Student Success Centre
Learning Skills and Strategies

Saint Mary's University

Solving Mathematical and Logical Problems

Solving complex math and logic problems is a common challenge in university, but it is a skill that anyone can learn through practice (yes, even you!). **Slow down your process**; take problems one step at a time following these four steps to build your problem-solving abilities (Polya, 1973, "How to Solve it").

1 Understand the Underlying Concepts

Before looking into numbers or formulas, we first want to ask **"what's the story?"** What **concepts and theories** are being applied in this problem? **Collect** and **organize** the information, paying attention to details such as units and keywords.

Where am I starting from? What information am I given? → **Where do I need to get to?** What am I being asked for?

Write this information down including units and symbols and then ask:

What course concepts connect this information? Talk it out; use diagrams and visualization to help you understand the story.

2 Devise a Plan

Plan out your problem-solving process before actually taking any steps. When working on new problems, refer to resources and examples to develop your plan. Gradually build up your comfort and knowledge to rely less on your resources.

When planning, think about **both your starting and end points**. Ask:

- What could be done with the information I'm given?
- How could I get to the information I am asked for?

If there are steps in your plan you don't feel confident about, **explore them further**. Why do you feel inclined to take that step? Why are you unsure? Come up with a 'Plan B' and even a 'Plan C' so you have some options in case you get stuck.

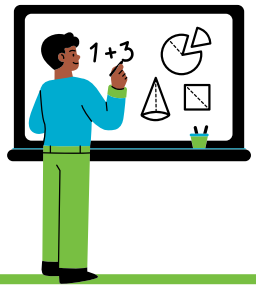
This is where **formulas** come in.

Formulas tell stories. They communicate concepts and relationships in condensed form. **Connect** the concepts and stories you identified in step 1 with formulas to devise your plan.

It's especially important when first learning how to solve a problem to **separate step 2 and 3**!

This will help you see where you are uncertain, where you might be going wrong, and what you could do instead.

3 Carry Out the Plan



Paying close **attention to detail**, carry out your plan and **document your entire process**. Write down your steps, calculations, and any questions that arise so that you can...

Pólya. (1973). How to solve it : a new aspect of mathematical method (2nd ed.). Princeton University Press.

To learn more, book a one-on-one coaching appointment or attend a Learning Skills Workshop!
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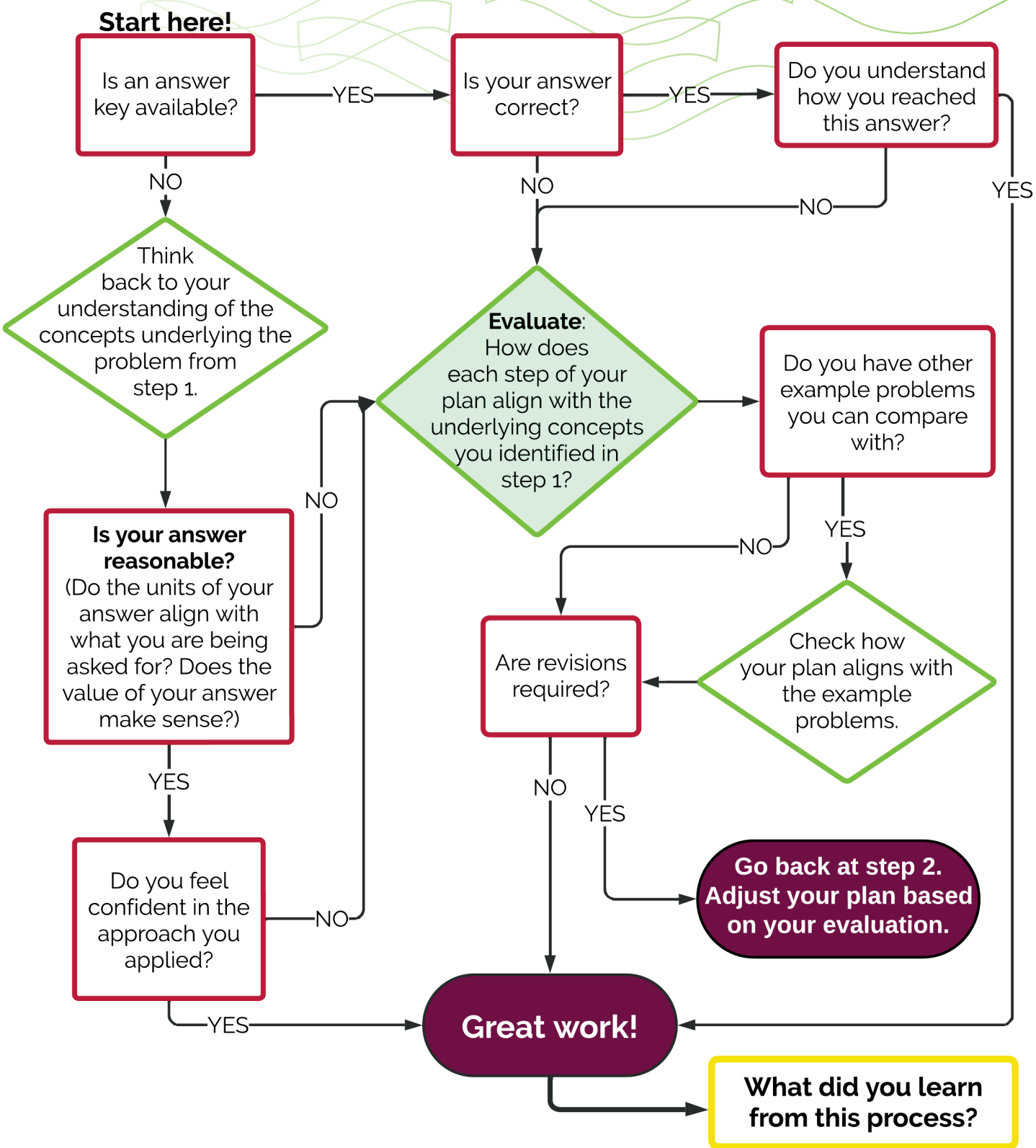
4 Reflect on Your Process



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