### 1.1. Counting and Number Line

Mathematics begins with counting.

|  | -39 | -38 | -37 | -36 | -35 | -34 | -33 | -32 | -31 |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| -30 | -29 | -28 | -27 | -26 | -25 | -24 | -23 | -22 | -21 |
| -20 | -19 | -18 | -17 | -16 | -15 | -14 | -13 | -12 | -11 |
| -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |

Practice 1: Count:
a) from 0 to 6
b) from -9 to 2
c) from -20 to -11

Practice 2: How many squares are there on a chessboard?


There are 8 rows and 8 columns, so the total number of fields is $8 \cdot 8=64$.

Important to remember
We use ten digits to write numbers: $0,1,2, \ldots 9$. Numbers greater than 9 are written by using two or more digits. A number can have any amount of digits.

Example 1: Observe this counting diagram:

$$
-6 \rightarrow-5 \rightarrow-4 \rightarrow-3 \rightarrow-2 \rightarrow-1 \rightarrow 0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow \ldots
$$

How many steps $\rightarrow$ are needed to count from -5 to 2 ?
Solution:

$$
-5 \rightarrow-4 \rightarrow-3 \rightarrow-2 \rightarrow-1 \rightarrow 0 \rightarrow 1 \rightarrow 2
$$

There are seven steps (arrows).

Practice 3: How many steps are needed to count from 4 to 14 ?

$$
4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10 \rightarrow 11 \rightarrow 12 \rightarrow 13 \rightarrow 14
$$

There are ten steps (arrows).

Practice 4: How many steps are needed to count from 4 to 24 ?
$4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10 \rightarrow 11 \rightarrow 12 \rightarrow 13 \rightarrow 14 \rightarrow 15 \rightarrow 16 \rightarrow 17 \rightarrow 18 \rightarrow 19 \rightarrow 20 \rightarrow 21 \rightarrow 22 \rightarrow 23 \rightarrow 24$
There are twenty steps (arrows).

Practice 5: How could you calculate the number of steps needed to count from some whole number to another whole number?

Subtract the smaller number from the larger number.

Practice 6: How many steps are needed to count from 4 to 34 ?
$34-4=30$. 30 steps are needed.

Practice 7: How many steps are needed to count from 4 to 134 ?
$134-4=130.130$ steps are needed.

Practice 8: How many steps are needed to count from 4 to 9834 ? $9834-4=9830.9830$ steps are needed.

Example 2: Count by 2 starting with 3.

$$
3 \rightarrow 5 \rightarrow 7 \rightarrow 9 \rightarrow 11 \rightarrow 13 \rightarrow 15 \rightarrow 17 \rightarrow 19 \rightarrow 21 \rightarrow \ldots
$$

Practice 9: How many steps are needed to count by 2 from 8 to 28 ?

$$
8 \rightarrow 10 \rightarrow 12 \rightarrow 14 \rightarrow 16 \rightarrow 18 \rightarrow 20 \rightarrow 22 \rightarrow 24 \rightarrow 26 \rightarrow 28
$$

There are ten steps (arrows).

Practice 10: How many steps are needed to count by 5 from 15 to 50 ?

$$
15 \rightarrow 20 \rightarrow 25 \rightarrow 30 \rightarrow 35 \rightarrow 40 \rightarrow 45 \rightarrow 50
$$

There are seven steps (arrows).

Example 3: Count backwards from 4 to -3.

$$
4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 0 \rightarrow-1 \rightarrow-2 \rightarrow-3
$$

Practice 11: Count backwards from 7 to 0 .

$$
7 \rightarrow 6 \rightarrow 5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 0
$$

Practice 12: Count by 2 backwards from 12 to -6 .

$$
12 \rightarrow 10 \rightarrow 8 \rightarrow 6 \rightarrow 4 \rightarrow 2 \rightarrow 0 \rightarrow-2 \rightarrow-4 \rightarrow-6
$$

Practice 13: Count by 10 backwards from 80 to -40 .

$$
80 \rightarrow 70 \rightarrow 60 \rightarrow 50 \rightarrow 40 \rightarrow 30 \rightarrow 20 \rightarrow 10 \rightarrow 0 \rightarrow-10 \rightarrow-20 \rightarrow-30 \rightarrow-40
$$

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## Number Line

A number line is a straight line with numbers placed at their correct places.


The unit length is the distance between two consecutive integers.


Short vertical line segments on a number line are called ticks.


Example 4: Find number 130 on the number line.
050

Solution: Find the placements of the missing numbers.
Each tick represents a distance of 10 .

|  | 50 | $\begin{array}{cccccc} 1 & 1 & 1 & 1 & 1 & 1 \\ 100 & 110 & 120 & 130 & 140 & 150 \end{array}$ |
| :---: | :---: | :---: |

Practice 14: Add the following values to the number line: $2,8,13$ and 17.


Practice 15: Add the following values to the number line: $2,-1,5,-8$ and 9 .


Practice 16: Add the following values to the number line: $4,-3,6,-1$ and 7 .


Practice 17: Add the following values to the number line: 2, $-10,-6,8$ and 3 .


Practice 18: Add the following values to the number line: $2,-10,-6,8$ and 3 .


Practice 19: Add the following values to the number line: 15, 30, 45, 60 and 85.


Practice 20: Use a ruler to construct a number line that shows the following values: $0,10,20,30,40$. Let the distance between consecutive ticks be 4 centimeters.

| 0 | 10 | 20 | 30 | 40 |
| :--- | :--- | :--- | :--- | :--- |


[^0]:    Warning
    By now you should be comfortable counting by $1,2,5$ and 10 in both directions. If not, practice some more counting!

