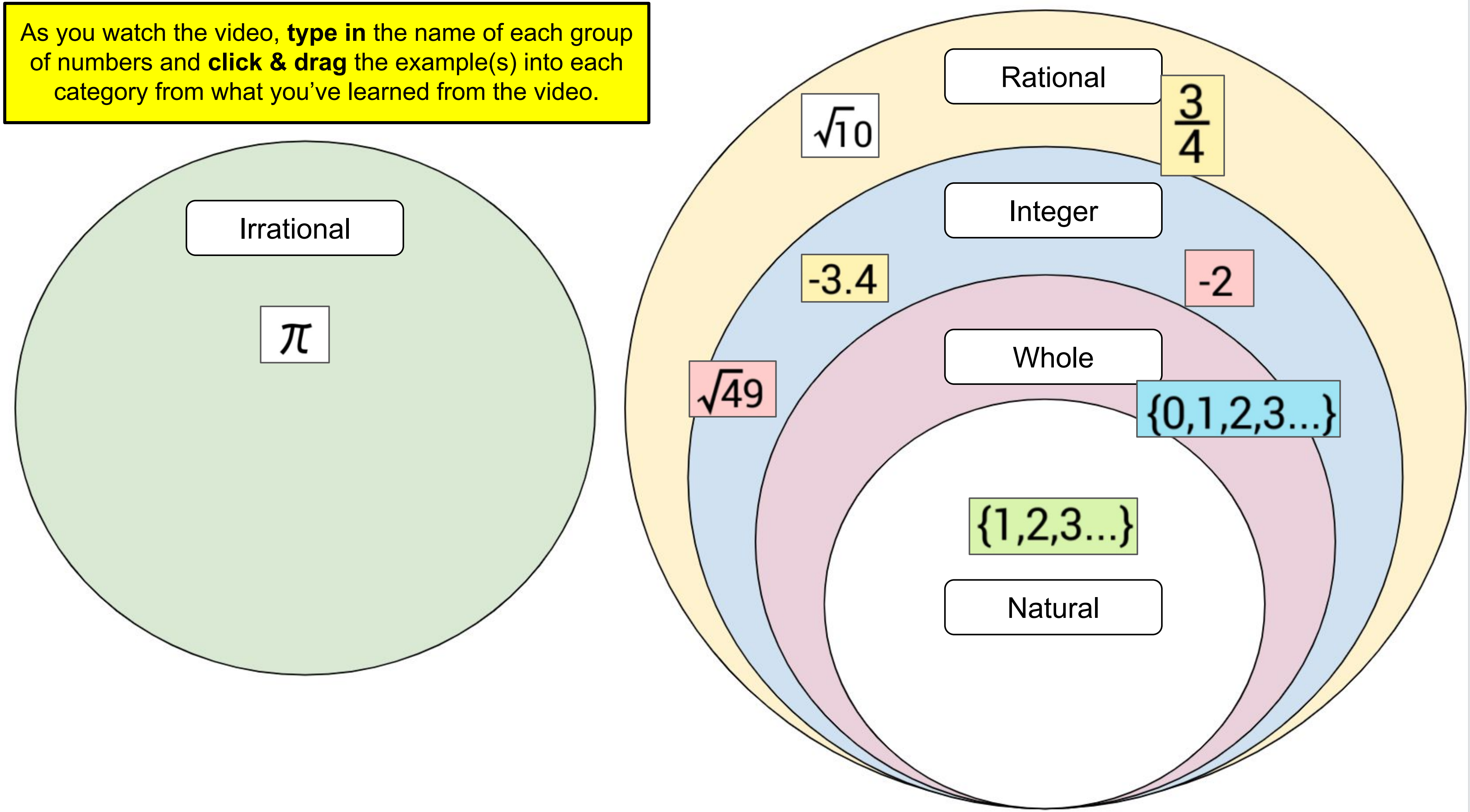
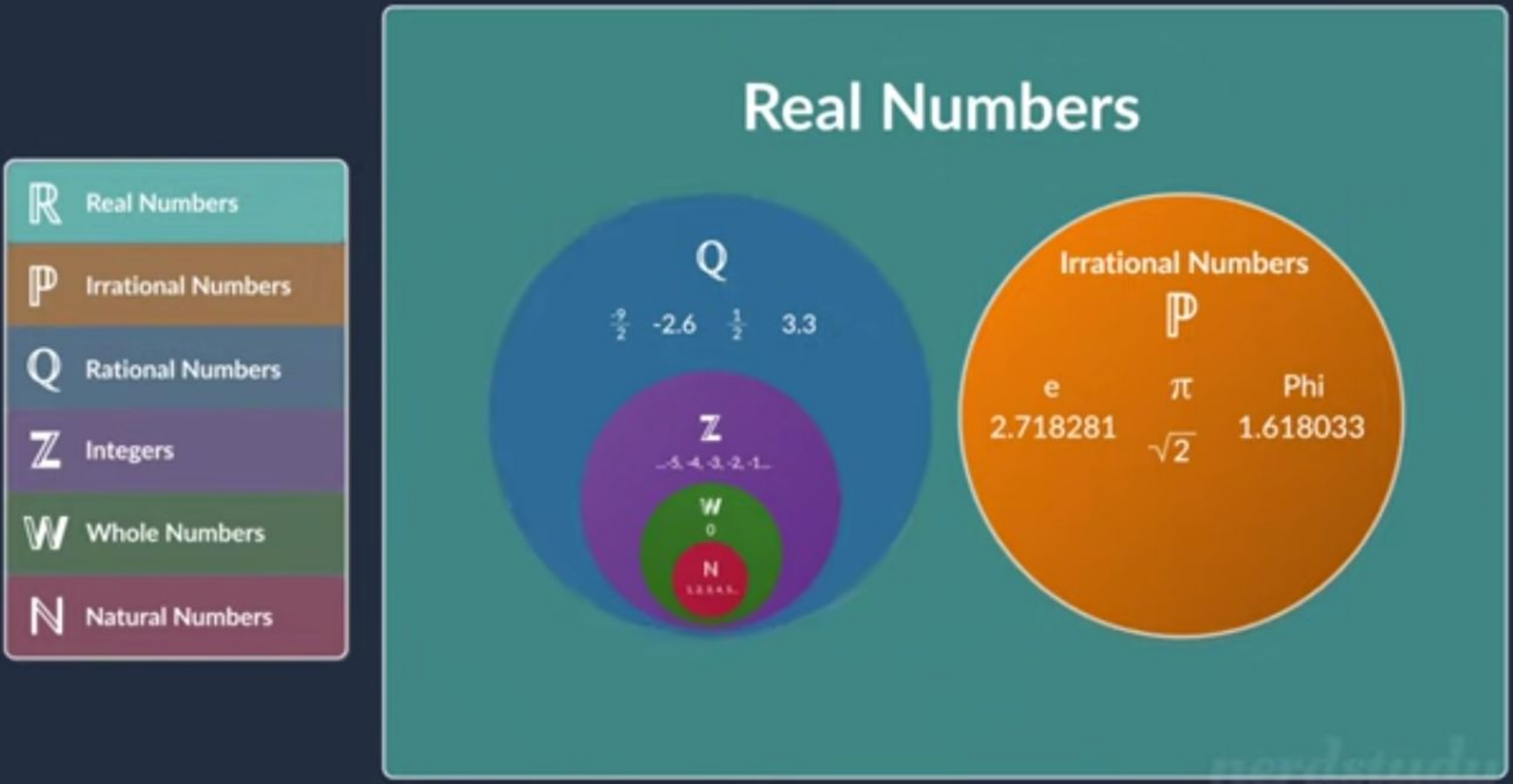
- Your virtual notebook may be done in any way you choose, as long as you cover all of the material within this notebook.
- Every bit of information that you are required to take notes about is provided in my lessons (articles, slides, recordings). You will get 0 points if you choose to use other internet resources to fill this out.
- All lessons are provided with a link in the upper left hand corner of each slide (*with a big arrow and the link inside*).
- Do not screenshot or copy and paste any of my work in lessons or recordings and use it as your own unless you're specifically given permission to do so.
- Any work from AI (ChatGPT) or other answer-generating websites will result in an automatic zero and an Honor Code violation.

