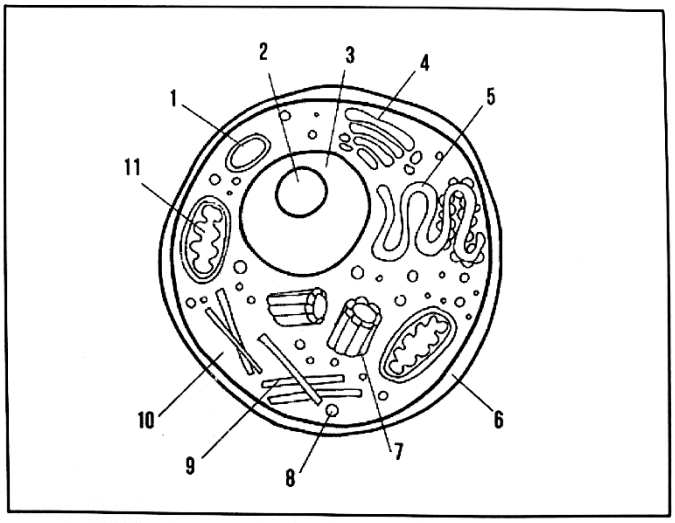
Six steps are listed below. Arrange the steps in the order you would follow to study the onion epidermal cells.

1) Draai G tot jy die ui-epidermis kan sien.
2) Draai F sodat jy die selle duideliker kan sien.
3) Kyk na die preparaat deur A.
4) Plaas die voorwerpglasie op C en klem vas.
5) Beweeg B in posisie.
6) Skakel D aan. (12)

4; 6; 5; 3; 1; 2

[15]

5. Study the diagram below and answer the questions that follow.



5.1 What structure is shown above? (1)
Animal cell

5.2 Provide TWO visible reasons for your answer in 5.1 above. (2)
No chloroplasts; small vacuoles; no cell wall

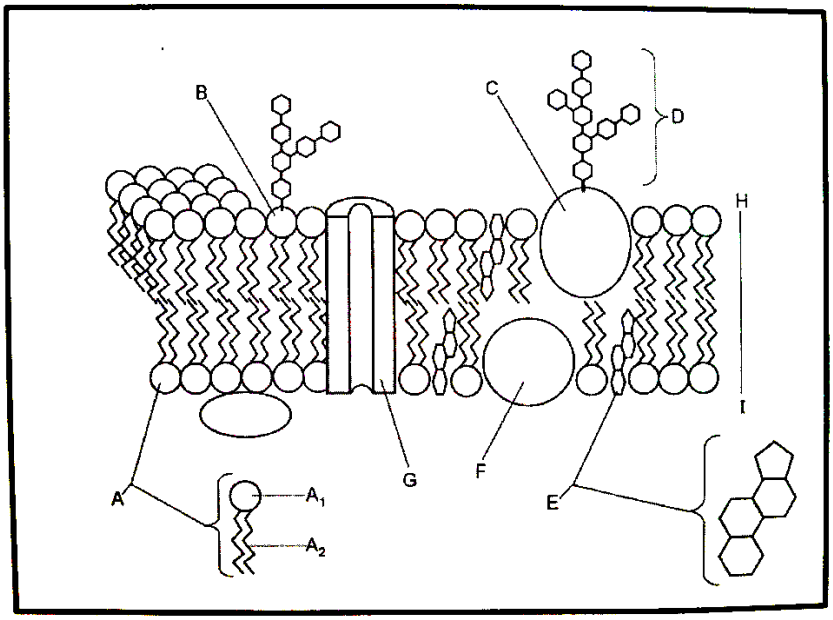
5.3 Provide labels for 2, 4 and 11. (3)
2: nucleolus
4: Golgi apparatus
11: mitochondrion

5.4 What are the functions of structures 4 and 6? (2)
4: involved in protein synthesis
6: keeps cell contents contained; acts as a permeable membrane for substances entering and leaving the cell

5.5 Draw and label a diagram of a plant cell. Make note of the structures NOT present in the cell above. (5)
Caption✓
Correct diagram (plant cell)✓
Compulsory labels: (to distinguish plant cell from animal cell): vacuole✓, chloroplast✓, cell wall✓

[13]

6. Study the diagram of a cell membrane below and answer the questions that follow.



6.1 Provide labels for A_1, A_2 and C. (3)
A_1: Phospholipid head
A_2: Phospholipid tail
C: Protein

6.2 Which transport method is represented by G? (1)
Facilitated diffusion

6.3 Name one difference between structures A_1 and A_2. (2)
A_1 is hydrophilic and A_2 is hydrophobic

5.4 Discuss the importance of this difference. (2)
It allows substances like water to move in and out of the cell

5.5 Provide an example of a molecule that can move freely between H and I and also provide the mode of transport. (2)
Water: osmosis OR
Glucose: diffusion

5.6 Bespreek kortliks hoe hierdie beweging plaasvind. (2)
Substances move from a higher concentration to a lower concentration without using energy

[12]