## Lesson 5: Negative Rational Exponents

* Let’s investigate negative exponents.

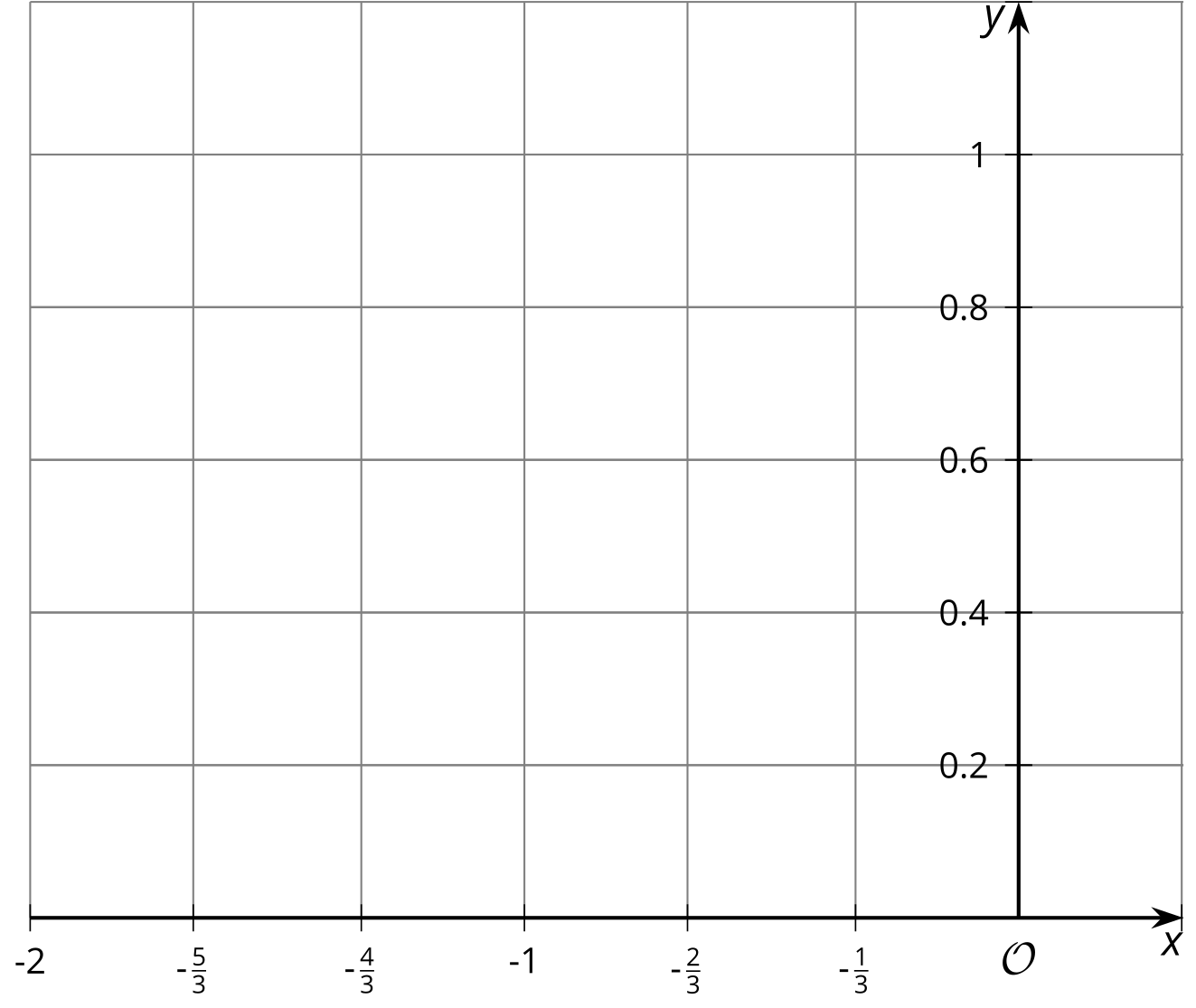
### 5.1: Math Talk: Don’t Be Negative

Evaluate mentally.

### 5.2: Negative Fractional Powers Are Just Numbers

1. Complete the table as much as you can without using a calculator. (You should be able to fill in three spaces.)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | * -2 |  |  | * -1 |  |  | * 0 |
| * (using exponents) |  |  |  |  |  |  |  |
| * (decimal approximation) |  |  |  |  |  |  |  |

* 1. Plot these powers of 2 in the coordinate plane. ​​​​​​
  2. Connect the points as smoothly as you can.
  3. Use your graph of to estimate the value of the other powers in the table, and write your estimates in the table.
* 

1. Let’s investigate .
   1. Write using radical notation.
   2. What is the value of ?
   3. Raise your estimate of to the third power. What should it be? How close did you get?
2. Let’s investigate .
   1. Write using radical notation.
   2. What is ?
   3. Raise your estimate of to the third power. What should it be? How close did you get?

### 5.3: Any Fraction Can Be an Exponent

1. For each set of 3 numbers, cross out the expression that is not equal to the other two expressions.
   1. , ,
   2. , ,
   3. , ,
   4. , ,
2. For each expression, write an equivalent expression using radicals.
3. For each expression, write an equivalent expression using only exponents.

#### Are you ready for more?

Write two different expressions that involve only roots and powers of 2 which are equivalent to .

### 5.4: Make These Exponents Less Complicated

Match expressions into groups according to whether they are equal. Be prepared to explain your reasoning.

### Lesson 5 Summary

When we have a number with a negative exponent, it just means we need to find the reciprocal of the number with the exponent that has the same magnitude, but is positive. Here are two examples:

The table shows a few more examples of exponents that are fractions and their radical equivalents.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | -1 |  |  | 0 |  |  | 1 |
| (using exponents) |  |  |  |  |  |  |  |
| (equivalent expressions) |  | or |  | 1 |  | or | 5 |



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