



INTERACTIVE TOOLS FOR ENGINEERING EDUCATION

Pieter Roos, TELT-talk, 16 January 2025



INTERACTIVE TOOLS FOR ENGINEERING EDUCATION

GRASPLE WORKS FOR MATH,
BUT WHAT ABOUT ENGINEERING?

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HOW FAR SHOULD WE GO
TO HELP OUR STUDENTS?

INTERACTIVE TOOLS FOR
ENGINEERING EDUCATION

GRASPLE WORKS FOR MATH,
BUT WHAT ABOUT ENGINEERING?

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**MATH VS
ENGINEERING**



**WHAT IS
GRASPLE?**



**PILOT STUDY:
FLUID MECHANICS**



**DISCUSSION:
YOUR OPINION?**





MATH VS ENGINEERING





MATH VS ENGINEERING

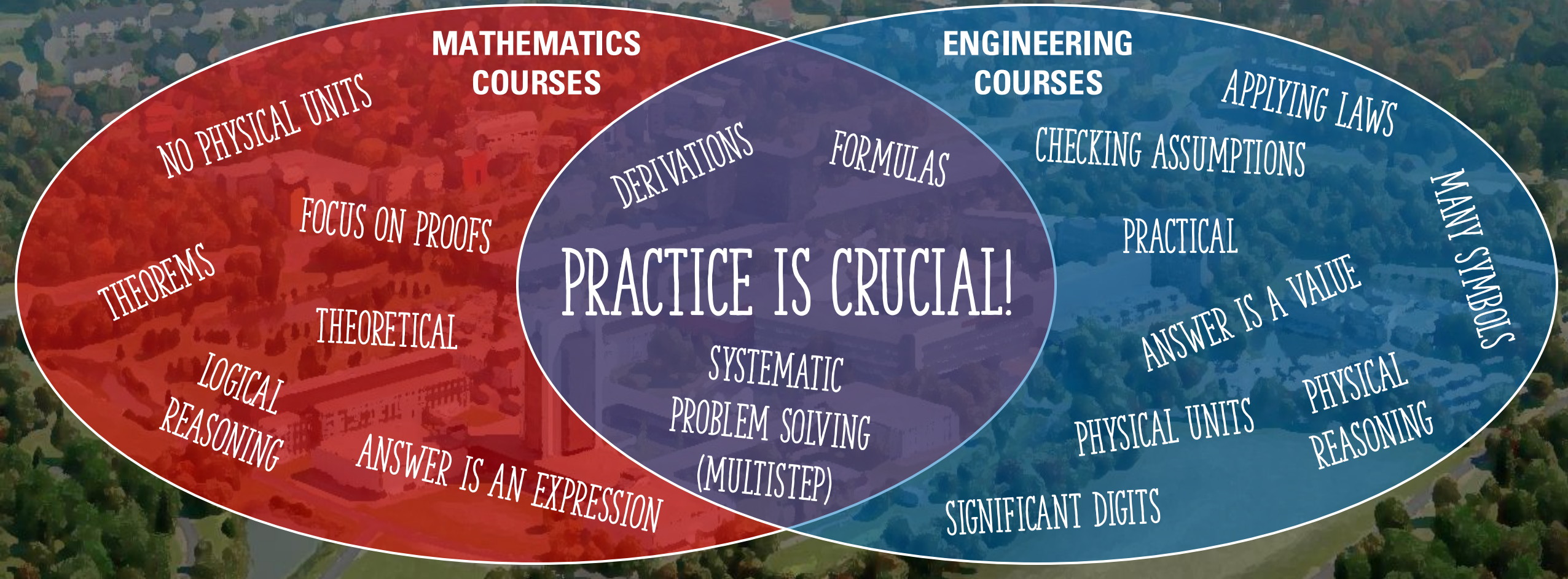
**MATHEMATICS
COURSES**

**ENGINEERING
COURSES**





MATH VS ENGINEERING





WHAT IS GRASPLE?

GRASPLE

- Interactive online practice platform
- For mathematics and statistics
- UT is client
- Formative and summative testing
- Sharing exercises among teachers
- Strong point: symbolic algebra

The screenshot shows the Grasple website homepage. At the top, there's a navigation bar with links: OPEN RESOURCES, LEARNING PLATFORM, COMMUNITY, ABOUT US, and buttons for CREATE TEACHER ACCOUNT and LOG IN. The main header has the Grasple logo and the text "Open interactive math & statistic exercises". Below this, a paragraph states: "Grasple is an online platform that enables teachers in Higher Education to find and create openly licensed exercises and easily share them with colleagues and students." There are two buttons: "Learn More" and "Book Live Demo". A laptop image displays a sample exercise interface. Below the main content, it says "Trusted by 40+ institutions worldwide" and lists logos for IT UNIVERSITY OF COPENHAGEN, Hogeschool van Amsterdam, UNIVERSITY OF TWENTE, UACM (Universidad Autónoma de la Ciudad de México), and NHTV. A quote from a user is displayed: "For me, this is the killer feature: Grasple offers an uniquely well-thought infrastructure to content development, curation, and distribution. Content is the hard part of teaching, and only Grasple". A "Book Live Demo" button is at the bottom right.





WHAT IS GRASPLE?

Example: The four expressions

$$V = \sqrt{2g(z_2 - z_1)}$$

$$V = \sqrt{2gz_2 - 2gz_1}$$

$$V = \sqrt{2(gz_2 - gz_1)}$$

$$V = (2g(z_2 - z_1))^{1/2}$$

are all **mathematically equivalent**,
but they differ in syntax.

Grasple's **Computer Algebra System**
automatically detects this equivalence,
which aids the digital assessment of
student's answers.

