

Name:

Date:

Decomposition

Do you know the videogame **Pac-Man**?

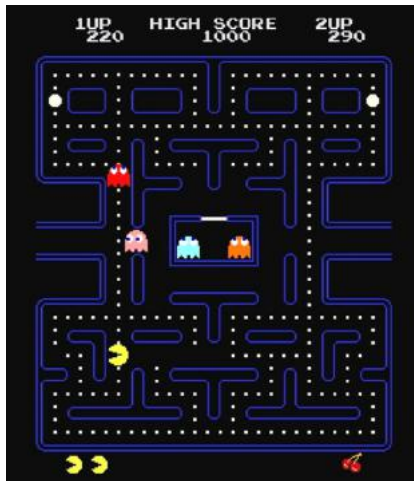
Have you already played it? Try it now!

<https://g.co/kgs/xy7FWi3>



If we wanted to program a game like Pac-Man, **how could we do it?**

That would be a **huge** project! One trick we have in computer science to solve **HUGE** problems is **to break them down** into various **smaller problems**.



Describe this graphic:

List all the items present:

Finding similar parts

Some things are made up of various parts that are very **similar** to each other.

In computer science **we love** similar parts! Because? Because we can work less! It's easier to create similar parts than it is to create completely different parts. In the next units we will understand why! We will learn how to do the job once, and then easily produce as many similar pieces as we want!

For now, let's focus on identifying all the opportunities to be lazy!
We always look for similar parts!

Below is a traffic light:



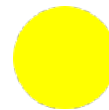
An alien who has never seen a traffic light could **break down** the graphics like this:



Black rectangle

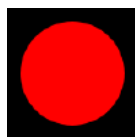


Red circle



Yellow circle

We are not aliens. We know that traffic lights are made up of three lamps. We could **break down** the graphics into three (**similar**) parts, one part for each lamp:



Red light



Yellow light



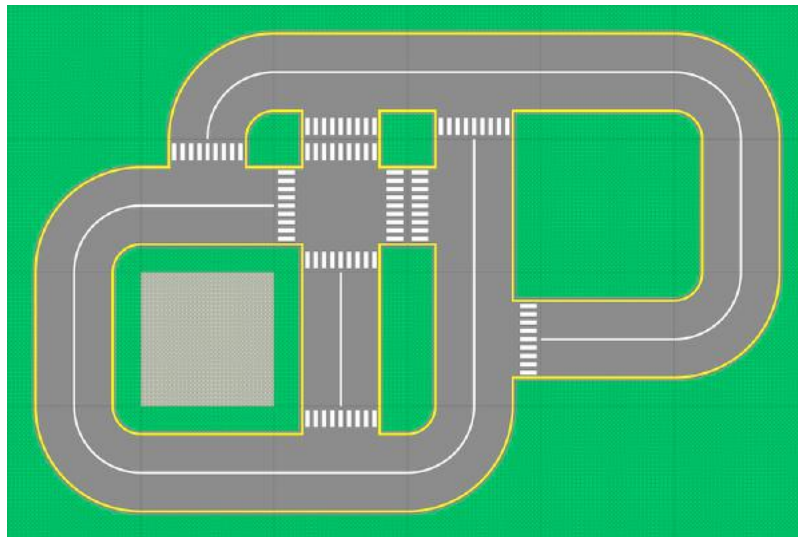
Turned-Off Light

What are **the similarities** between the three elements?

What are the **differences**?

Similarities and differences

Here is another example you may remember from when you were younger.



Draw the various **elements** of this graphic and **name** the various elements:

What **similarities** are there between the elements?

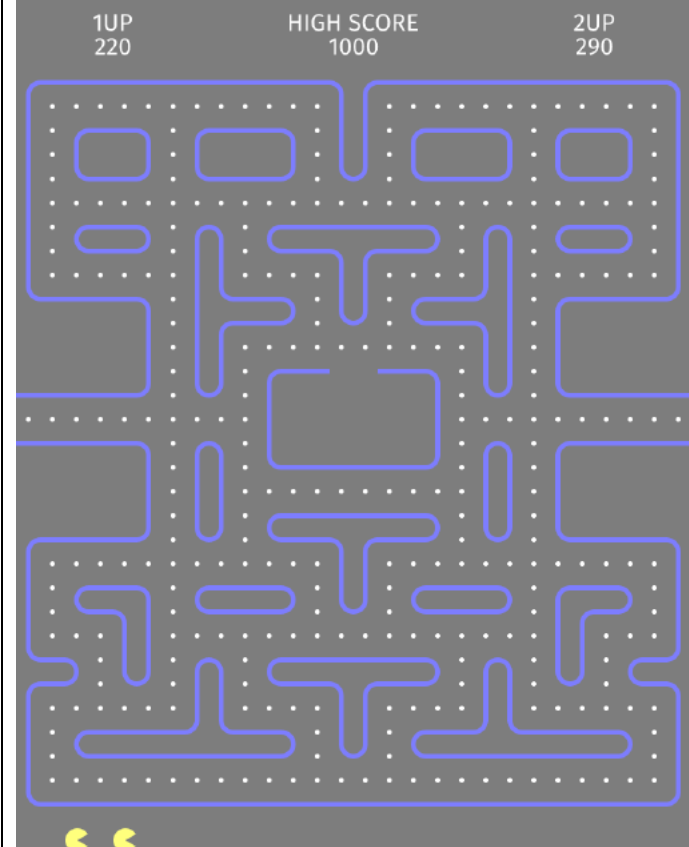
What are the **differences**?

