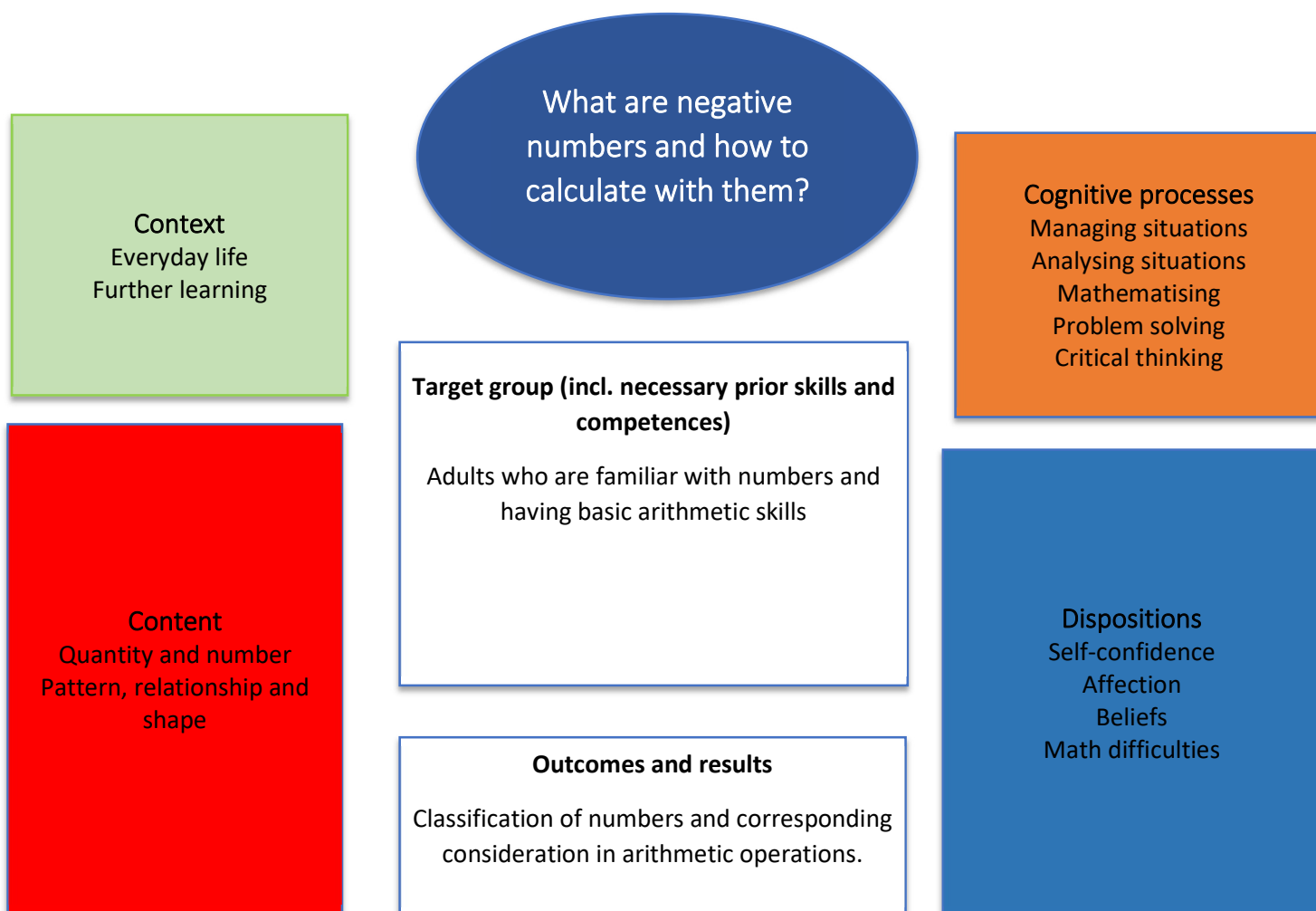


FOCUS ON NEGATIVE NUMBERS

Numbers and figures are with us throughout our everyday lives. We use numbers every day from morning till night: We look at the clock and read numbers, we rush to the bus line and search for the right number of the bus. And when we are in a hotel, we have to find the number of our room on the right floor.

But we also often have to deal with "negative numbers" without paying much attention to them. Sometimes we even have to calculate with numbers, including negative numbers. What actually are negative numbers? Where do we encounter these and how can we calculate with them?

Overview "FOCUS ON NEGATIVE NUMBERS"



Main information	
Content	Natural numbers, negative numbers Basic arithmetic operations (addition, subtraction) Recognize and classify negative numbers
Target group	(Young) adults, learners who are able to count, solve simple basic calculations and classify the results.
Learning intention	What is the intention of adults to face this problem? <ul style="list-style-type: none"> – Numeracy for personal and private purposes – Numeracy for professional issues – Numeracy to understand society
Duration	Approx.2- 3 lessons
Material and resources	Paper, flipchart, tape measure
Group size	Range from 5 to 10 learners
Problem statement	Negative numbers are everywhere – when we enter the elevator, when watch the weather report and maybe also when we have a look at our bank account ... Calculating with negative numbers sometimes is a big challenge.
Working questions	Where can we find negative numbers in everyday life? How can we enter find and enter negative numbers in a number line? How can we calculate with negative numbers?
Learning outcomes and results	The learners understand the concept of negative numbers
Reference to National Qualification Frame	Optional (country's decision)



Working plan

Time (minutes)	Description of content/activities	Material	Methodical and didactic information ¹
20'	<p>Activation</p> <p>The teacher writes an example of a negative number to the flipchart and asks the learners about the meaning of the minus sign in front of the number.</p> <p>The teacher shows some pictures to illustrate negative numbers and asks the learners where they have already discovered negative numbers.</p>	<p>Pictures (see Appendix 1)</p>	<p>Cognitive activation</p> <p>Questioning Discussion</p>
30'	<p>Activity</p> <p>The teacher illustrates that a weather thermometer can be compared to a number line. The teacher demonstrates a simple calculation: 3-6=-3</p> <p>The learners do some simple calculations themselves.</p>	<p>Worksheet (see Appendix 2)</p> <p>Worksheet (number lines)</p>	<p>Explicit teaching</p> <p>Hands on learning</p>
60'	<p>Activity</p> <p>The learners calculate some examples. The first example is illustrated by the teacher.</p> <p>For the next examples the learners work in small groups.</p> <p>The teacher assists the groups of learners individually.</p>	<p>Worksheet (see Appendix 3)</p>	<p>Explicit teaching</p> <p>Hands on learning</p> <p>Multiple exposures</p>
	<p>Transfer</p> <p>The learners are able to deal with negative numbers and can use this knowledge in everyday life (i.e., to keep an overview of their account balance).</p>		

¹ for description and explanation of kinds of tasks, HITS and other background information please consult the teacher's/user's guide



Suggestions for the teacher/user

The example presented here should be considered as exemplary and inspirational material presenting a guideline with a high range of possibilities of adapting those suggestions to a specific group of learners or an individual learner with his or her very personal requirements.

In concrete terms, the example “Focus on negative numbers” could be adapted these ways:

- Duration: Depending on the prior skills it might be necessary to introduce or clarify the vocabulary and specific expressions that we encounter when we deal with negative numbers (concerning account balances and finances, temperature changes...). The learners can make a mind map with verbs indicating negative numbers (reduce, take away, fall, go down, ...)
- Further or additional material: Additional material i.e., in the field of dept repayment can be offered to the learners.
- Level of difficulty: The level of difficulty in this example is very easy, it can be adapted according to the learners’ skills (calculations with decimal numbers, larger numbers ...).

Our educational activities aim at numeracy skills being not only memorized, but first of all being practiced and functionally used by the learners in daily life or/and vocational situations. It is therefore recommended to implement the idea of HITS² (higher impacts of teaching skills) as far and often as possible: ...

- ... work with concrete and authentic material that learners will recognize from everyday life situations.
- ... ask the learners questions and let them raise questions themselves. It can be crucial to discuss numeracy themes, contexts and numbers.
- ... think of possible ways of transfer: The learners understand that negative numbers are a part of their everyday lives. The acquired knowledge helps them to make informed decisions (i.e., when it comes to keep an overview of their incomes and expenses).