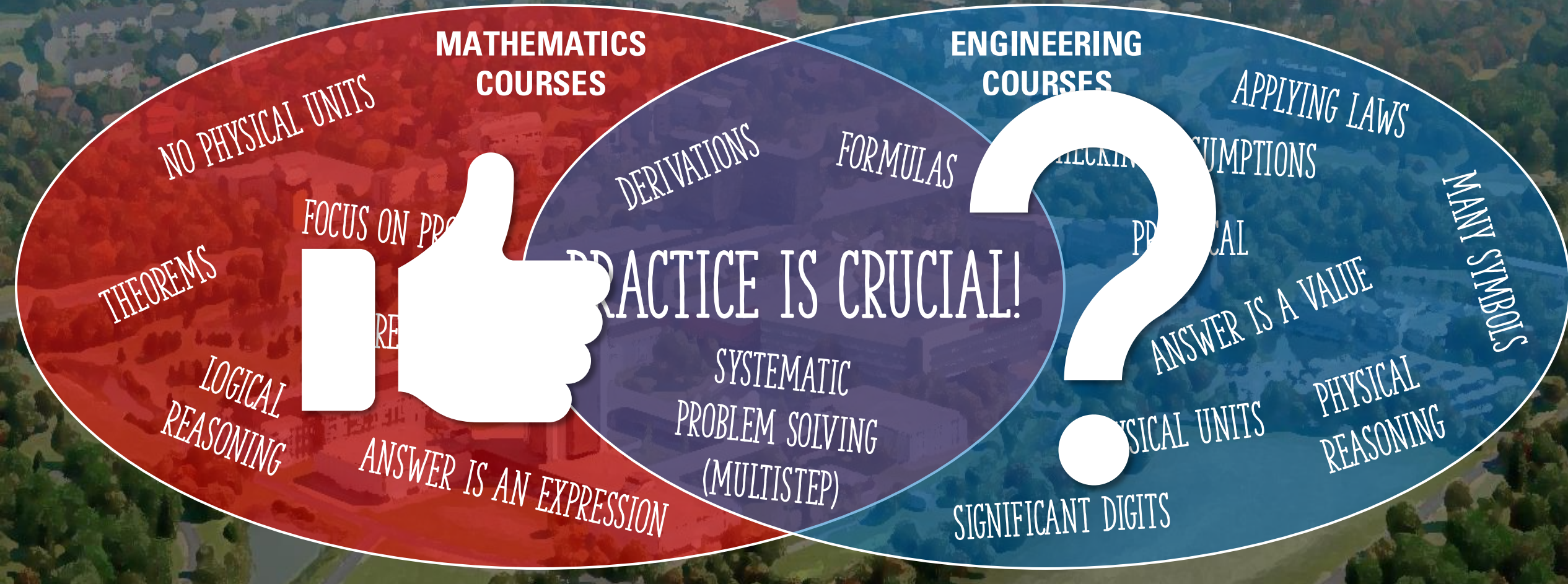
GRASPLE

- Interactive online practice platform
- For mathematics and statistics
- UT is client
- Formative and summative testing
- Sharing exercises among teachers
- Strong point: **symbolic algebra**
- Another strong point: **conditional logic**
- Question: "Grasple works for **math**,
but what about **engineering**?"





WHAT IS GRASPLE?

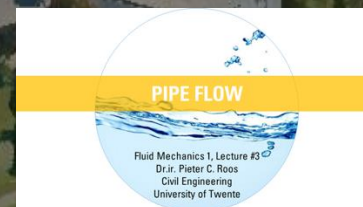
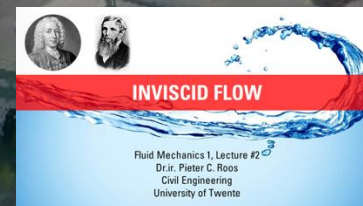
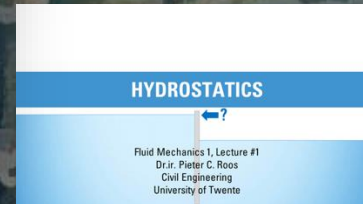
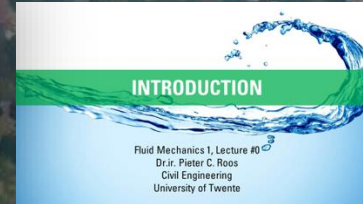




PILOT STUDY: FLUID MECHANICS

Goal:
to explore how
Grasple can support
self-study in Fluid
Mechanics 1

<< N.B.: not intended to replace tutorials! >>



FLUID MECHANICS 1

1st year BSc Civil Engineering

Number of students: ~100

Study load: 2 EC

4x Lecture, 3x Tutorial

- General Principles
- Hydrostatics
- Inviscid Flow
- Pipe Flow

Assessment: written exam





PILOT STUDY: FLUID MECHANICS

1

Literature
review

2

Teaching FM1
in 2022/23

3

Interviewing
FM-teachers

4

Exploring
Grasple

5

Panel meeting
with students

6

Develop and
test new tool

7

Teaching FM1
in 2023/24



8

Evaluation of
new tool





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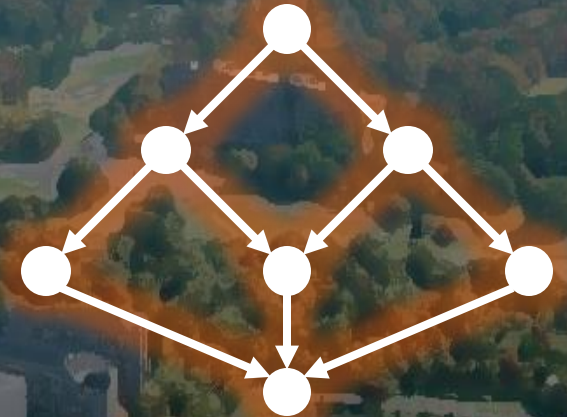




PILOT STUDY: FLUID MECHANICS

Main challenges:

- Resemble self-study setting that students would have without a computer
- Stimulate 'good behaviour'
- Systematic problem-solving
- Allow for multiple solution paths (conditional logic)
- Do not give away answers!
- Avoid visual confusion



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Flow through pipe with nozzle

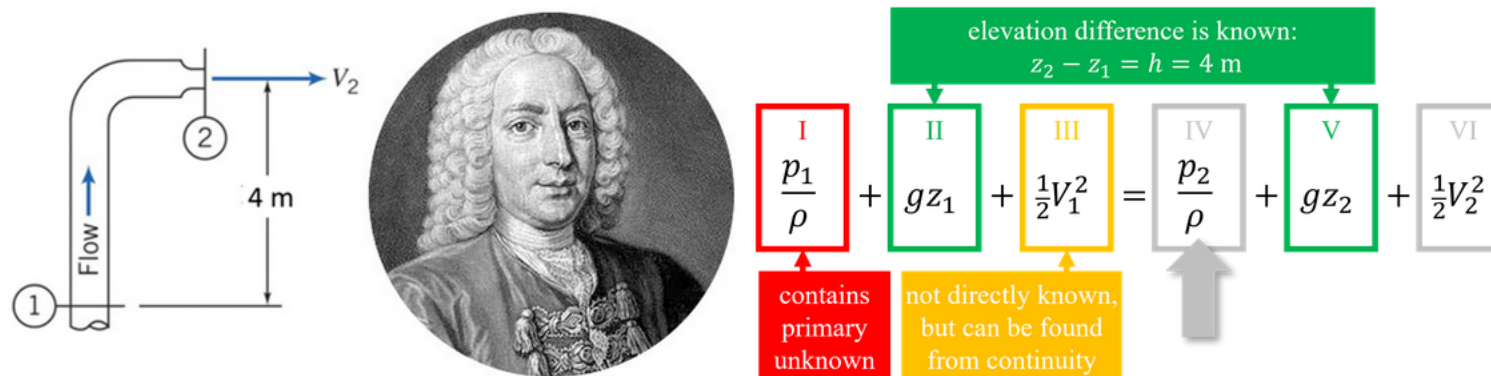
3 / 6

edit Report mistake

You are done with this question. A follow-up question is shown below.

QUESTION #87353 | ATTEMPTS USED: 0 OUT OF 2

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



Step 3.5: Let us now turn to Term IV in the *Bernoulli equation* above.

In one word, what can you say about the pressure p_2 in term IV?

atmospheric

Check my answer



Search



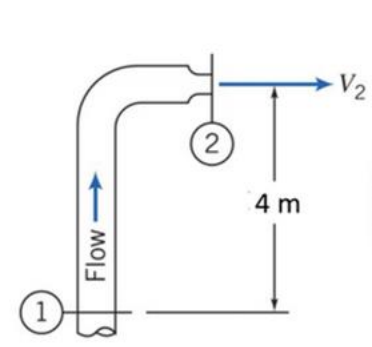
Flow through pipe with nozzle

3 / 6

edit Report mistake

QUESTION #87354 | ATTEMPTS USED: 0 OUT OF 2

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elevation difference is known:
 $z_2 - z_1 = h = 4 \text{ m}$

$$\frac{p_1}{\rho} + gz_1 + \frac{1}{2}V_1^2 = \frac{p_2}{\rho} + gz_2 + \frac{1}{2}V_2^2$$

I: contains primary unknown
 II: not directly known, but can be found from continuity
 III: not directly known, but can be found from continuity
 IV: nozzle open to atmosphere, so $p_2 = p_{atm}$
 V:
 VI:

Step 3.6: Finally, we analyse term VI in the *Bernoulli equation* above.

What can you say about the quantity V_2 in term VI?

- Directly given in problem description
- Not directly known, but can be obtained from physical principle
- Fully unknown



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in 2023/24



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Evaluation of
new tool



26 verzonden antwoorden

What is your opinion on the learning effect of GraspLe in Fluid Mechanics 1?

strongly disagree disagree neutral agree strongly agree

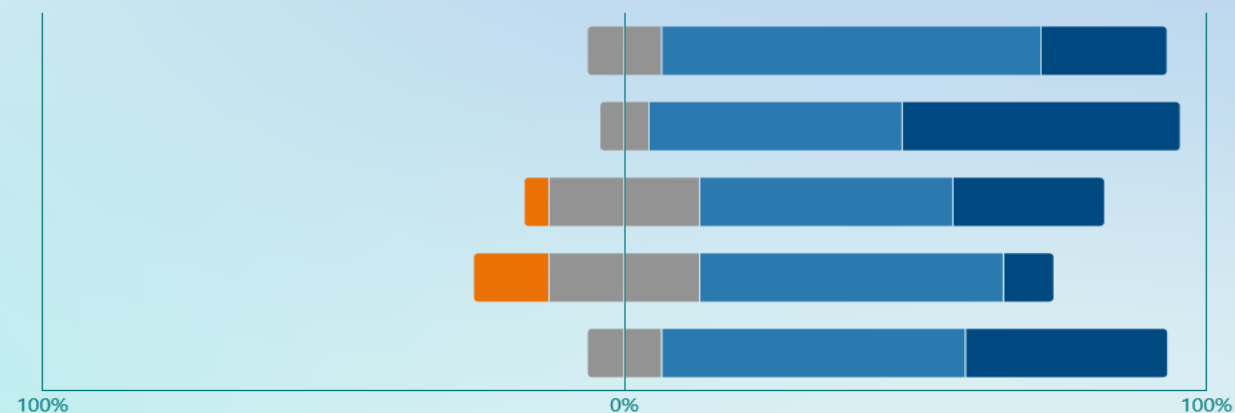
It supported my general understanding of the theory.

It helped me understand the steps to solve a Fluid Mechanics problem.

It sharpened my problem-solving skills.

It motivated me to spend time on self-study.

It helped me prepare for the exam.





PILOT STUDY: FLUID MECHANICS

Main conclusions:

- Promising tool
- Students satisfied
- Multistep solutions
- Multiple solution paths
- Grasple needs further modification (physical units, significant digits, ...)
- Time-consuming
- (Un)desired side effects...?

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DISCUSSION: YOUR OPINION?

Main conclusions:

- Promising tool
- Students satisfied
- Multistep solutions
- Multiple solution paths
- Grasple needs further modification (physical units, significant digits, ...)
- Time-consuming
- (Un)desired side effects...?



**IF FM1 WERE
CYCLING,
THEN USING
GRASPLE IS....**





IF FM1 WERE BOWLING, THEN USING GRASPLE IS...

Thanks to Cas Jansen, Jolanda van de Kooij, Sofie Bastiaansen, Robin van Emmerloot, Cornélise Vreman-de Olde, Cindy Poortman, Kirsten Stadermann, UT's Fluid Mechanics teachers, FM1-students and TAs.



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Appendix A

Example of FM1-exercise in Grasple

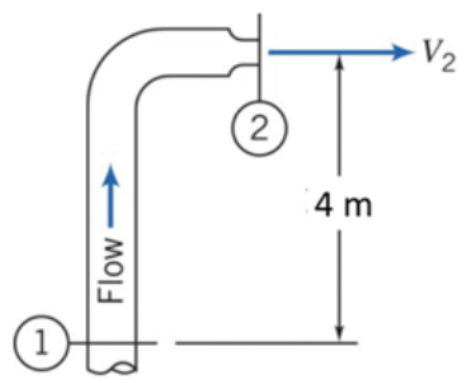
Flow through pipe with nozzle

1 / 6

edit Report mistake

QUESTION #77141 | ATTEMPTS USED: 0 OUT OF 2

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



Step 1: Let us first characterize the above problem within the context of FM1.

What type of problem is this?

- Hydrostatics
- Inviscid flow (open channel)
- Pipe flow (with losses)
- Inviscid flow (pipe)

Flow through pipe with nozzle

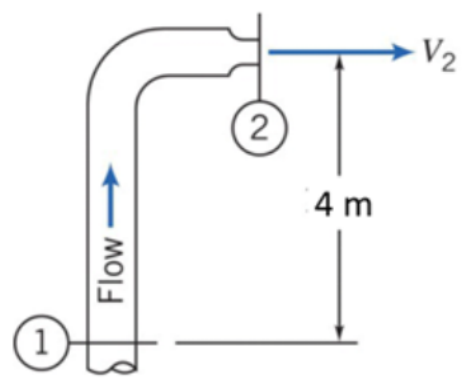
2 / 6

edit Report mistake

Skip Exercise

QUESTION #87313 | ATTEMPTS USED: 0 OUT OF 2

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



Step 2.1: We must now identify the overall law or principle.

Which law/principle would you apply here?

Bernoulli's law

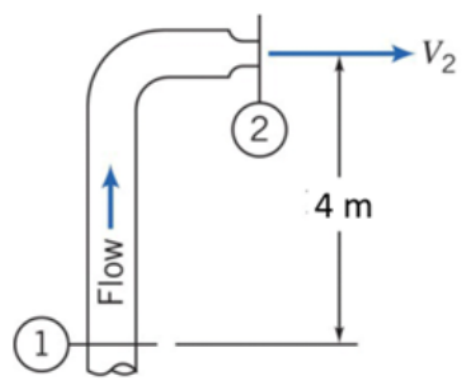
Check my answer

Flow through pipe with nozzle

2 / 6

edit Report mistake

velocity at the nozzle exit (section 2) of 20 m/s.



Step 2.2: Let us verify whether the conditions for application of the *Bernoulli equation* are indeed satisfied.

What are these conditions?

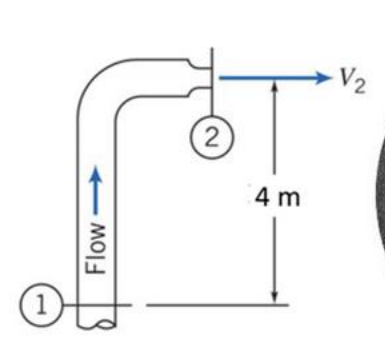
- | | | |
|----------------------------------|--------------------------------|------------------------------|
| Inviscid+Unsteady+Incompressible | Inviscid+Steady+Incompressible | Viscous+Steady+Compressible |
| Viscous+Unsteady+Incompressible | Inviscid+Unsteady+Compressible | Inviscid+Steady+Compressible |
| Viscous+Unsteady+Compressible | Viscous+Steady+Incompressible | |

Flow through pipe with nozzle

3 / 6

edit Report mistake

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



$$\boxed{\text{I} \quad \frac{p_1}{\rho}} + \boxed{\text{II} \quad gz_1} + \boxed{\text{III} \quad \frac{1}{2}V_1^2} = \boxed{\text{IV} \quad \frac{p_2}{\rho}} + \boxed{\text{V} \quad gz_2} + \boxed{\text{VI} \quad \frac{1}{2}V_2^2}$$

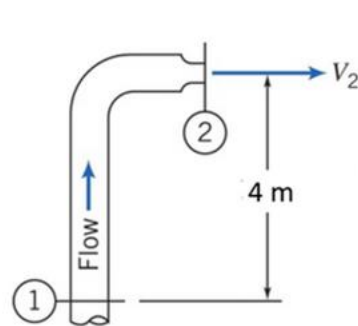
Step 3.1: Let us now analyse the *Bernoulli equation* for the flow along a streamline between section 1 and section 2. See above, where we have identified six terms I, II, III, IV, V and VI.
N.B.: you must know this equation by heart!

Which of the six terms contains the primary unknown of this problem?

- Term I
- Term II
- Term III
- Term IV
- Term V
- Term VI

QUESTION #87350 | ATTEMPTS USED: 0 OUT OF 2

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



$$\boxed{\text{I} \quad \frac{p_1}{\rho}} + \boxed{\text{II} \quad gz_1} + \boxed{\text{III} \quad \frac{1}{2}V_1^2} = \boxed{\text{IV} \quad \frac{p_2}{\rho}} + \boxed{\text{V} \quad gz_2} + \boxed{\text{VI} \quad \frac{1}{2}V_2^2}$$

contains primary unknown

Step 3.2: Let us now move to the second term in the *Bernoulli equation* above.

What can you say about Term II?

Fully unknown

Fully known from problem description

Unknown, but difference between II and V is known

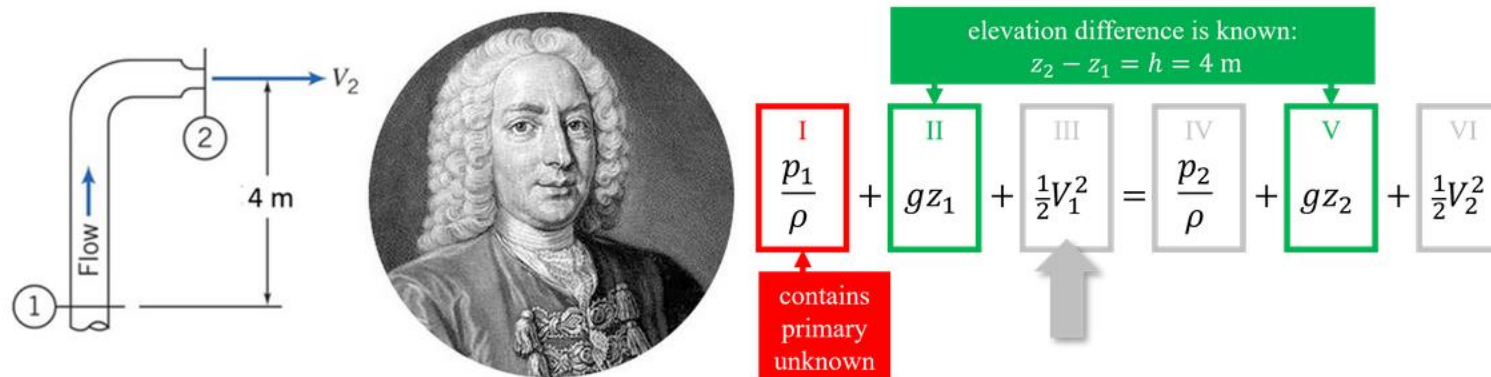
Flow through pipe with nozzle

3 / 6

edit

Report mistake

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



Step 3.3: The next step is to analyse Term III in the *Bernoulli equation* above.

What is the most accurate statement about Term III?

Fully unknown

Not directly known, but can be readily obtained from another physical principle

Directly given in problem description



Search



16:32
20-2-2024

Flow through pipe with nozzle

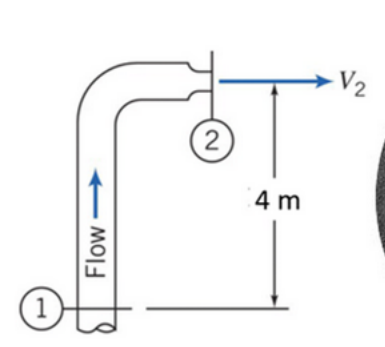
3 / 6

edit Report mistake

You are done with this question. A follow-up question is shown below.

QUESTION #87352 | ATTEMPTS USED: 0 OUT OF 10

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



elevation difference is known:
 $z_2 - z_1 = h = 4 \text{ m}$

I	II	III	IV	V	VI					
$\frac{p_1}{\rho}$	$+$	gz_1	$+$	$\frac{1}{2}V_1^2$	$=$	$\frac{p_2}{\rho}$	$+$	gz_2	$+$	$\frac{1}{2}V_2^2$
contains primary unknown		not directly known, but can be found from ...								

Step 3.4: Indeed, term III can be obtained by applying a physical principle. What is the name of that physical principle?

continuity


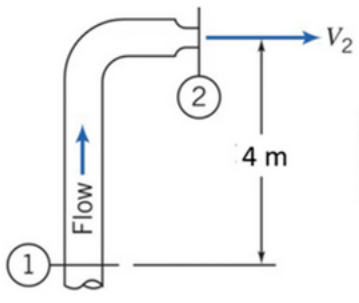
Check my answer

Flow through pipe with nozzle 3 / 6 edit Report mistake

You are done with this question. A follow-up question is shown below.

