



Number Rights

Guide and Answer Key for Instructors



The *Number Rights* animation is available on iTunes U (search "Math Snacks") and at mathsnacks.org

Note: Then *Number Rights* animation can be used in conjunction with the *Pearl Diver* game, also available at mathsnacks.org.

Goals/Standards

By watching the video and completing the activities in the *Learner Guide* will help students learn that:

- Property of the number line.
- How to plot numbers on the number line.
- How to visualize quantity on the number line.
- How to order numbers on the number line.
- How to use the number line as a visual model for mathematical operations (addition, subtraction, multiplication and division).

Video Discussion

With your students, watch the 3-minute video *Number Rights* at <http://www.mathsnacks.com> and spend about 10 minutes discussing the big ideas or key points in the video. Ask:

- What do you think the video is about?
- Have you ever seen fractions or decimals on a number line before?
- According to the video, are there any numbers that are more important than the other numbers on the number line?
- How does the number line help you visualize the position of numbers in relation to other numbers – both positive and negative?

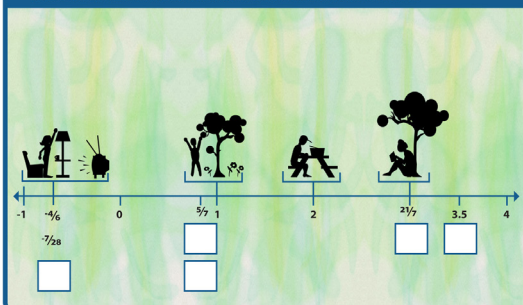
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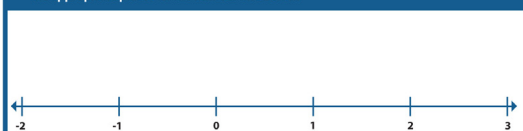
Number Rights Learner Guide

Watch the video, *Number Rights*, and complete these activities. The video and an instructor guide are available on iTunes U (search "Math Snacks") and at mathsnacks.org

1. In the *Number Rights* video, the speaker, $\frac{1}{4}$, says that you can also call her $\frac{2}{8}$, $\frac{3}{12}$, or $\frac{10}{40}$. Write other names for the numbers in the boxes below the number line.



2. Shout from your desk, "A fraction or a decimal is just like any other number and deserves to be put on the number line!" Think of five fractions and five decimals and place them at the appropriate places on the number line below.



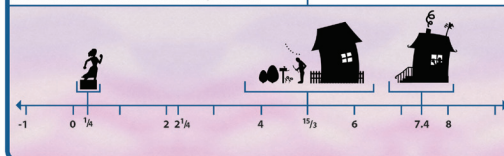
Math Snacks Number Rights Student Learner Guide

<http://www.mathsnacks.org>

Learner Guide Page 2

3. Look at the number line and answer these questions.

- A. $\frac{2}{3}$ is how many units to the right of 3?
- B. What number is the same distance from 0 on the right-hand side of the number line as -1 is on the left-hand side?
- C. What number is $2\frac{1}{2}$ units to the right of $\frac{1}{4}$?
- D. Is the number 5 closer to the number $2\frac{1}{4}$ or to 7.4?

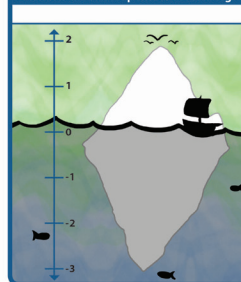


4. Why does the speaker in the *Number Rights* video call zero "the hero of the number line"? In other words, why is zero so important on the number line?

5. A. What is the highest point on the iceberg?

B. At what depth is the iceberg the widest?

C. What is the lowest point of the iceberg?



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Math Snacks Number Rights Student Learner Guide

<http://www.mathsnacks.org>

Vocabulary

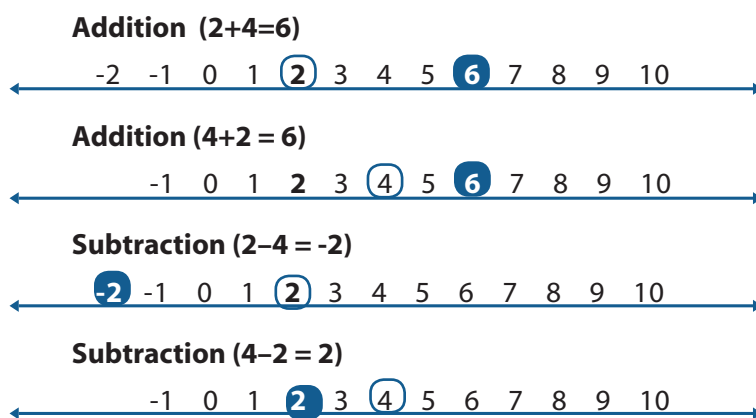
Number line, fractions, decimals, whole numbers, numerator, denominator, negative numbers

Bonus Activities

Select one or more of these to do with your students after they've completed the *Learner Guide*.