As you watch the video, **type in** the name of each group of numbers and **click & drag** the example(s) into each category from what you've learned from the video.




ℝ Real Numbers
ℙ Irrational Numbers
Q Rational Numbers
ℤ Integers
𝕎 Whole Numbers
ℕ Natural Numbers
Real Numbers
Q
-9/2 -2.6 1/2 3.3
ℤ
...-5, -4, -3, -2, -1...
W
0
N
Irrational Numbers
ℙ
e
2.718281
π
√2
Phi
1.618033

Just like Tokyo is part of Japan which is a subset of the world, natural numbers are a subset of whole number which are part of real numbers.

🎈✨ Correct! 🎈✨

$4\sqrt{2}$
$\sqrt{83}$
$0.000365837409...$
IRRATIONAL NUMBER
$\sqrt{21}$
-3π
$0.953...$
$\sqrt{3}$

RATIONAL NUMBER
$.7777777777...$ repeating
0
$9{,}873$
.75
$\sqrt{25}$
-34
$\sqrt{64}$
$-\frac{1}{3}$
-4.532

W38 The Number System DRV | Derivita Assignment | M10.1 Rational & Irrational Nu | IXL - Classify rational and irrat | square root of 35 - Wolfram|A

homework.derivita.com/lti/assignment/s/Y2fKuAZ0UkABc9Rb6TFy

ORCA Bookmarks | Desmos | Graphing... | Metamorphoses -... | Sphinx is NUT - Go... | Exponents Module... | Nut - Explore Deitie... | Q-OSA | Outline Indonesia -... | Task & Purpose: Ho...

Select the rational numbers. Select all that apply.

- [x] 0.4375
- [ ] $0.12345\ldots$
- [x] $0.5\overline{7}$
- [x] -3.2228
- [x] $\sqrt{64}$
- [ ] $3.60555\ldots$
- [x] 0
- [ ] $0.57557555755557\ldots$

Correct. Good Job! **Score: 100%**

The following values, in decimal form, either repeat or stop, thus making them rational numbers.

Question 1	100%
Question 2	100%
Question 3	100%
Question 4	100%
Question 5	100%
Question 6	100%
Question 7	100%
Question 8	100%
Question 9	100%
Question 10	100%
Question 11	
Question 12	
Question 13	
Question 14	
~~Question 15~~	~~100%~~
Summary	

US Jun 5 4:56

M10.1 Rational & Irrational Numbers Card Sort

Austin Horner

🎈✨ Correct! 🎈✨

RATIONAL NUMBER

a real number that can be written as a ratio of two integers (fraction), repeating or terminating decimal or an integer

REPEATING DECIMAL

a decimal which has repeating digits or a repeating pattern

NONTERMINATING DECIMAL

a decimal that does NOT end and continues on forever

TERMINATING DECIMAL

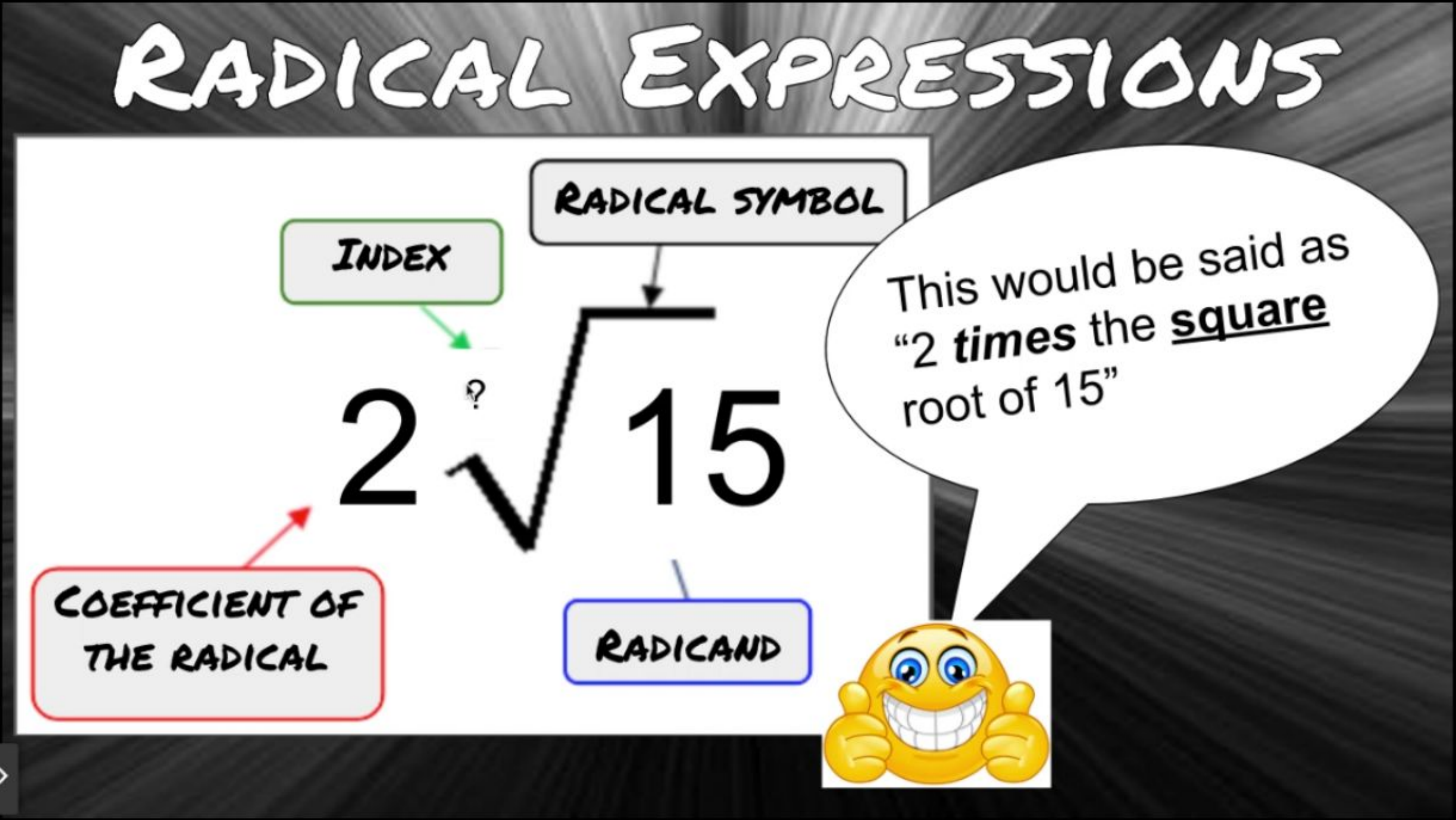
a decimal that comes to an end

IRRATIONAL NUMBER

a real number that can be written as a NONREPEATING, NONTERMINATING decimal

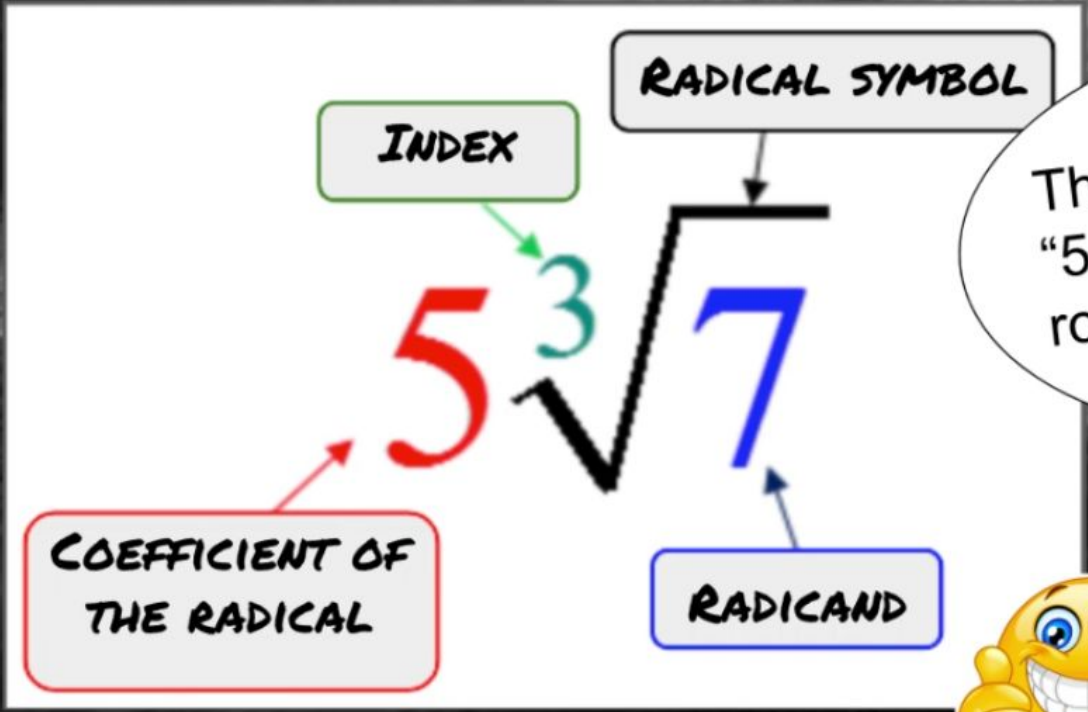
NONREPEATING DECIMAL

a decimal which has no repeating pattern

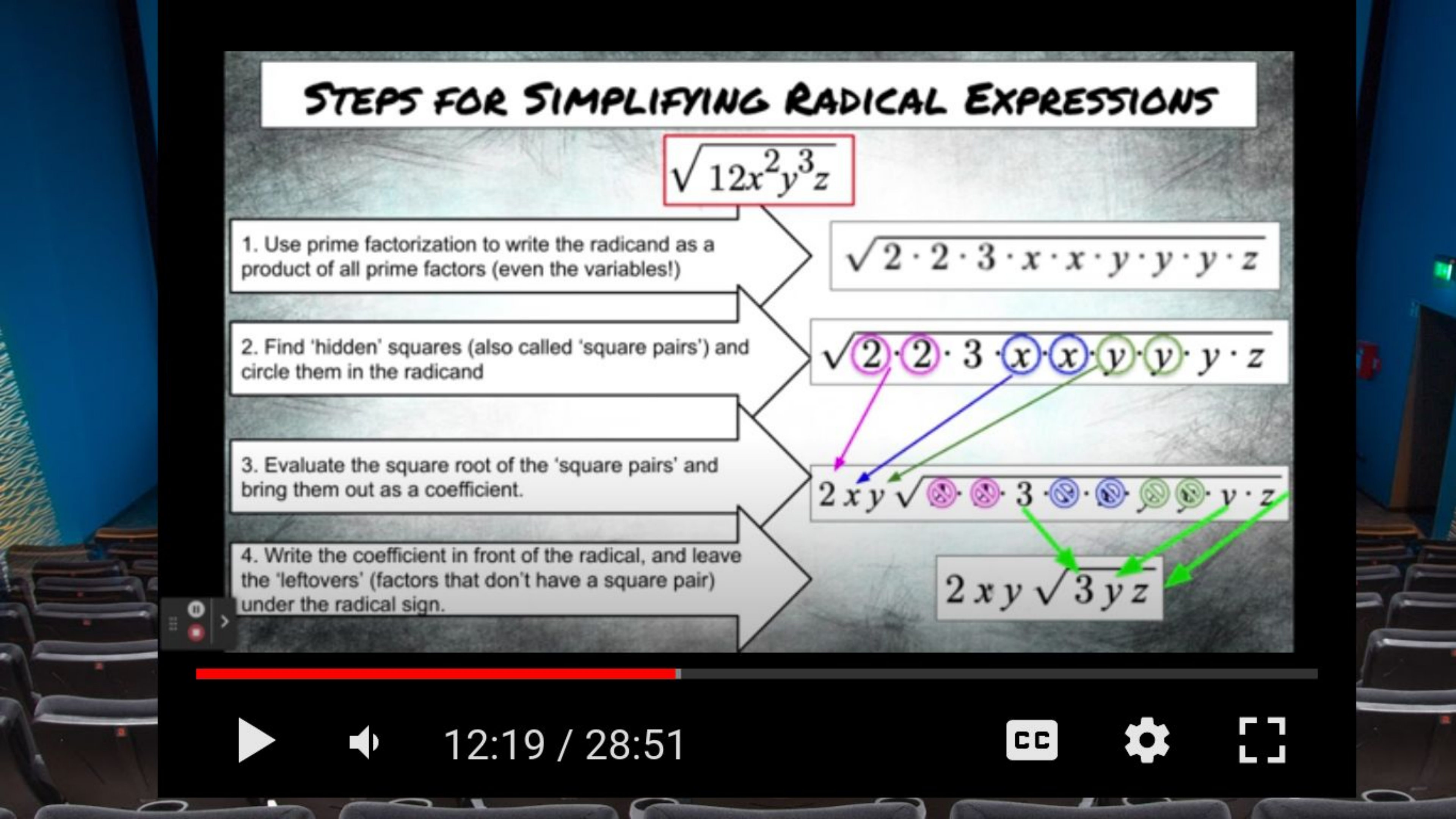


Radical Expressions
Radical symbol
Index
2 √15
Coefficient of the radical
Radicand
This would be said as "2 times the square root of 15"

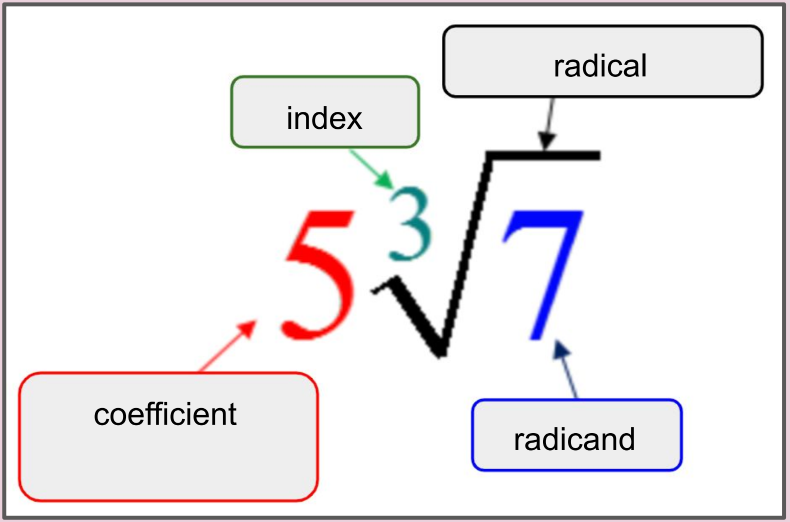
Radical Expressions



This would be said as "5 ***times*** the cubed root of 7"