Hierarchical decomposition

We can decompose very **complex** problems into simpler ones, and then we can decompose the latter into even simpler problems, and so on.

When we break down problems that are already decomposed, we say that we make a **hierarchical** decomposition.

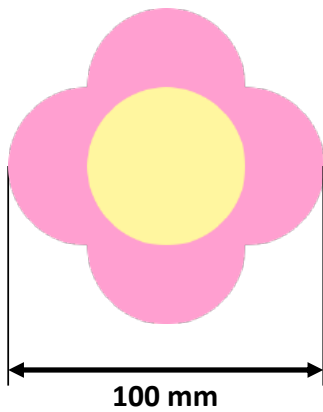
If we wanted to implement a game like Pac-Man, we would have to produce the following graphics. This graphic is quite complex. **Break it down hierarchically.**

	First break down the artwork into three main parts. Then break each part down into even smaller parts <i>(You can draw lines on the image to show your breakdown.)</i> Hierarchy:
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Draw the various elements of the maze:

Several decompositions are possible

There are often several ways to divide a (graphic) figure into its parts.



Describe a possible decomposition:

Can you find another one?

Decompositions in mathematics and their usefulness

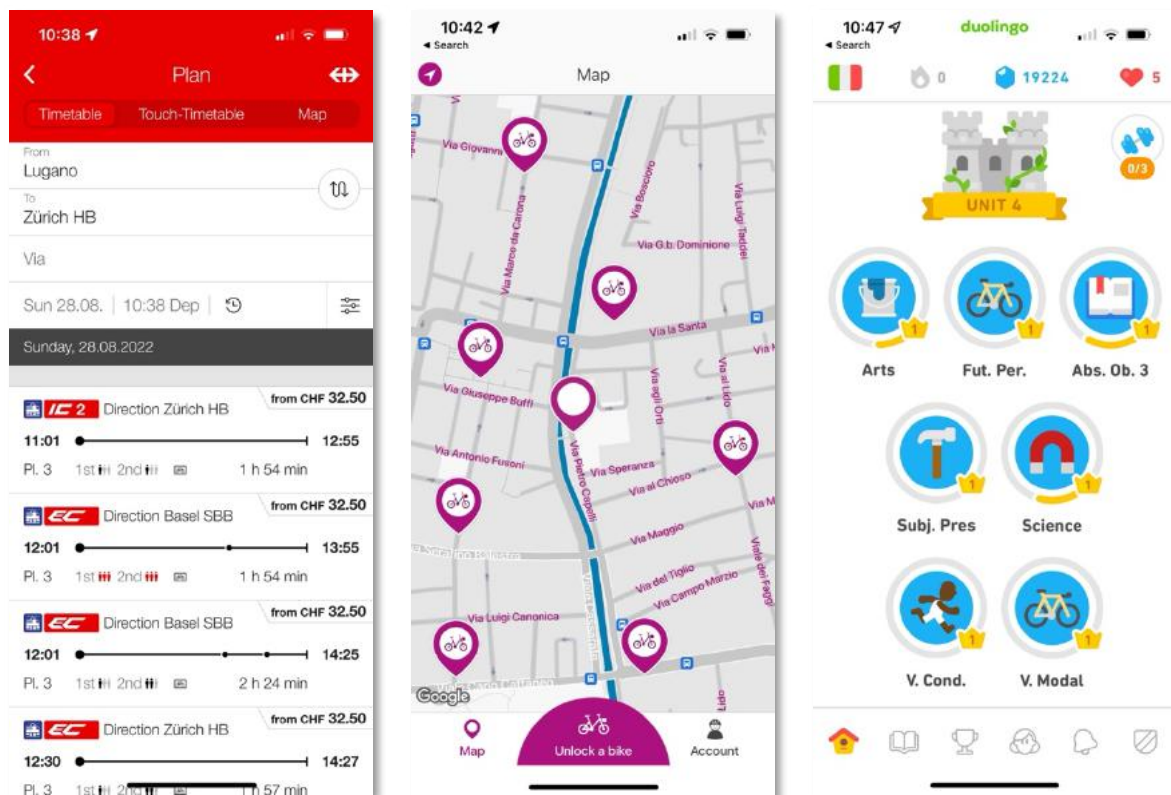
In mathematics, the method of decomposition is applied in many areas: composite geometric figures, prime factorization, backward reasoning...

Give some examples where you apply the method of decomposition (subdivision into parts or steps):

Scope:	Topic:	Goal:	Example:

Decompose an app

Open your favorite app and break down what you see hierarchically.
Or break down one of the screenshots below:



Which app did you choose?

Describe the decomposition and **give a name** to the various elements: