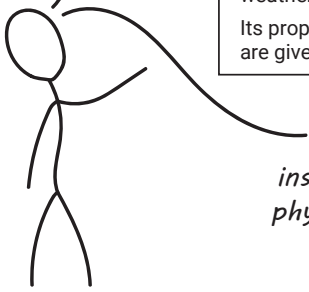
Step-Wise: an interactive practice platform

Step-Wise is an interactive practice platform

We will calculate the pressure inside a large helium-filled weather balloon.

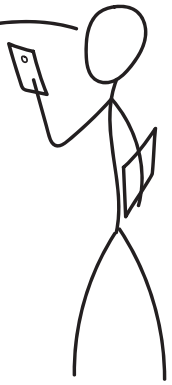
Its properties are given as ...



You can for instance practice physics homework with it

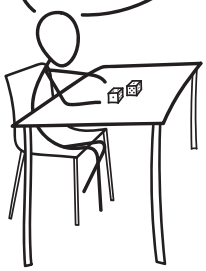
Due to modern design principles, Step-Wise is very user-friendly

The app works best on a laptop, but you can also add it to the home screen of your smartphone



At Step-Wise, exercises use randomly generated numbers/parameters

Effectively, this gives an infinite amount of practice material



The answers are entered through new intuitive input fields

1.1 bar ✓
Amazing! Keep it up.

$11 \cdot 10^4$ Pa ✓
Looking good.

$0.11 \frac{\text{N}}{\text{mm}^2}$ ✓
You solved it!

You also insert units into these, which are checked by a smart physics engine

1.1 N ✗
The unit you used does not indicate pressure.

1.1 Pa ✗
The given value is too small.

110 000 Pa ✗
You used too many significant digits.

Made a mistake?

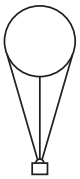
On incorrect answers, Step-Wise tries to find the fault

This gives you automatic feedback on your work

Step 1
Put all given values in standard units

$V =$ ____

$T =$ ____

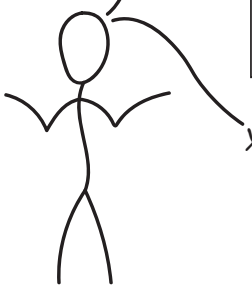


Really can't figure out an exercise?

Then you can split the exercise up into steps

This will guide you through it step by step

Some exercises can be solved in multiple ways



Step 2
Through which law do you want to solve this?

The gas law

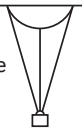
Poisson's law

You can then choose your own solution method

The rest of the exercise automatically adapts

Step 3
Find the new pressure using the gas law

Solution
The gas law states $pV = mR_sT$
Inserting numbers results in ...



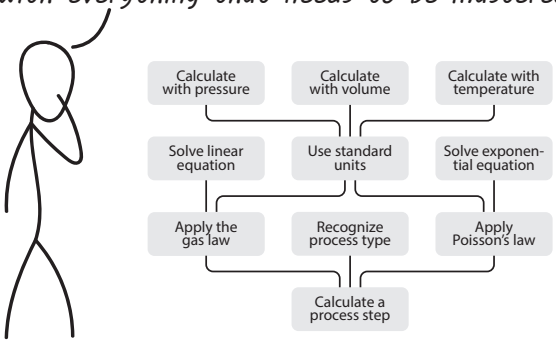
If you're stuck, you'll find where you went wrong

Or if things went well, you can see if there was maybe an easier solution

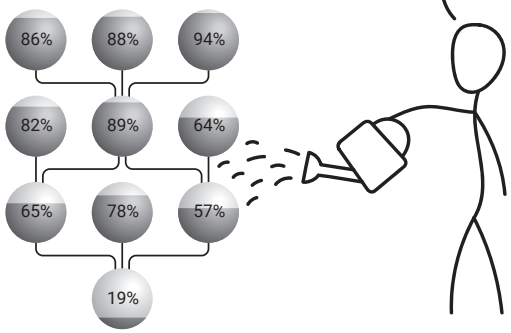
If you solve or give up on an exercise, you always get a clear solution

Guiding the learning process: the skill tree

Behind the scenes, Step-Wise has a large skill tree with everything that needs to be mastered

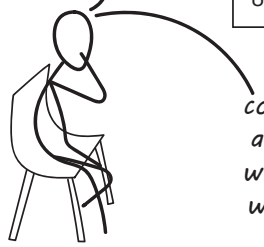


Using advanced probability theory the app tracks your skill level for every skill



Because you can solve exercises step by step, Step-Wise can precisely see where things go wrong

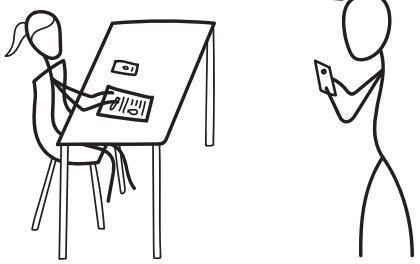
Step 1
Apply the gas law to the set-up
Step 2
Recognize the process type
Step 3
Using this, apply Poisson's law



