

Subgroups of Real Numbers

Identify the subgroup of Real numbers a number belongs to.

[Link to section in online textbook](#)

First, watch [this video](#) to review the different sets of Real numbers.

After watching the video, write down your own definitions for the following subgroups of the Real numbers. You should include examples for each (you may even want to take a sneak peak at the problems and use some of these as examples!) and descriptions of how to tell what the smallest set the number belongs to.

- Natural:
- Whole:
- Integers:
- Rational:
- Irrational:
- Real:

We will test these definitions by categorizing the same set of numbers.

Exercise 1 Choose all of the following numbers that are **NATURAL** numbers.

Select All Correct Answers:

(a) $-\frac{21}{7}$

(b) $-\frac{7}{21}$

(c) $\frac{21}{7}$ ✓

(d) $\frac{\pi}{4}$

Learning outcomes: Understand the different sets of numbers along with the properties of these sets.

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(e) $\frac{4}{\pi}$

(f) $\frac{0}{\pi}$

(g) $\frac{\pi}{0}$

(h) $\sqrt{4}$ ✓

(i) $\sqrt{-4}$

(j) $\sqrt{21}$

(k) $\sqrt{-21}$

Hint: Remember to reduce *first*, then think about what groups the number belongs to.

Exercise 2 Choose all of the following numbers that are **Whole** numbers.

Select All Correct Answers:

(a) $-\frac{21}{7}$

(b) $-\frac{7}{21}$

(c) $\frac{21}{7}$ ✓

(d) $\frac{\pi}{4}$

(e) $\frac{4}{\pi}$

(f) $\frac{0}{\pi}$ ✓

(g) $\frac{\pi}{0}$

(h) $\sqrt{4}$ ✓

(i) $\sqrt{-4}$

(j) $\sqrt{21}$

(k) $\sqrt{-21}$

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Hint: What is the only number included in the Whole numbers that is **not** included in the Natural numbers?

Exercise 3 Choose all of the following numbers that are **Integer** numbers.

Select All Correct Answers:

(a) $-\frac{21}{7}$ ✓

(b) $-\frac{7}{21}$

(c) $\frac{21}{7}$ ✓

(d) $\frac{\pi}{4}$

(e) $\frac{4}{\pi}$

(f) $\frac{0}{\pi}$ ✓

(g) $\frac{\pi}{0}$

(h) $\sqrt{4}$ ✓

(i) $\sqrt{-4}$

(j) $\sqrt{21}$

(k) $\sqrt{-21}$

Hint: What is the biggest difference between Whole numbers and Integers?

Exercise 4 Choose all of the following numbers that are **Rational** numbers.

Select All Correct Answers:

(a) $-\frac{21}{7}$ ✓

(b) $-\frac{7}{21}$ ✓

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(c) $\frac{21}{7}$ ✓

(d) $\frac{\pi}{4}$

(e) $\frac{4}{\pi}$

(f) $\frac{0}{\pi}$ ✓

(g) $\frac{\pi}{0}$

(h) $\sqrt{4}$ ✓

(i) $\sqrt{-4}$

(j) $\sqrt{21}$

(k) $\sqrt{-21}$

Hint: What is the biggest difference between Integers and Rational numbers?

Exercise 5 Choose all of the following numbers that are **Irrational** numbers.

Select All Correct Answers:

(a) $-\frac{21}{7}$

(b) $-\frac{7}{21}$

(c) $\frac{21}{7}$

(d) $\frac{\pi}{4}$ ✓

(e) $\frac{4}{\pi}$ ✓

(f) $\frac{0}{\pi}$

(g) $\frac{\pi}{0}$

(h) $\sqrt{4}$

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- (i) $\sqrt{-4}$
- (j) $\sqrt{21}$ ✓
- (k) $\sqrt{-21}$

Hint: What is the biggest difference between Rational and Irrational numbers?

Exercise 6 Choose all of the following numbers that are **Real** numbers.

Select All Correct Answers:

- (a) $-\frac{21}{7}$ ✓
- (b) $-\frac{7}{21}$ ✓
- (c) $\frac{21}{7}$ ✓
- (d) $\frac{\pi}{4}$ ✓
- (e) $\frac{4}{\pi}$ ✓
- (f) $\frac{0}{\pi}$ ✓
- (g) $\frac{\pi}{0}$
- (h) $\sqrt{4}$ ✓
- (i) $\sqrt{-4}$
- (j) $\sqrt{21}$ ✓
- (k) $\sqrt{-21}$

Hint: There are two ways to not be a Real number (that we know so far)...

As you can see, there is a lot of overlap between these groups. You should also try to draw a picture like the video to represent how these subgroups interact. *Since numbers belong to more than one group, the best way to describe these numbers is to identify the **smallest** subgroup they belong to.* The pictorial

representation will help with this! **Remember to reduce first, then decide the smallest subgroup the number belongs to!**

Note: This part of the homework will change each time you click “Another”. You can keep clicking “Another” to practice seeing these more difficult numbers to classify.

Exercise 7 Which of the following is the **smallest** set of Real numbers that $\sqrt{\frac{??}{??}}$ belongs to?

To work around current Xronos issues, input the corresponding number for the correct set.

Natural - 0

Whole - 1

Integer - 2

Rational - 3

Irrational - 4

Not a Real Number - 5

Hint: While many students have learned Irrational numbers are “Never ending, non-repeating decimals”, this can be tricky with a calculator. A number like $3/17$ may look Irrational if put in a calculator, but it does end after 16 places. Your definition should include the words “fraction” and “integers”. The best way to complete these problems are to reduce as much as possible **without making the number a decimal**.

Exercise 8 Which of the following is the **smallest** set of Real numbers that $\sqrt{\frac{??}{??}}$ belongs to?

To work around current Xronos issues, input the corresponding number for the correct set.

Natural - 0

Whole - 1

Integer - 2

Rational - 3

Irrational - 4

Not a Real Number - 5

Hint: While many students have learned Irrational numbers are “Never ending, non-repeating decimals”, this can be tricky with a calculator. A number like $3/17$ may

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Exercise 9 Which of the following is the **smallest** set of Real numbers that

$\sqrt{\frac{??}{??}}$ belongs to?

To work around current Xronos issues, input the corresponding number for the correct set.

Natural - 0

Whole - 1

Integer - 2

Rational - 3

Irrational - 4

Not a Real Number - 5

Hint: While many students have learned Irrational numbers are “Never ending, non-repeating decimals”, this can be tricky with a calculator. A number like 3/17 may look Irrational if put in a calculator, but it does end after 16 places. Your definition should include the words “fraction” and “integers”. The best way to complete these problems are to reduce as much as possible **without making the number a decimal**.