QUESTION #87353 | ATTEMPTS USED: 0 OUT OF 2

Problem description: Water flows steadily through the vertical 0.10 m diameter pipe and out the 0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



elevation difference is known:
 $z_2 - z_1 = h = 4 \text{ m}$

I	II	III	IV	V	VI					
$\frac{p_1}{\rho}$	$+$	gz_1	$+$	$\frac{1}{2}V_1^2$	$=$	$\frac{p_2}{\rho}$	$+$	gz_2	$+$	$\frac{1}{2}V_2^2$
contains primary unknown		not directly known, but can be found from continuity								

Step 3.5: Let us now turn to Term IV in the *Bernoulli equation* above.

In one word, what can you say about the pressure p_2 in term IV?

atmospheric

Check my answer

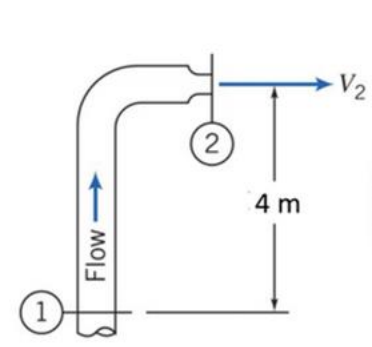
Flow through pipe with nozzle

3 / 6

edit Report mistake

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 $z_2 - z_1 = h = 4 \text{ m}$

I $\frac{p_1}{\rho}$	+	II gz_1	+	III $\frac{1}{2}V_1^2$	=	IV $\frac{p_2}{\rho}$	+	V gz_2	+	VI $\frac{1}{2}V_2^2$
contains primary unknown				not directly known, but can be found from continuity		nozzle open to atmosphere, so $p_2 = p_{atm}$				

Step 3.6: Finally, we analyse term VI in the *Bernoulli equation* above.

What can you say about the quantity V_2 in term VI?

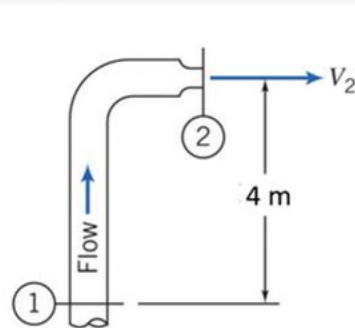
- Directly given in problem description
- Not directly known, but can be obtained from physical principle
- Fully unknown

Flow through pipe with nozzle

4 / 6

edit

Report mistake



elevation difference is known:
 $z_2 - z_1 = h = 4 \text{ m}$

I $\frac{p_1}{\rho}$	+	II gz_1	+	III $\frac{1}{2}V_1^2$	=	IV $\frac{p_2}{\rho}$	+	V gz_2	+	VI $\frac{1}{2}V_2^2$
contains primary unknown		not directly known, but can be found from continuity				nozzle open to atmosphere, so $p_2 = p_{atm}$				outflow speed is known: $V_2 = 20 \text{ m/s}$

Step 4.1: Let us now return to term III, and obtain it using the principle of *continuity*. To this end, we will first derive an expression for the *flow velocity* at section 1: $V_1 = \dots$

We let D_1 denote the pipe diameter (e.g., at section 1) and D_2 the nozzle diameter (at section 2).

Complete the above equation by providing an expression for V_1 .

[N.B.: do this in terms of D_1 and D_2 ; do not insert numerical values.]

Check my answer



Search



4 / 6

Report mistake



The diagram shows the Bernoulli equation for a nozzle where the elevation difference is known. The equation is presented as a sum of terms for point I (inlet) and point II (outlet):

$$\frac{p_1}{\rho} + gz_1 + \frac{1}{2}V_1^2 = \frac{p_2}{\rho} + gz_2 + \frac{1}{2}V_2^2$$

The terms are categorized as follows:

- I** (Inlet): $\frac{p_1}{\rho}$ is labeled "contains primary unknown" (red box).
- II** (Inlet): gz_1 is labeled "not directly known, but can be found from continuity" (yellow box).
- III** (Inlet): $\frac{1}{2}V_1^2$ is labeled "nozzle open to atmosphere, so $p_2 = p_{atm}$ " (green box).
- IV** (Outlet): $\frac{p_2}{\rho}$ is labeled "outflow speed is known: $V_2 = 20 \text{ m/s}$ " (green box).
- V** (Outlet): gz_2 is labeled "outflow speed is known: $V_2 = 20 \text{ m/s}$ " (green box).
- VI** (Outlet): $\frac{1}{2}V_2^2$ is labeled "outflow speed is known: $V_2 = 20 \text{ m/s}$ " (green box).

A green box at the top indicates the elevation difference is known: $z_2 - z_1 = h = 4 \text{ m}$. Arrows point from this box to the gz_1 and gz_2 terms.

Step 4.2: The result you just obtained can also be written as $V_1 = C^2 V_2$,

where for convenience we have introduced the *diameter ratio* $C = D_2/D_1$.

In terms of V_2 and this diameter ratio C , let us now rewrite term III.

What is the correct expression for term III?

$\alpha\beta\infty$ ▼
 $\sin \cos$ ▼
 $\int \Sigma \Pi$ ▼
 $! \binom{n}{k} \ln$ ▼
 $\overline{\square} x_{\square}$ ▼
 $\{ \} , []$ ▼
 $= \neq \leq$ ▼
 $\neg \forall$ ▼
 $\begin{pmatrix} \square & \square \\ \square & \square \end{pmatrix}$ ▼

[Check my answer](#)

5 / 6

Report mistake



$$\underbrace{\frac{p_1}{\rho}}_{\text{contains primary unknown}} + gz_1 + \underbrace{\frac{1}{2}V_1^2}_{\text{equal to } \frac{1}{2}C^4V_2^2 \text{ with } C = D_2/D_1} = \underbrace{\frac{p_2}{\rho}}_{\text{nozzle open to atmosphere, so } p_2 = p_{atm}} + gz_2 + \underbrace{\frac{1}{2}V_2^2}_{\text{outflow speed is known: } V_2 = 20 \text{ m/s}}$$

Step 5.1: After having completed the analysis of all six terms in the *Bernoulli equation*, we must combine all information gathered. This leads to

$$\frac{p_1}{\rho} + \frac{1}{2}C^4V_2^2 = \frac{p_{atm}}{\rho} + gh + \frac{1}{2}V_2^2.$$

This last result can be rearranged to find an expression for the pressure at section 1: $p_1 = \dots$

Complete the expression above.

[N.B.: do not insert values and keep the diameter ratio C and height h .]

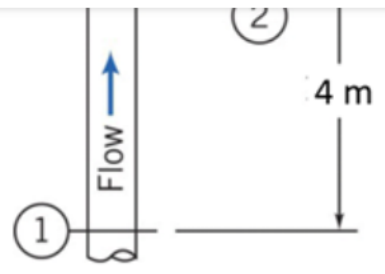
[Check my answer](#)

$\alpha\beta\infty$ ▼
 $\sin\cos$ ▼
 $\int\Sigma\Pi$ ▼
 $!{n\choose k}\ln$ ▼
 $\overline{\square}x_{\square}$ ▼
 $\{\},(,)$ ▼
 $=\neq\leq$ ▼
 $\neg\vee$ ▼
 $\left(\begin{smallmatrix}\square&\square\\\square&\square\end{smallmatrix}\right)$ ▼

Flow through pipe with nozzle

5 / 6

edit Report mistake



Step 5.2: We may thus write $p_1 = p_{atm} + \rho gh + \frac{1}{2} \rho (1 - C^4) V_2^2$,

in which all parameters on the right-hand side are known.

