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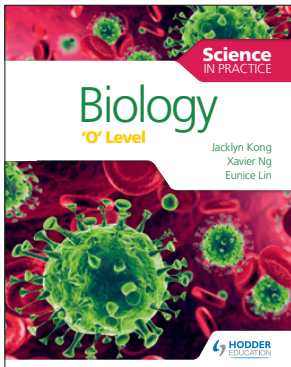
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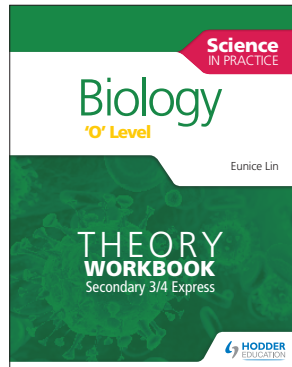
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- Test knowledge and skills at comprehending, applying, synthesising and evaluating the content learned with questions.
- Aid learning with suggested frameworks and answers to all questions.

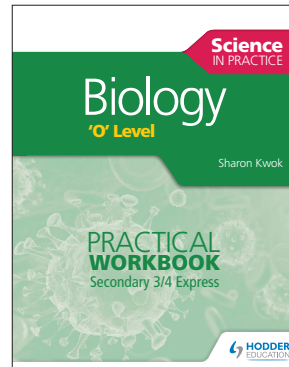
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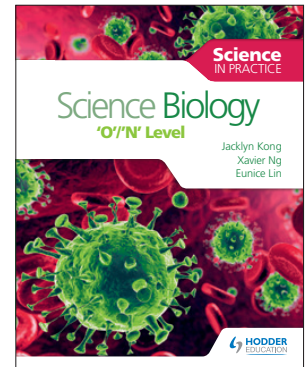
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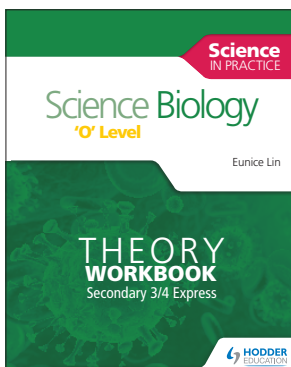
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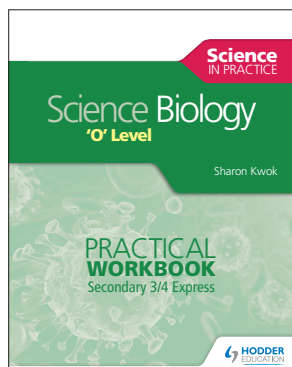
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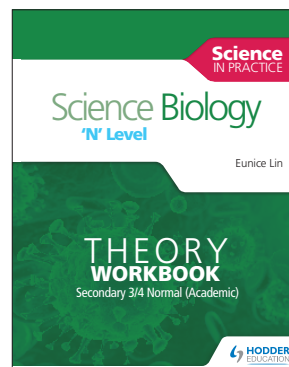
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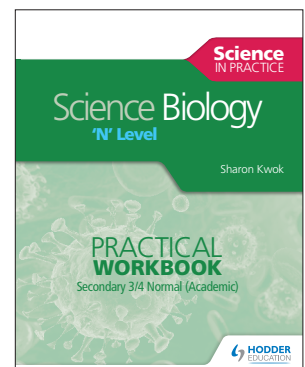
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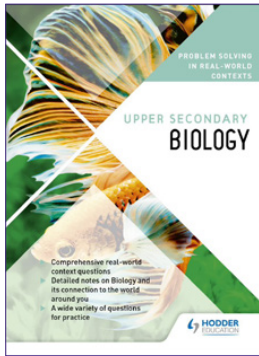
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Problem Solving in Real-World Contexts Upper Secondary Biology

Prepare for the challenging questions in the GCE 'O' Level Biology examinations with real-world contexts that ensure a deeper understanding of the topics and how they are connected.

- Prepare for the real-world context questions with notes and guidance, worked examples and exam-style questions.
- Deepen understanding and explore the connections of how various topics come together with practice questions that test relationships of different topics.
- Check understanding with detailed answers and explanations at the back of the book.

Theme 1 Principles of Biology
Topical Assessment 1: Cell Structure and Organisation

1. Amy visits her local market. On her trip, she buys kangkong, bok choy, chicken, duck, beef, onions, and broccoli.

a) Amy examines samples of the items under a microscope and divides them into two main groups based on her observations. What are the two groups and what structures does Amy observe to put the products into these groups? [4]

b) Amy knows that some organelles are common to both groups. She makes a list found in both types of cells. Which organelles are on her list?

Hint
In cell biology, the structure of cells is linked to their function. Some structures (or common) in all cells, and others are specific to certain types of cells.

d) Outline the procedure for observing plant and animal cells under a microscope and cheek cells.

Thought Process
You have studied cells under the light microscope using prepared slides and stain with an appropriate temporary staining technique. What staining technique is used in cells? How about animal cells? Think about the procedure you used, and the print had to take.

Theme 1 Principles of Biology
Topical Assessment 1: Cell Structure and Organisation

1. Amy observes a plant cell under the microscope and draws it. The drawing of the cell is 8 cm long. She has used the 400 objective lens on her microscope, and drawn the cell twice the size seen under the microscope. The eyepiece lens is $\times 10$ magnification.

d) What is the actual size of the cell in mm? [2]

Hint
A simple memory diagram can be used to calculate the magnification, actual size, or image size of an object.
 $I = \text{size of image (drawing of an object on paper)}$
 $A = \text{actual size of the object being measured}$
 $M = \text{magnification (the size of an object compared to its i.e., the number of times larger an image is than the obj.)}$
So, $M = \frac{I}{A}$, $A = \frac{I}{M}$ and $I = A \times M$.

her teacher to label organelles in animal and plant cells, each.

is labelled A-J in Figures 1 and 2.

Figure 2 A plant cell

Figure 1 An animal cell

f) Group the organelles in e) according to their function in Table 1. [7]

Function	Organelles
i. Energy trapping/supply of energy	
ii. Protein synthesis	
iii. Lipid synthesis	
iv. Packaging and/or modification of proteins	
v. Structure and support	
vi. Transport into and out from the cell	
vii. Control and coordination of cell	

Table 1 Organelle structure and function

Thought Process
Organelles are structures within cells that have specific functions. By dividing up the cell in this way, or 'compartmentalising' it, the functions of the cell can be carried out more efficiently. Which organelles have you learnt about in the course? What function does each organelle have?

Theme 1 Principles of Biology
Topical Assessment 2: Movement of Substances

1. Jamal is studying how substances move into and out from cells. He knows that these processes are vital for supporting life and keeping cells alive.

Figure 1 Movement of molecules into and out from a cell

a) Figure 1 shows four ways in which molecules may move into and out from a cell. The dots represent the concentration of the different molecules.

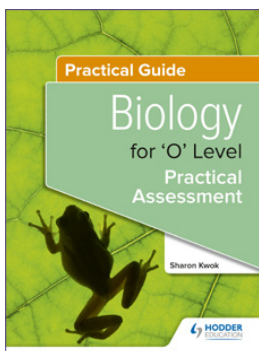
i) Which arrow represents the movement of oxygen molecules? [1]

ii) Which arrow represents the movement of carbon dioxide molecules? [1]

iii) Which arrow represents the active transport of glucose molecules? [1]

Hint
The diagram indicates a relative concentration of substance by the amount of shading, and the arrows show direction of movement. Use this information, and your knowledge of the movement of substances across cell membranes, to answer these questions.

b) Distinguish between diffusion and osmosis. [2]



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