

# MATHEMATICS

Do you struggle with studying theory and mathematical proofs? Do you have the feeling you never succeed with the exercises? Sometimes students find math so difficult that they don't even dare to give it a go. It is therefore important to follow a **good approach** where theory and exercises are combined in an efficient manner. On this page you can find some **useful ideas** to help you studying math. On the **back side** we give you **specific tips on how to study proofs**.

## Theory

A **thorough understanding** is necessary to start working with exercises.

## Exercises

**Practicing** with the different concepts gives you extra insight in the theory.



✓ **Know the notation and definitions well**

This is essential to follow your classes.

✓ **Try to understand every concept**  
Thoroughly, with attention for details!

✓ **Look also at the examples that are given for the different notions**  
Try to understand why these are valid examples.

✓ **Alternate theory with exercises**  
Important to immediately see how it works.

✓ **For each chapter think about**

- **what** you have learned
- **how** you have to use it
- **why** it is important.

✓ **Look for logical connections**  
How are the different concepts linked to each other?

✓ **Start well in time!**  
It is difficult to know in advance how long it will take to understand everything. Processing your material will for sure require time and energy.

✓ **Choose your strategy in advance**  
What do I need to solve this exercise?

✓ **Work step by step**  
Does the result of the intermediate steps make sense?

✓ **Make exercises with an increasing level of difficulty**  
First simple examples, then more challenging exercises.

✓ **Make exercises with an increasing level of independence**  
Start with (solved) examples, then use some help (e.g. fellow students or teaching assistant) and in the end try to solve exercises completely independently.

✓ **Make also new exercises**  
Without looking at the solution.

✓ **It's ok to make mistakes!**  
Check your calculations in order to find your own mistakes.

✓ **Practice regularly from the start of the semester**  
It should become an automatism.

# HOW TO STUDY PROOFS

## ✓ Understand



- Make sure you first grasp the **notation and definitions very well**. *Do I understand every word in the theorem?*
- Try to **understand every step thoroughly**. *Why does a certain conclusion follow from a previous statement?*
- Write down **explicitly** next to a difficult step **the explanation** for that step. Mark also your **questions next to the steps you don't understand** and ask your professor, teaching assistant or study advisor.
- **At the end** check whether the **theorem is indeed proven**. *What is it that makes that the proof is done?*
- Think about the **structure of the proof**. *Which kind of proof is it? By mathematical induction, by contradiction, ... ? Is it possible to split the proof in subparts?*

## ✓ Reconstruct



- **Do NOT try to learn proofs by heart** or **summarize** them!
- What you should **memorize** are **all assumptions** and the **conclusion**. When dealing with complicated proofs you should memorize as well the **structure** of the proof and, if necessary, some **specific tricks** or difficult steps.
- Start from a **blank page**. Write down first the assumptions and the conclusion.
- Try then to **reconstruct all intermediate steps** in a logical way. Sometimes it can help to start from the bottom.
- **Don't give up** if you don't immediately succeed: at first it might not be that easy. Keep trying and focus on the steps you find difficult. In this way you can learn from your experience!
- Sometimes it can be useful to **make a diagram** (e.g. an **arrow scheme**) with an **overview** of the different axioms, theorems en lemmas and of the **logical connections** between them.

## Need extra support? Contact Study Guidance!



### Study advisors

Individual guidance for mathematics  
[student.vub.be/en/study-advisors](https://student.vub.be/en/study-advisors)

### Tutoring

Intensive help (private lessons) by VUB-students  
[student.vub.be/en/study-guidance#tutoring](https://student.vub.be/en/study-guidance#tutoring)