However, since the **gage pressure** at section 1 is requested, we must rearrange the above result into $p_{1,gage} = \dots$

Complete the expression for the gage pressure.

[N.B.: do not insert values and keep the diameter ratio C and height h .]

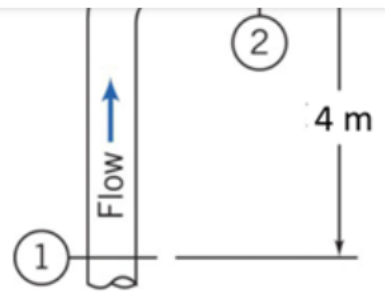
$\frac{\square}{\square}$ \times \square^\square $\sqrt{\square}$ $\sqrt[\square]{\square}$ π e^\square \pm

$\alpha\beta\infty$ $\sin \cos$ $\int \sum \prod$ $!\left(\frac{n}{k}\right) \ln$ $\square x_\square$ $\{ \} , ()$ $= \neq \leq$ $\neg \forall$ $\left(\frac{\square}{\square} \frac{\square}{\square} \right)$

Check my answer

Flow through pipe with nozzle

6 / 6



Step 6.1: We have obtained $p_{1,gage} = \rho gh + \frac{1}{2} \rho (1 - C^4) V_2^2$

with $C = D_2/D_1$ such that all parameter values on the right-hand side are known.

The last step is to provide the correct answer, in which three aspects are important:

- correct value
- appropriate number of significant digits
- appropriate physical units.

What are the correct **number of digits** and the correct **physical units**?

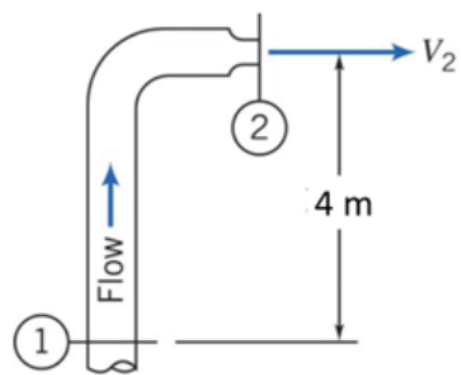
2 digits, N	3 digits, N/m	3 digits, N/m ²	1 digit, N	3 digits, N	1 digit, N/m ²	2 digits, N/m
2 digits, N/m ²	1 digit, N/m					

Flow through pipe with nozzle

6 / 6

edit Report mistake

0.050 m in diameter nozzle to the atmosphere. See figure below, showing a side view with gravity pointing downward. Determine the minimum gage pressure required at section 1 to produce a velocity at the nozzle exit (section 2) of 20 m/s.



Step 6.2: We have obtained $p_{1,gage} = \rho gh + \frac{1}{2} \rho (1 - C^4) V_2^2$, and know that we must provide the answer in N/m² with one significant digit.

Finally, calculate the numerical value of the gage pressure
[N.B.: value only, no physical units]

Check my answer

Grasple

https://app.grasple.com/#/courses/9492/ci/640767/subjects/14184/exercises/87359?hash=22

80%

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Flow through pipe with nozzle

6 / 6

edit Report mistake

Step 6.2: We have obtained $p_{1,gage} = \rho gh + \frac{1}{2} \rho (1 - C^4) V_2^2$, and know that we must provide the answer in N/m² with one significant digit.

Finally, calculate the numerical value of the gage pressure
[N.B.: value only, no physical units]

Your answer: 227000

Yeah! That's right. The correct answer is 226740

And, using one significant digit and the correct physical units, this should be finally written as: $p_{1,gage} = 2 \times 10^5$ Pa.

This completes the exercise, which we have solved in six steps:

1. Note that this is an **inviscid pipe flow** problem.
2. Identify **Bernoulli's law** as the governing principle, and verify that it is indeed applicable.
3. **Analyse all terms** in the Bernoulli equation, when applied to a streamline between section 1 (pipe) and section 2 (nozzle).
4. Specifically, apply **continuity** to express the velocity in at section 1 in terms of that in the nozzle and the diameter ratio.
5. **Rearrange** the terms in the Bernoulli equation to obtain an expression for the **gage pressure** at section 1.
6. Substitute values to compute the value of the gage pressure at section 1.

i You have completed the whole exercise.

16:49 20-2-2024

Appendix B

Results from evaluation among FM1-students

Microsoft Forms

Microsoft Forms

https://forms.office.com/Pages/DesignPageV2.aspx?prevorigin=Marketing&origin=NeoPortalPage&subpage=design&id=oUYycvXDxUOs3EOttASsTYeV8Yi_HQZOgVpINM3cXm1UQjNIR0x

Presenteren

26 verzonden antwoorden

Did you use GraspLe in Fluid Mechanics 1?

92%
Yes

8%
..