So this is not just convenient for you, but also for the algorithm, which uses this to learn what you struggle with

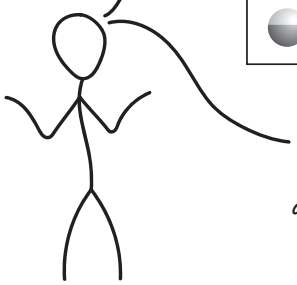
Through the skill tree, each student has a clear overview of the progress

And, if the student accepts this, so does the teacher



Step-Wise also uses the skill tree to recommend new skills to practice

Week 2
Recognize process type
Solve exponential equation
Continue practicing here
Apply Poisson's law



If you want, you are of course free to ignore this advice and practice whatever you like

Exercise	Success rate
The compressor	30%
The bicycle pump	35%
The weather balloon	45%
The light bulb	60%

Behind the scenes, Step-Wise estimates the chance that an exercise will be solved successfully

The app always tries to pick an exercise with a roughly 50% success rate, ensuring it's not too hard but not too easy either

You have an average score of 32% on the course final goals

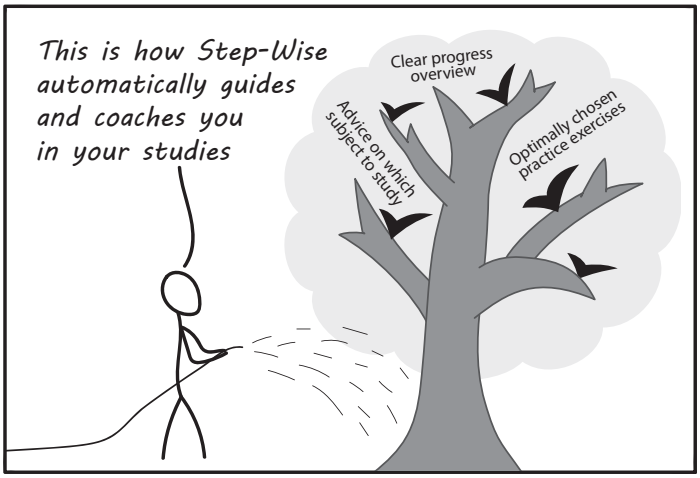
Rough estimate exam grade:
3.2

Not satisfied? Keep practicing!

You can even get a rough estimate of your final exam grade

So you always know where you stand and what still needs to be done

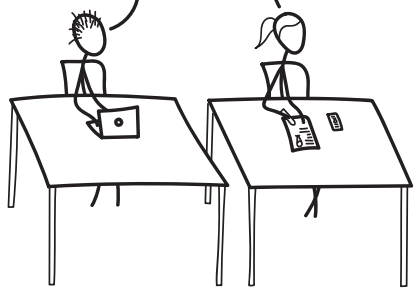
This is how Step-Wise automatically guides and coaches you in your studies



Planned extensions: more interaction

There is a downside to exercises with random numbers

It makes practicing exercises together a bit tricky



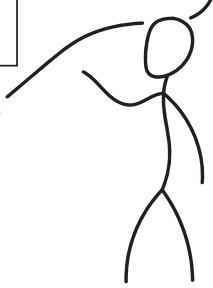
Stewis asks to practice together. Do you accept?

Note: submitted answers count for both of you!

Yes, let's go! | No, not now

Luckily Step-Wise knows the level of every student following the course

This allows the app to find someone who is just as far as you are, and give the both of you the same exercise



Are you stuck at an exercise and can't find a way out?

You can then also ask a fellow student for help

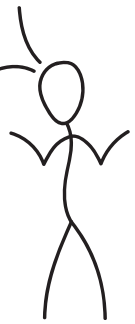
Stewis is stuck at a gas law exercise. Do you have time?

We open a chat screen or voice channel for you to discuss in

Of course! | No, not now

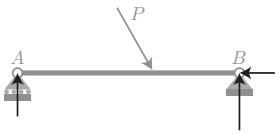
The app then looks for someone who recently mastered this subject

This also adds a learning effect for the helping student



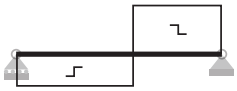
In addition, next to physics exercises, there will also be mechanics exercises

Draw the support reactions



You will then, in an intuitive way, be able to draw forces in the corresponding schemas

Draw the shear force diagram

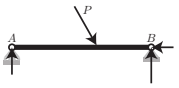


✕ This is not correct. Hint: check your sign convention.

And you can also draw various types of diagrams in the app

Of course you get automatic feedback on this too, as usual

Give the equilibrium equations



$\uparrow \sum F_y : F_{A_y} + P_y + F_{B_y} = 0$ ✕

That's not correct. Which way does P_y go?

Through a new mathematics engine, also equations can be checked

And those naturally also get specific and personal feedback

In this way Step-Wise becomes a platform that

- encourages interaction between students instead of stifling it
- can intuitively register solutions to countless types of questions
- gives proper personal feedback for all possible solution inputs