1. Human Number Line – Make cards or signs with various positive and negative whole numbers on them (index cards or copy paper). Randomly distribute a number to each student and ask the students to line up according to their places on the number line. Assign new numbers and repeat the activity. This can be made increasingly difficult by adding fractions, mixed numbers and decimals.
2. Human Number Line: Fractions – Have students get a blank piece of notebook paper and draw a horizontal line across the middle of the paper. On the top of the line, have the students write the month of their birth as the numerator of a fraction. Have the students write the day of their birth as the denominator. For example, someone born on September 25 would have 9/25 on their paper. Someone born on December 3 would have 12/3 on their paper. After each student has written down their fraction, have them reduce it or convert their number into a whole or mixed number. Finally, have them line up from smallest to biggest. Additionally, have students post their number on a large number line (0 to 12 since 12 is the largest possible number for this activity). Make sure the numbers are spaced properly on the line even though many of the numbers will be between 0 and 1. The nice thing about this activity is that you will have very small fractions, mixed numbers and whole numbers.
 - a. Questions to ask when putting together the class number line: What is the smallest possible number that can be represented? What is the largest possible number that can be represented? Give the students time to contemplate the possibilities based on their own fractions. (Answers: $\frac{1}{31}$ and $1\frac{3}{4}$)
3. Have students play the *Pearl Diver* game.
4. Practice using the number line to model operations. Fractions, decimal numbers and whole numbers can all be added, subtracted, multiplied and divided. Working as a class, in teams or in small groups, ask students to perform each of these operations on a pair of numbers. Have students use the number line to model the number they started on and the number where they ended up after performing the appropriate operation. (It is possible to use an open number line for this activity, especially if students select very large numbers.)

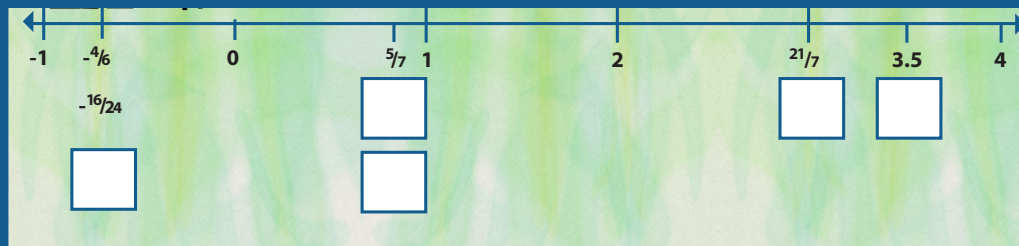
See the example below: If a student selects the two numbers 2 and 4,



- Excellent free tools that can be used to increase students understanding of fractions can be found at www.conceptua.com. The Math Snacks team recommends use of the *conceptuamath* tools for students of all ages.

Page 1 Answer Key

1. In the Number Rights video, the speaker, $\frac{1}{4}$, says that you can also call her $\frac{2}{8}$, $\frac{4}{16}$, or $\frac{7}{28}$. Write other names for numbers on the number line below in the boxes provided.



Answers: $-\frac{2}{3}$, $-\frac{20}{30}$; $\frac{10}{14}$, $\frac{15}{21}$; 3 , 6 , $\frac{30}{6}$; $3\frac{1}{2}$, $\frac{7}{2}$, $3\frac{2}{4}$ (not a complete list of possible answers).

2. Shout from your desk, "A fraction or a decimal is just like any other number, and deserves to be put on the number line!" Think of five fractions and five decimals and place them at the appropriate places on the number line.

Answers will vary.

Page 2 Answer Key

3. Look at the number line and answer these questions.

Questions	Answers
a. $1\frac{5}{3}$ is how many units to the right of 3?	2 units
b. What number is the same distance from 0 on the right-hand side of the number line as -1 is on the left-hand side?	1
c. What number is $2\frac{1}{2}$ units to the right of $\frac{1}{4}$?	$2\frac{3}{4}$
d. Is the number 5 closer to the number $2\frac{1}{4}$ or to 7.4?	7.4 is $2\frac{2}{5}$ away from 5 and $2\frac{1}{4}$ is $2\frac{3}{4}$ away from 5, so 7.4 is closer.

4. Why does the speaker in the Number Rights video call zero "the hero of the number line"? In other words, why is zero so important on the number line?

Answers will vary but should include 0 as the number that divides the number line into negative and positive numbers.

5. Iceberg

Questions	Answers
a. What is the highest point on the iceberg?	<i>Answers will vary but should be close to 2.</i>
b. At what depth is the iceberg the widest?	<i>Answers will vary but should be between $-\frac{1}{4}$ and $-\frac{1}{3}$.</i>
c. What is the lowest point of the iceberg?	-3