Treemap

Bar

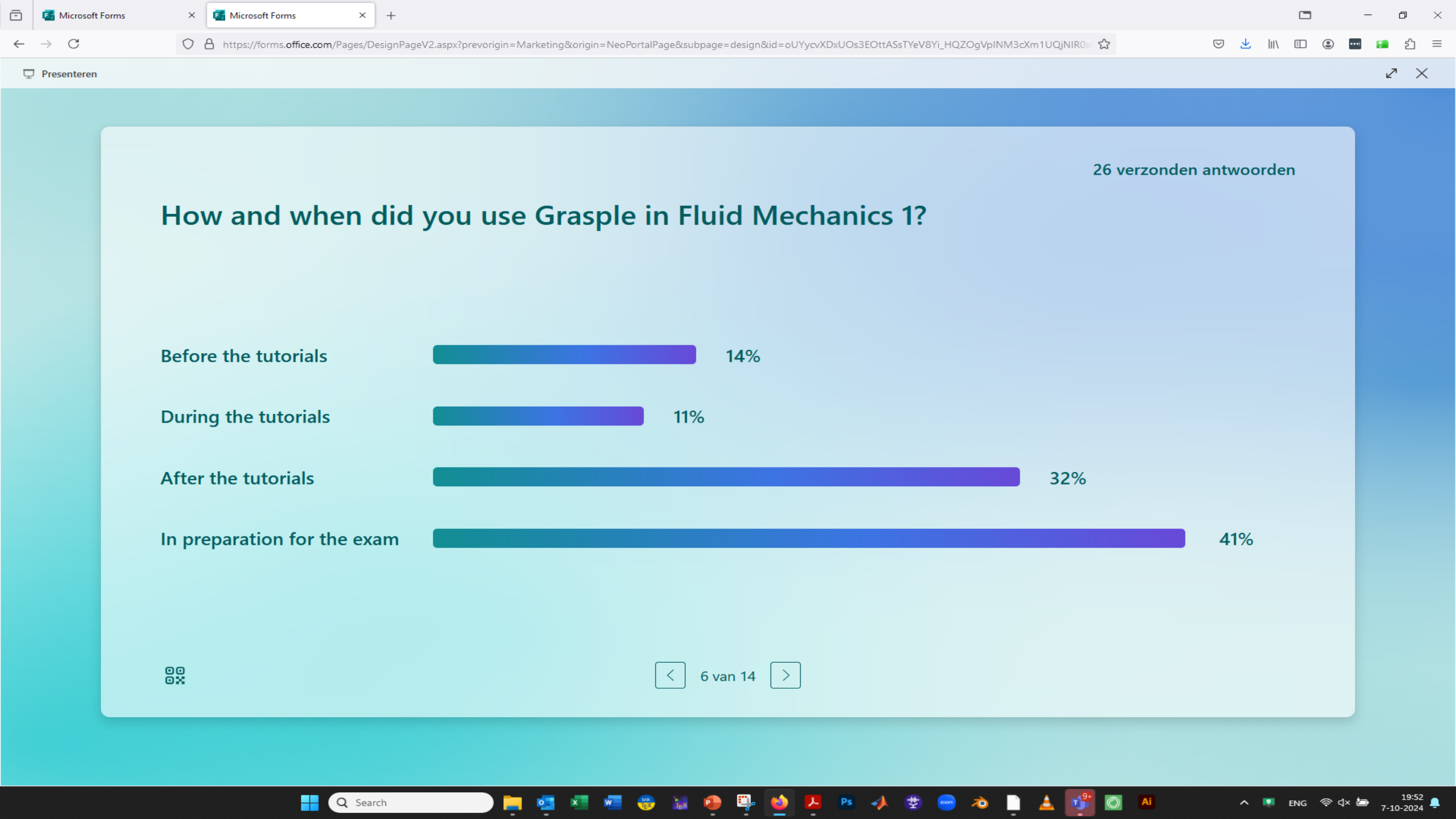
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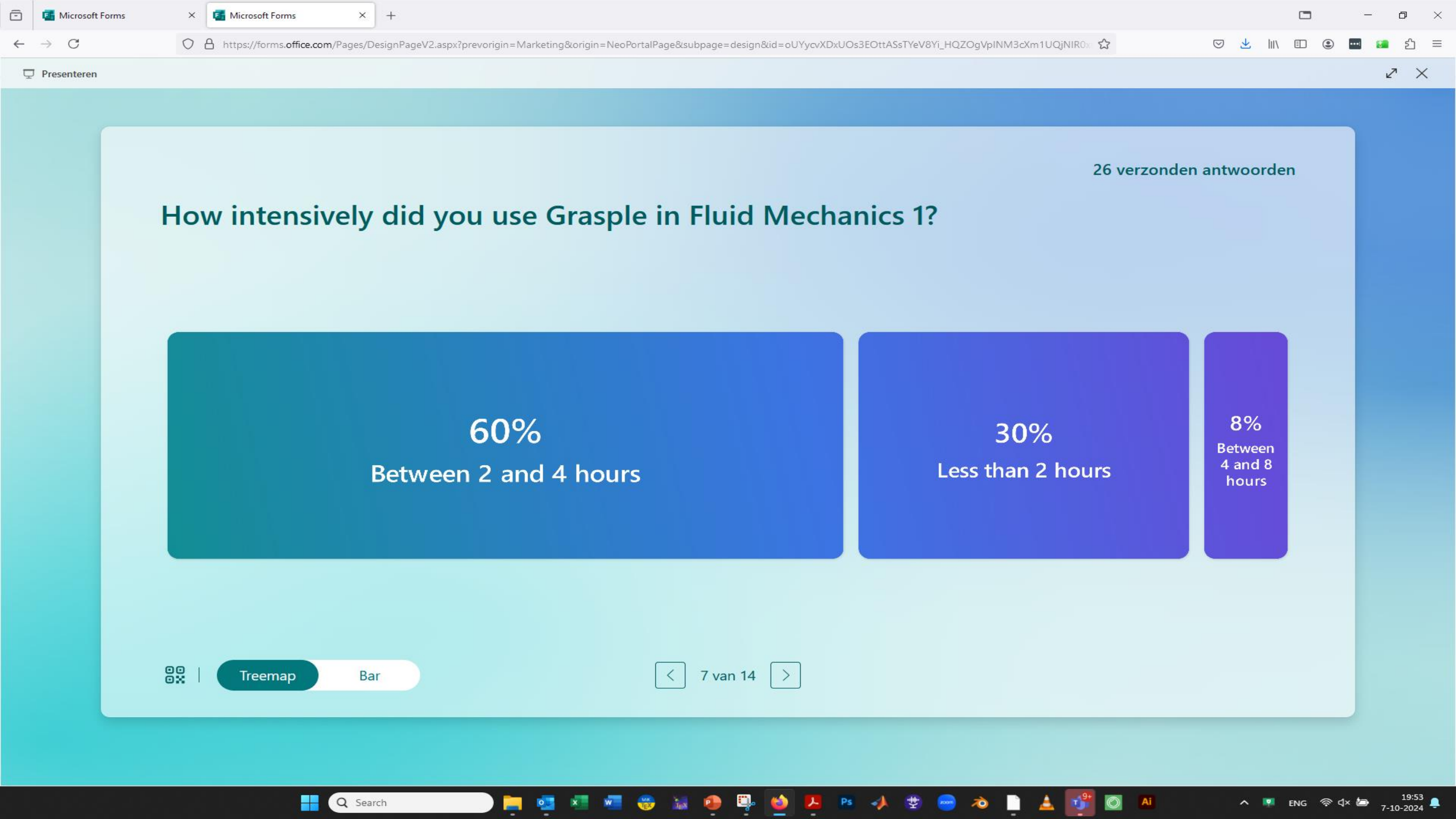
4 van 14

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Search

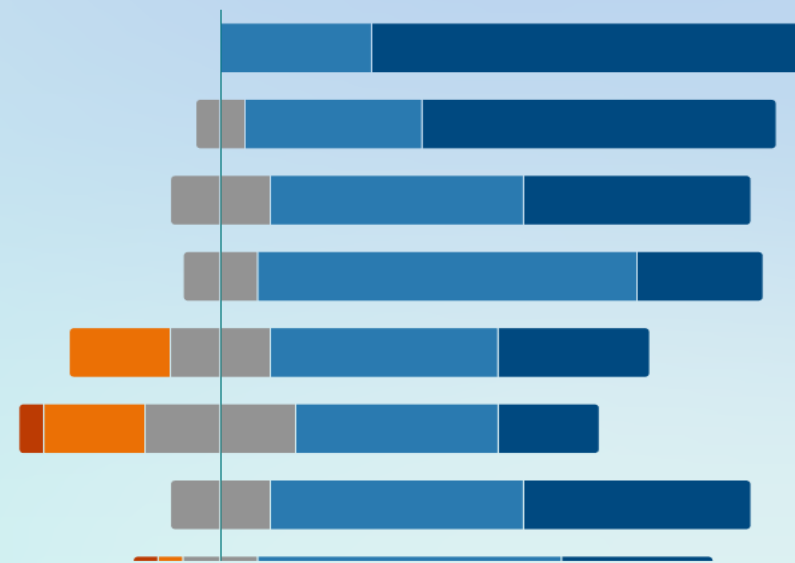
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7-10-2024