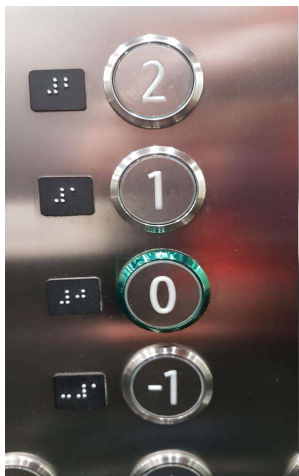
² For general information and explanation on HITS please see teacher’s/user’s guide



Appendix 1



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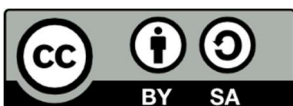


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www.gute-reise-tipps.de/totes-meer-hoehe/

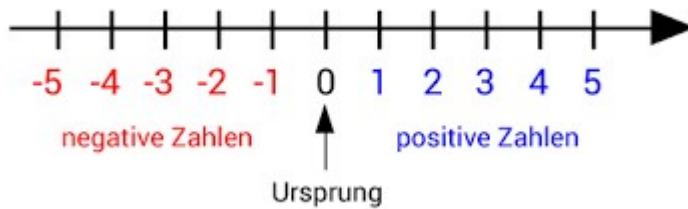
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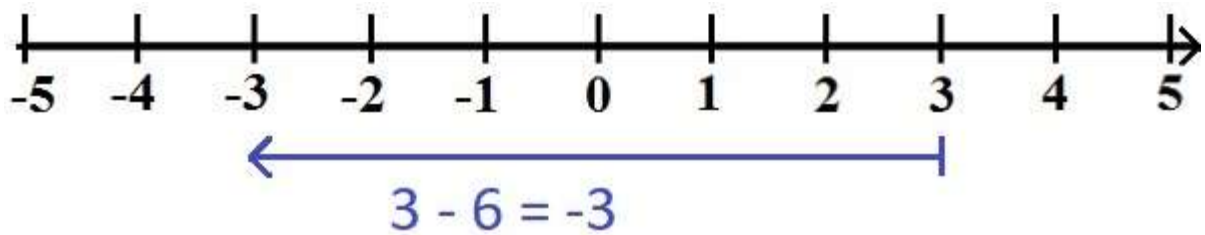
Appendix 2



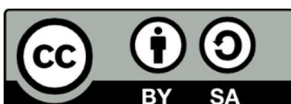
Foto: www.pixabay.com



Source: www.matheretter.de/wiki/negative-zahlen-geschichte; [02.03.024]



Source: www.gut-erklaert.de/mathematik/negative-zahlen.html [02.03.2024]



Appendix 3

Calculate with negative numbers.

1. It's $+4^{\circ}\text{C}$ in Linz today. The weather forecast announces that the temperature will drop by 6°C tomorrow. What will the temperature be tomorrow in Linz?
2. The temperature drops by a further 3°C . How cold will it be then?
3. On the mountain at 2,000 m above sea level, it is -10°C . In the valley at an altitude of 1,400 m it is -4°C . How big is the temperature difference?



Foto: www.pixabay.com

1. Simon takes the elevator from the ground floor to the 2nd floor. There he meets Armin. Armin asks Simon to get the bag from his car. The car is parked in the underground garage (-1). Simon gets Armin's bag and takes it to the 2nd floor. How many floors did Simon travel in the elevator?
2. The spa is located in the underground (-1). Armin takes the elevator from the spa to his room on the 7th floor. How many floors does he go up?

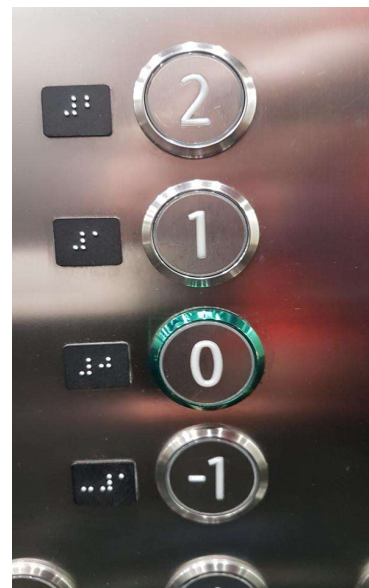


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Appendix 3 a

1. Sabine's bank balance is € 520. She pays € 32 and € 420 into her account, later she withdraws € 1,000. What is her new bank balance?

2. Klaus' account balance shows a minus of € 350. He pays into it € 158 and € 118. What is his new account balance?

3. Felix's account balance is € -350. He first pays into it € 140, then € 340, later he withdraws € 135. What is his new account balance?

4. At the beginning of the month, the credit balance is € 1,340.
The deposits and withdrawals are as follows:
+ € 450, - € 900, - € 675, + € 100,
- € 450
What is the account balance at the end of the month?



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