Problem solving

Solving problems

“The biggest mistake I see new programmers make is focusing on learning syntax instead of **learning how to solve problems**.”

- V. Anton Spraul

Problem solving

Thinking about thinking

Logical and reflective thinking

critical thinking

“**Thinking about**, monitoring, and regulating our own **thinking**.”

+

Looking at your results along the way

metacognition

Awareness of how efficient we are in **applying strategies** to complete a task to **monitor** and **regulate** our own thinking.

The combination of these two involves:

01.
Awareness of our cognitive processes and activities,

02.
knowing how to take **appropriate action**, and

03.
having a range of **flexible strategies** to solve problems.

Problem solving

Why should I learn this?

Effective problem solving requires a **structured, transferable, logical** approach.

It can be done through **critical evaluation** of a problem.

– known as

critical thinking

Many of us are able to solve problems without knowing how we do it.

This might mean we are excellent thinkers, or we just get lucky.

To ensure that we can solve problems of varying complexity and context, we need to understand **how we solve problems**.

Problem solving

How does it help me solve a problem?

Critical thinking and metacognition help us to solve problems because it...

Gives you an **intellectual toolset** that can be applied to any problem.

Ensures that you **correctly define** the problem.

Ensures you **consider all parts** of the problem.

Ensures you produce the **best solution** for a problem.

Problem solving

Six dimensions of critical thinking

EVALUATE or assess arguments, explanations, considerations, opinions, questions, and inferred relationships between statements.

INTERPRET statements by understanding and categorizing them, decoding their significance, and clarifying the meaning thereof.

ANALYZE statements by identifying relevant information and the relationships between it, identifying arguments for and against it, and examining ideas.

INFER and hypothesize by querying evidence, conjecturing alternatives, and understanding the consequences thereof.

EXPLAIN or state results, justify procedures, and present arguments for and against them.

SELF-REGULATE by being aware of their cognitive activities (how they evaluate, interpret, analyse, infer, and explain) and examining them.

But first, try on your own

Scenario:
A few of your colleagues really need coffee to get those neurons firing for a big project you're working on. They've asked you to take control of the situation.

Information:
The office has a kitchen with a coffee machine and all the necessary ingredients to make coffee. You also know of a great takeaway coffee shop around the corner from the office. Make as many assumptions as you think are necessary.

Write down the steps you need to take to solve this "problem".

Try to **recognize the implicit processes** you follow while writing down these steps.

When you DON'T understand the problem

airbnb

Lenny Rachitsky (former developer at Airbnb)

The original instruction:

Build out a "social travel" experience for Airbnb travellers.

What they thought the problem was:

"Travellers want to hang out with other travellers."

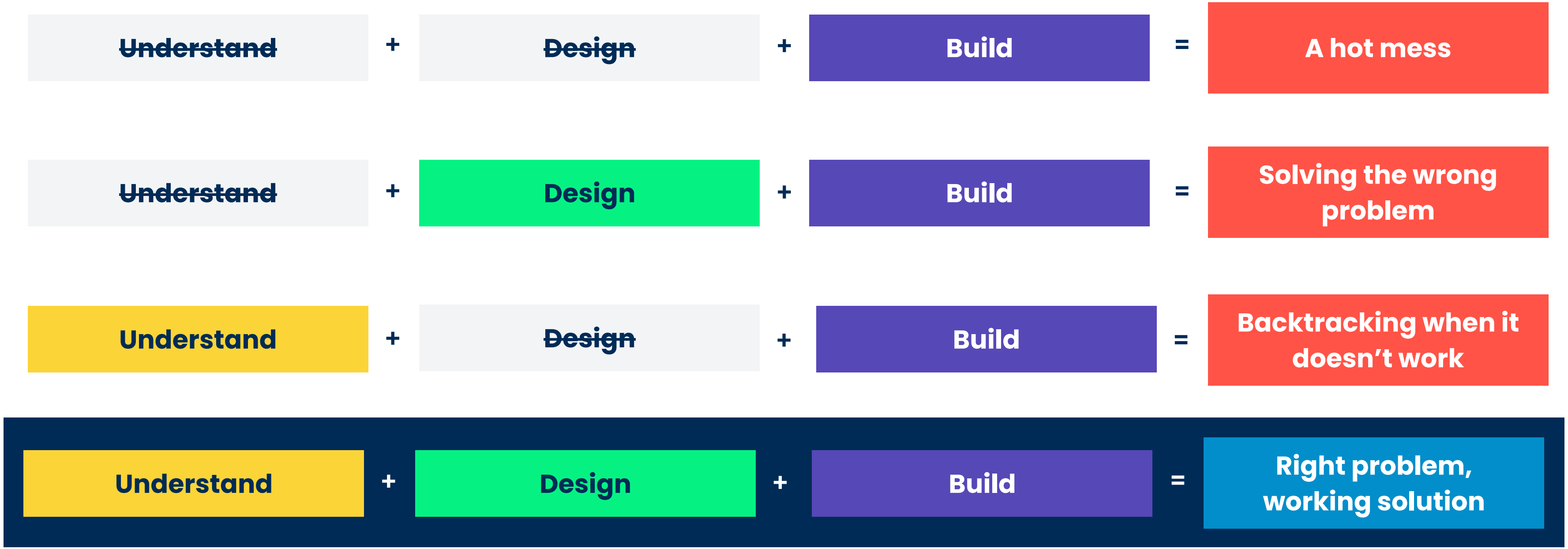
The **REAL** problem:

"Travellers want to find high-quality, non-touristy things to do."

Problem solving

A three-step approach to problem solving

As a result of misunderstanding the real problem, Lenny proposed a **problem-solving framework**:



~~Understand~~ + ~~Design~~ + Build = A hot mess

~~Understand~~ + Design + Build = Solving the wrong problem

Understand + ~~Design~~ + Build = Backtracking when it doesn't work

Understand + Design + Build = Right problem, working solution

Problem solving

Right problem, working solution

UNDERSTAND THE PROBLEM

01. **Understand** the problem in detail. What is the desired outcome?

02. Write down a **problem statement**, making sure there is no ambiguity.

Understand

FIND THE FACTS

03. List the potential options/solutions using a **logic tree**.

04. Consider the pros and cons of each potential solution.

Design

IMPLEMENT AND REVIEW

05. Select the best option and build that solution.

Build

Problem solving

Some ways to solve a problem

Logic trees

A fundamental **problem-structuring framework** for solving complicated problems.

Agile

A framework to effectively **manage projects**. Mostly used by developers, but can be applied to almost anything.

Design thinking

A solution-based approach to **solve complex, ill-defined** problems.

Scientific method

A logical problem-solving approach that is **rigorous and replicable** – used by scientists.

Root cause analysis

A problem-solving method used to **identify the root causes** of problems.