Quadratic Functions — Introduction

Subject	Duration	Framework	Date
Year 11 Maths Methods	60 minutes	VTLM 2.0 / Heathmont	_____

🎯 Learning Intentions

By the end of this lesson, students will be able to:
- Identify key features of a quadratic function: vertex, axis of symmetry, x-intercepts and y-intercept
- Sketch the graph of $f(x) = ax^2 + bx + c$ with all key features labelled
- Interpret the effect of changing parameters a, b, and c on the parabola

✅ Success Criteria

Students demonstrate success by:
- Correctly identifying vertex and axis of symmetry from a given equation
- Accurately sketching at least two quadratic functions with full labelling
- Explaining in their own words how the sign of a affects the parabola's shape

Lesson Structure

Phase	Time	Activity	VTLM 2.0
🌉 Bridge	10 min	Think-Pair-Share: prior knowledge activation on parabolas. Students sketch rough parabola on mini whiteboards. Class discussion — connect to learning intention.	Enabling Learning
🔍 Discover	15 min	**I Do (8 min):** Teacher models sketching $f(x) = x^2 - 4x + 3$ step by step. **We Do (7 min):** Students work alongside teacher on $f(x) = -x^2 + 2x + 8$.	Explicit Teaching
✏️ Achieve	25 min	**Guided (10 min):** Pairs work on Q1–3 with teacher circulating. **Independent (15 min):** Individual work on Q4–6. Extension Q7–8 available.	Supported Application
🪞 Reflect	10 min	Exit ticket: axis of symmetry question + metacognitive prompts. Thumbs check against learning intentions. Preview next lesson.	Enabling Learning

🌉 Bridge — Detailed Notes (10 min)

Prompt displayed on board:

> *"What do you already know about parabolas? Where have you seen them in real life?"*

- 2 min individual → 2 min pair → 4 min class share
- Record student responses on board
- Connect to learning intention explicitly

Check for understanding: Mini whiteboards — sketch a rough parabola. Look for misconceptions about symmetry and orientation.

🔍 Discover — Worked Examples (15 min)

Example 1 — I Do: $f(x) = x^2 - 4x + 3$

- y-intercept: $f(0) = 3$
- x-intercepts: $x^2 - 4x + 3 = 0 \Rightarrow (x-1)(x-3) = 0$, so $x = 1, x = 3$
- Axis of symmetry: $x = -\dfrac{b}{2a} = \dfrac{4}{2} = 2$
- Vertex: $f(2) = 4 - 8 + 3 = -1$, vertex at $(2, -1)$
- Concave up since $a = 1 > 0$

sketch space

Example 2 — We Do: $f(x) = -x^2 + 2x + 8$ *(students work simultaneously)*

⚠️ Common Misconceptions

- **Sign error** in axis of symmetry: $x = -b/(2a)$, not $b/(2a)$
- **Forgetting concavity**: always check sign of a first
- **Incomplete sketches**: all key features must be labelled
- **Not checking** x-intercepts by substitution

⭕ Exit Ticket

1. State the axis of symmetry of $f(x) = 2x^2 - 8x + 1$

2. One thing I understood well today: _____

3. One thing I am still unsure about: _____