MATHEMATICS ADVANCED YEAR 11 - MODULE 3 - LESSON 9

Optimisation Problems

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name _____

Date _____

Class _____

1. Key Ideas

What is the largest area you can fence with a fixed length of wire? What price should a company charge to maximise profit? These are optimisation problems — and calculus gives us a systematic way to solve them. In this lesson, you will turn real-world scenarios into mathematical models, then use derivatives to find the best possible outcome.

- The general strategy for solving optimisation problems
- How to translate a word problem into a mathematical model

2. Success Criteria

By the end, you should be able to:

- The general strategy for solving optimisation problems
- How to write constraint and objective equations
- That endpoints may need to be checked in closed domains

3. Key Terms

Derivative
The rate of change of a function at a point; the gradient of the tangent.

Differentiation
The process of finding the derivative of a function.

Stationary Point
A point where the derivative equals zero.

Chain Rule
A rule for differentiating composite functions: dy/dx = dy/du × du/dx.

Product Rule
A rule for differentiating products: d(uv)/dx = u(dv/dx) + v(du/dx).

Optimisation
Using calculus to find maximum or minimum values in practical problems.

4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

5. Short Answer Questions

1. Explain this lesson goal in your own words: "The general strategy for solving optimisation problems". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "How to write constraint and objective equations". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Optimisation Problems: "That endpoints may need to be checked in closed domains".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Optimisation Problems but does not use evidence or reasoning.

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

7. Multiple Choice

1. What is the best first step when answering a question about Optimisation Problems?

☐ A. Identify the key concept being tested

☐ B. Write every fact from memory

☐ C. Ignore the command word

☐ D. Skip examples and evidence

2. Which answer would show stronger understanding of Optimisation Problems?

☐ A. An answer with accurate terms and reasoning

☐ B. A copied definition only

☐ C. A single-word response

☐ D. An answer with no example

3. What should you do if a question asks you to explain?

☐ A. Link the idea to a reason or cause

☐ B. List unrelated facts

☐ C. Only draw a diagram

☐ D. Write the shortest possible answer

8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

SUCCESS CRITERION 1

Prove that you can: The general strategy for solving optimisation problems

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: How to write constraint and objective equations

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: That endpoints may need to be checked in closed domains

BAND 5 4 MARKS

One thing I still need help with: