

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

# 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**.

# 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.

# 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.

# Six dimensions of critical thinking

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

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

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

**INFER** and hypothesise 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 **recognise the implicit processes** you follow while writing down these steps.

# Let's reflect...

**01.** What had to change in my thought process to get to a solution?

**02.** Can I explain why my solution is the most appropriate?

**03.** Did I miss something? Maybe I should check again.

**04.** Did I follow an appropriate cognitive process?

**05.** How can I do a better job at thinking about what I'm doing?



# When you DON'T understand the problem



Lenny Rachitsky (former developer at Airbnb)

The original instruction:

Build out a “social travel” experience for Airbnb travellers.

What they thought the problem was:

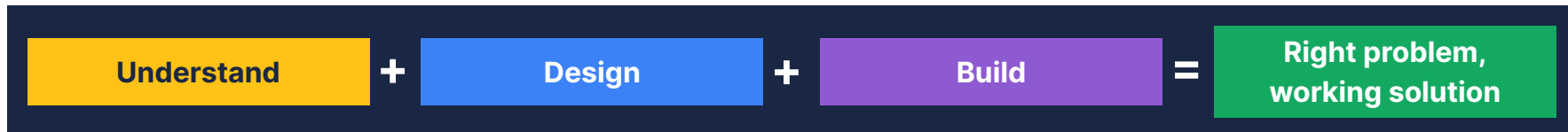
“Travellers want to hang out with other travellers.”

The **REAL** problem:

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

# A three-step approach to problem solving

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



# 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

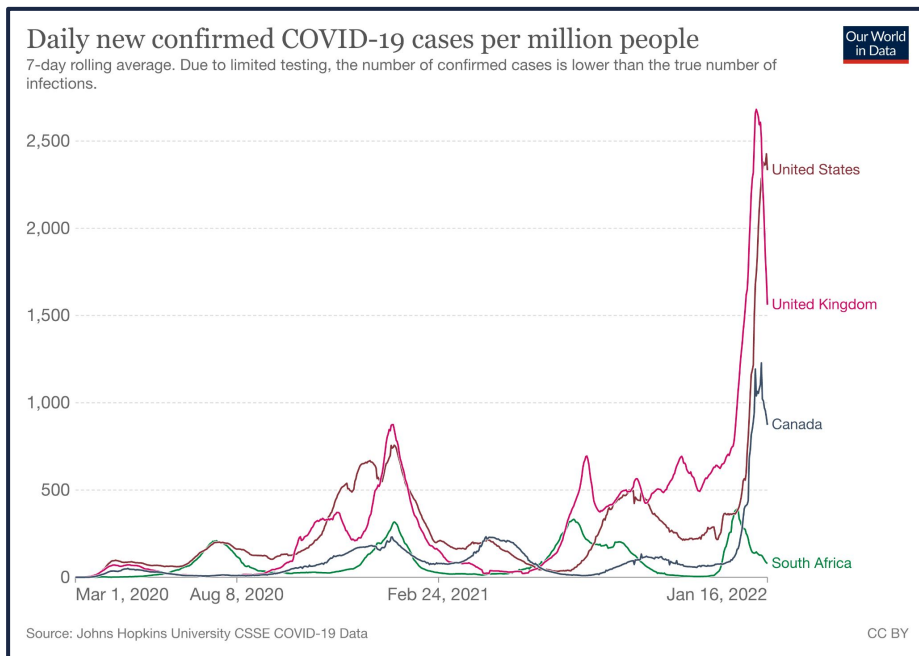
05.

Select the best option and build that solution.

Build

# So, how would you solve this problem?

Do you think you can apply the same processes to solve the following problem?



How do we  
fight  
COVID-19?

**An impossible problem to solve?**

# 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.