# The Mathematics Project Pipeline

*A guide to progress, not perfection*

A senior project is **not linear**. Most successful projects move back and forth between stages. Feeling “stuck” usually means you’re in a stage that hasn’t been named yet.

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## 1. Exploration

**What this looks like**

- Reading papers, books, notes
- Watching talks
- Playing with examples or computations

**Real progress**

- Annotated notes
- A list of interesting questions
- “I don’t understand X yet” (this counts)

**Common trap**

- Thinking you should already have results

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## 2. Narrowing & Question Formation

**What this looks like**

- Turning interests into specific questions
- Deciding what *not* to pursue

**Real progress**

- A clearly stated question, conjecture, or goal
- A short paragraph explaining *why it matters*

**Common trap**

- Questions that are too broad or too vague

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## 3. Background Mastery

**What this looks like**

- Learning definitions, theorems, techniques you actually need
- Working small examples by hand

**Real progress**

- You can explain key ideas without notes
- You know which tools are relevant

**Common trap**

- Trying to learn *everything* instead of what's necessary

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## 4. Attempting Mathematics

**What this looks like**

- Proof attempts (successful or not)
- Computations, simulations, counterexamples
- Partial results

**Real progress**

- Failed attempts you understand
- Patterns you can articulate

**Common trap**

- Interpreting failure as lack of ability

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## 5. Revision & Pivoting

**What this looks like**

- Modifying the question
- Weakening claims

- Changing approaches

**Real progress**

- A *better* question than before
- Clearer understanding of constraints

**Common trap**

- Believing pivots mean you “wasted time”

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# 6. Synthesis

**What this looks like**

- Organizing results into a story
- Deciding what comes first, what depends on what

**Real progress**

- An outline
- A logical flow of ideas

**Common trap**

- Waiting for everything to be “done”

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# 7. Writing

**What this looks like**

- Drafts (many of them)
- Explaining ideas to a reader, not just yourself

**Real progress**

- Clear definitions
- Honest explanations of motivation

**Common trap**

- Confusing LaTeX formatting with clarity

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## 8. Presentation & Defense

**What this looks like**

- Talks, posters, Q&A
- Responding to questions thoughtfully

**Real progress**

- You can explain your project to a peer
- You can say what you tried and why

**Common trap**

- Thinking you need to know *everything*

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# Important Reminders

- Writing begins **before** results are final
- Most projects loop through stages 3–6 multiple times
- “I’m stuck” usually means **you’re in the middle**, not behind

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# Right Now

**I am currently in Stage: _____**

**My next concrete action is:**

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**My biggest uncertainty is:**

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