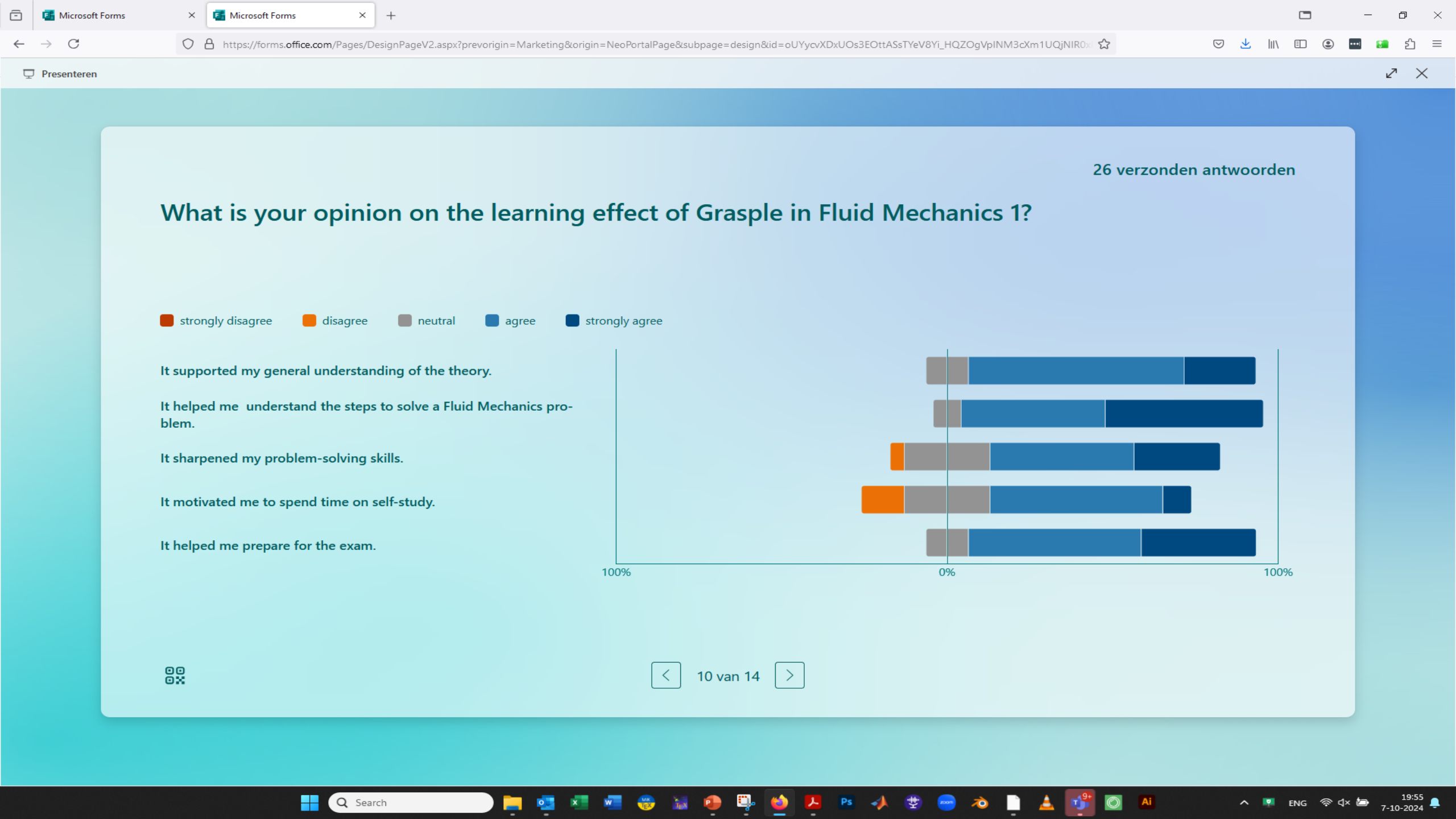




How did you experience working with GraspLe in Fluid Mechanics 1?

The visual support (including colors, images, equations) within the exercises is clear.





Microsoft Forms

Microsoft Forms

https://forms.office.com/Pages/DesignPageV2.aspx?prevorigin=Marketing&origin=NeoPortalPage&subpage=design&id=oUYycvXDxUOs3EOttASsTYeV8Yi_HQZOgVpINM3cXm1UQjNIR0x

Presenteren

26 verzonden antwoorden

How do you evaluate this GraspLe pilot in Fluid Mechanics 1?

strongly disagree

disagree

neutral

agree

strongly agree

I recommend using GraspLe in FM1 to my fellow students.

I think GraspLe can be useful for other courses too (other than FM1 and mathematics)

I support the idea of GraspLe in FM1 (online, interactive tool to practise exercises).

In the future, GraspLe could replace the FM1-tutorials.

To be really suitable for FM1, improvements in GraspLe are necessary.

100%

0%

100%

11 van 14

19:58

7-10-2024

Microsoft Forms

Microsoft Forms

https://forms.office.com/Pages/DesignPageV2.aspx?prevorigin=Marketing&origin=NeoPortalPage&subpage=design&id=oUYycvXDxUOs3EOttASsTYeV8Yi_HQZOgVpINM3cXm1UQjNIR0x

Presenteren

26 verzonden antwoorden

What is, in your opinion, the best aspect of GraspLe in Fluid Mechanics 1?

steps with there explanation

step breakdown

step process

order of the steps

step nature

step basis

clear

exercises

problems

step by step

question

answers

FM exercises

easy to access

step procedure

som exercises

type of problem

step overview

different steps

solution of a problem

Wordcloud

Alle antwoorden

< 12 van 14 >

Search

19:59 7-10-2024

Microsoft Forms

Microsoft Forms

https://forms.office.com/Pages/DesignPageV2.aspx?prevorigin=Marketing&origin=NeoPortalPage&subpage=design&id=oUYycvXDxUOs3EOttASsTYeV8Yi_HQZOgVpINM3cXm1UQjNIR0x

Presenteren

26 verzonden antwoorden

What should, in your opinion, be improved regarding GraspLe in Fluid Mechanics 1?

answers

additional exercises

actual answer

exercises

answers are helpful

multiple times

correct answer

wrong attempts

intermediate answers

answers to the questions

way

GraspLe

final answers

wrong GraspLe

exercises similar

answer and an explanation

wrong answer

needed

right answer

answer of the problem

Wordcloud

Alle antwoorden

< 13 van 14 >

Search

19:59 7-10-2024