STEPS FOR SIMPLIFYING RADICAL EXPRESSIONS
$\sqrt{12x^2y^3z}$
1. Use prime factorization to write the radicand as a product of all prime factors (even the variables!)
$\sqrt{2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot z}$
2. Find 'hidden' squares (also called 'square pairs') and circle them in the radicand
$\sqrt{2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot z}$
3. Evaluate the square root of the 'square pairs' and bring them out as a coefficient.
$2xy\sqrt{\cdots 3 \cdots y \cdot z}$
4. Write the coefficient in front of the radical, and leave the 'leftovers' (factors that don't have a square pair) under the radical sign.
$2xy\sqrt{3yz}$
12:19 / 28:51
CC



When is a radical expression ***completely simplified***?

- ❏ There are no “square pairs” left under the radicand.
- ❏ There are no radicands that can be combined.
- ❏ There are no radicals in the denominator of the fraction.

TO SIMPLIFY A RADICAL EXPRESSION...

1. Use prime factorization. Write radicand as product of prime factors.

$\sqrt{12x^2y^3z}$

$2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot$

2. Circle square pairs

$2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot z$

from below here to match up with the st n in the recording.

3. Add square roots to coefficient

$2xy$

4. Write coefficient multiplied by remainder under radical

$2xy\sqrt{3yz}$

STEPS FOR SIMPLIFYING RADICAL EXPRESSIONS

$$\sqrt{12x^2y^3z}$$

1. Use prime factorization to write the radicand as a product of all prime factors (even the variables!)

$$\sqrt{2\cdot 2\cdot 3\cdot x\cdot x\cdot y\cdot y\cdot y\cdot z}$$

2. Find 'hidden' squares (also called 'square pairs') and circle them in the radicand

$$\sqrt{\boxed{2}\cdot\boxed{2}\cdot 3\cdot\boxed{x}\cdot\boxed{x}\cdot\boxed{y}\cdot\boxed{y}\cdot y\cdot z}$$

3. Evaluate the square root of the 'square pairs' and bring them out as a coefficient.

$$2xy\sqrt{\cancel{2}\cdot\cancel{2}\cdot 3\cdot\cancel{x}\cdot\cancel{x}\cdot\cancel{y}\cdot\cancel{y}\cdot y\cdot z}$$

Simplifying Radical Expressions

Simplest form: we simplify fractions, expressions, and now… radical expressions.

A radical expression is completely simplified if…

- ❑ There are no "square pairs" left under the radicand.
- ❑ There are no like radicands that can be combined. *(we will get to that later,)*
- ❑ There are no radicals in the denominator of a fraction *(we will get to that later, too…)*

1) $\sqrt{96}$

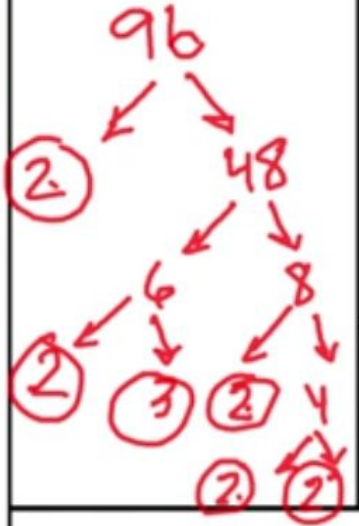
2) $\sqrt{216}$

3) $\sqrt{98}$

4) $\sqrt{18}$

Simplifying Radicals Work Mat

Prime Factorization



Work

$\sqrt{96} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}$

$2 \cdot$

Solution

Primes Below 100

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

1) $\sqrt{96}$

2) $\sqrt{216}$

3) $\sqrt{98}$

4) $\sqrt{18}$

Simplifying Radicals Work Mat

Prime Factorization	Work
96 → 2, 48; 48 → 6, 8; 6 → 2, 3; 8 → 2, 4; 4 → 2, 2	$\sqrt{96} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}$ $2 \cdot 2\sqrt{6}$ $4\sqrt{6}$
	Solution $4\sqrt{6}$?

Primes Below 100

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Multiplication with Radicals

Product Property of Square Roots

Words The square root of a product equals the product of the square roots of the factors.

Numbers $\sqrt{9 \cdot 5} = \sqrt{9} \cdot \sqrt{5} = 3\sqrt{5}$

Algebra $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$, where $a, b \geq 0$

This means that you can do 2 things...

1. Multiply the radicands of any radical expressions.
2. Break one radicand into its factors under new radicals.

Division with Radicals

Quotient Property of Square Roots

Words The square root of a quotient equals the quotient of the square roots of the numerator and denominator.

Numbers $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$

Algebra $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$, where $a \geq 0$ and $b > 0$

This means that you can do 2 things...

1. Turn a division of two radicands into one radicand.

2. Break one radicand into its numerator and denominator under new radicands.

Multiplication with Radicals

EXAMPLE 1 Using the Product Property of Square Roots

a. $\sqrt{108} = \sqrt{36 \cdot 3}$ — Factor using the greatest perfect square factor.

$= \sqrt{36} \cdot \sqrt{3}$ — Product Property of Square Roots

$= 6\sqrt{3}$ — Simplify.

b. $\sqrt{9x^3} = \sqrt{9 \cdot x^2 \cdot x}$ — Factor using the greatest perfect square factor.

$= \sqrt{9} \cdot \sqrt{x^2} \cdot \sqrt{x}$ — Product Property of Square Roots

$= 3x\sqrt{x}$ — Simplify.

How do you add/subtract radicals?

1. Just like any other math addition and subtraction: **make sure they are the *<u>same</u>* before adding/subtracting**. The same what? Radicand!
2. ***Like radicands*** just means, what is under the radical sign is the same. Exactly the same. It's the same as saying "like terms" when we are talking about polynomials.
3. What if they're not "like"? Can you flex your Algebra muscles to ***make*** them be **like** radicands by simplifying?
4. ***Simplify*** each term of the expression separately, then see what you can combine at the end!

$$-2\sqrt{3}+3\sqrt{27}$$

When radicands are not the same, you will simplify to see if they are the same!

$-2\sqrt{3}$ is already simplified.

Simplify $3\sqrt{27}$

$\rightarrow \sqrt{(3\cdot3\cdot3)}$

$\rightarrow 3\cdot3\sqrt{3}$

$\rightarrow 9\sqrt{3}$

Now they are ***like radicands***! Combine!

$-2\sqrt{3} + 9\sqrt{3}$

$7\sqrt{3}$, final simplified expression!

Operations with Radical Expressions

Product Property of Square Roots	The product of square roots equals the square root of the product
Quotient Property of Square Roots	The quotient of square roots equals the quotient of the product

How to Add/Subtract Radicals

Type here

Simplify radicands

3√27 = 9√3

Type here

Combine like terms

Type here

Combine like terms

Type here

Simplify the final expression

Click and drag steps below into the right order

$-2\sqrt{3} + 3\sqrt{27}$

3√27

3 √(3·3·3)

3·3√3

9√3

-2√3 + 9√3

7√3

Why aren't radicals allowed in the denominator?	Fractions must have a rational denominator
Explain **why** multiplying by a "*form of 1*" doesn't change the fraction.	Multiplying by an identity does not change the fraction
How do you rationalize the denominator according to our lesson, or Mr. Khan's explanation?	Multiply numerator and denominator by the conjugate

To rationalize, multiply by…
(type in the gray box)

$$\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

To rationalize, multiply by…
(type in the gray box)

$$\frac{2}{5\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$$

To rationalize, multiply by…
(type in the gray box)

$$\frac{2}{3+\sqrt{5}} \cdot \frac{3 - \sqrt{5}}{3 - \sqrt{5}}$$

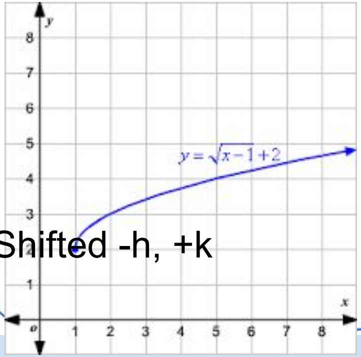
Square Root Function

Definition:

Square root of the number is quantity which multiplied by itself yield the number

Graphs: **$3 = \sqrt{9}$**

Click and drag image here



Shifted -h, +k

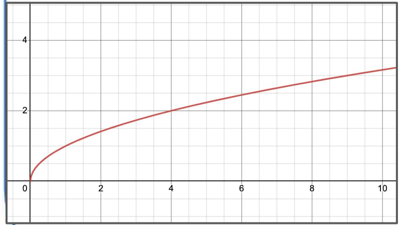
Parent Function of Square Root Function

Click and drag image here

Type here
$$y = \sqrt{x}$$

Graph:

Click and drag image here

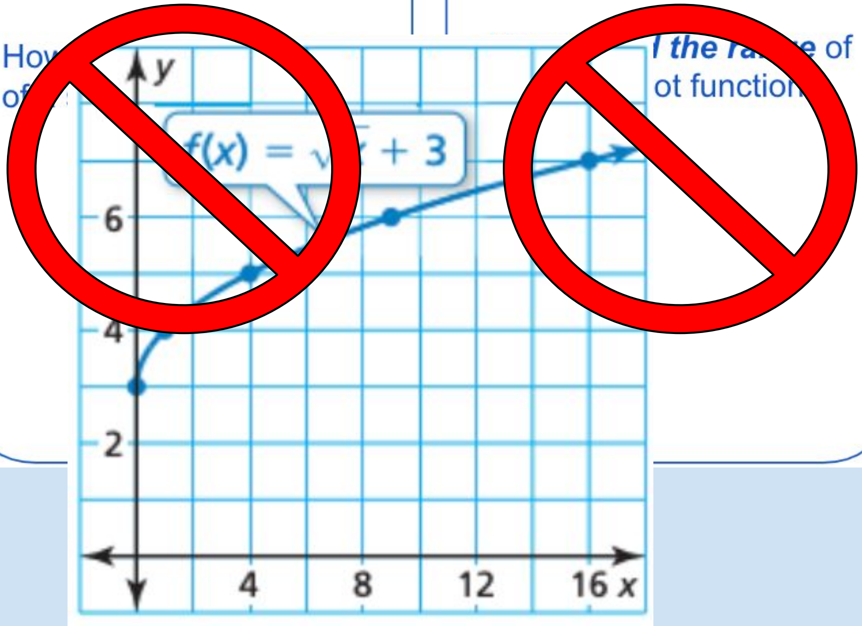


Domain of a Square Root Function

Type here **Domain** the set of all x-values for which the **function is defined.** In other words,

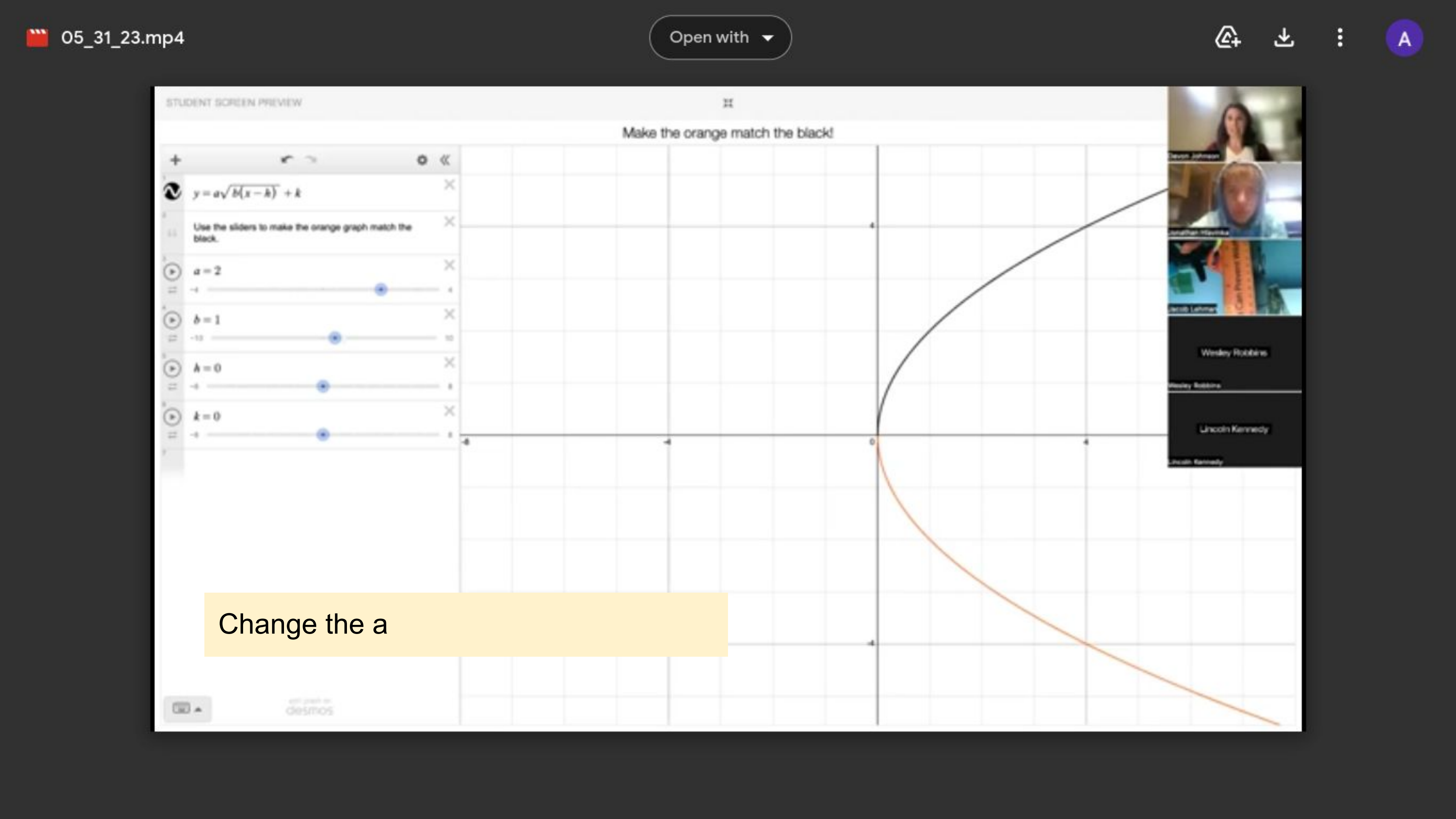
Range of a Square Root Function

Type here **Range** set of all y-values for which the function is defined.



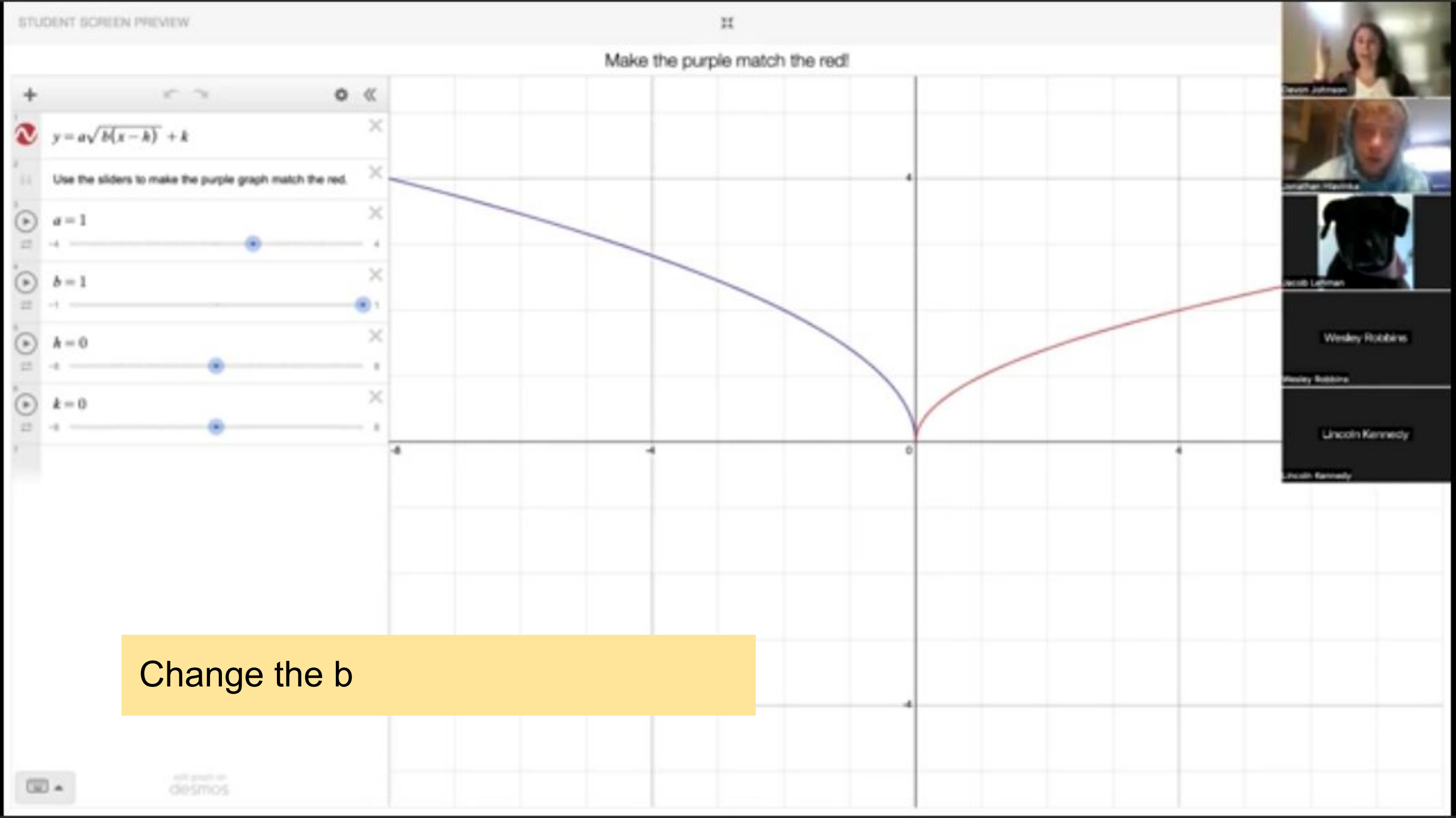
05_31_23.mp4

Open with


05_31_23.mp4
Open with
STUDENT SCREEN PREVIEW
Make the orange match the black!
y = a√(b(x − h)) + k
Use the sliders to make the orange graph match the black.
a = 2
b = 1
h = 0
k = 0
Wesley Robbins
Lincoln Kennedy
Change the a
desmos

05_31_23.mp4

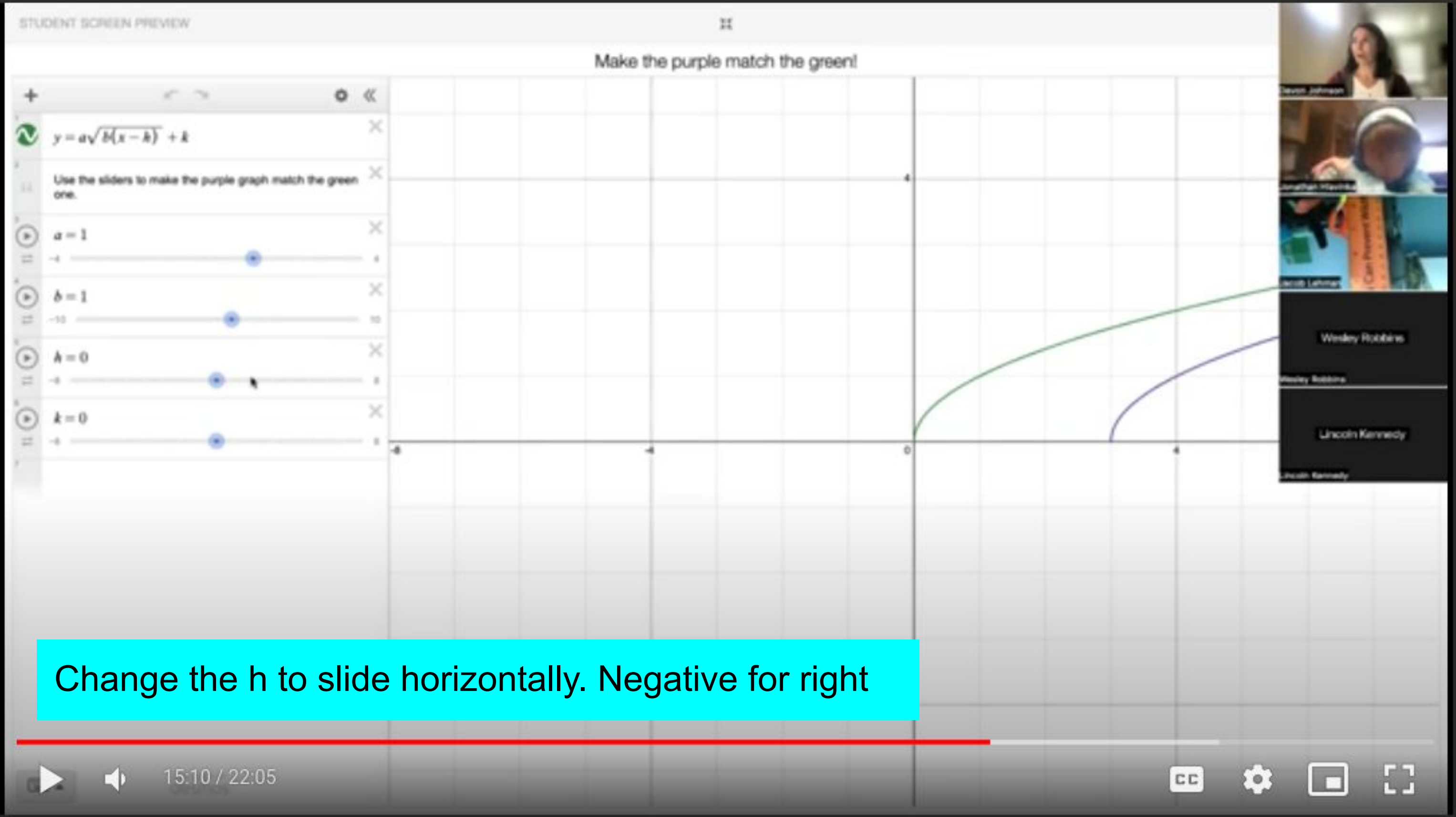
Open with



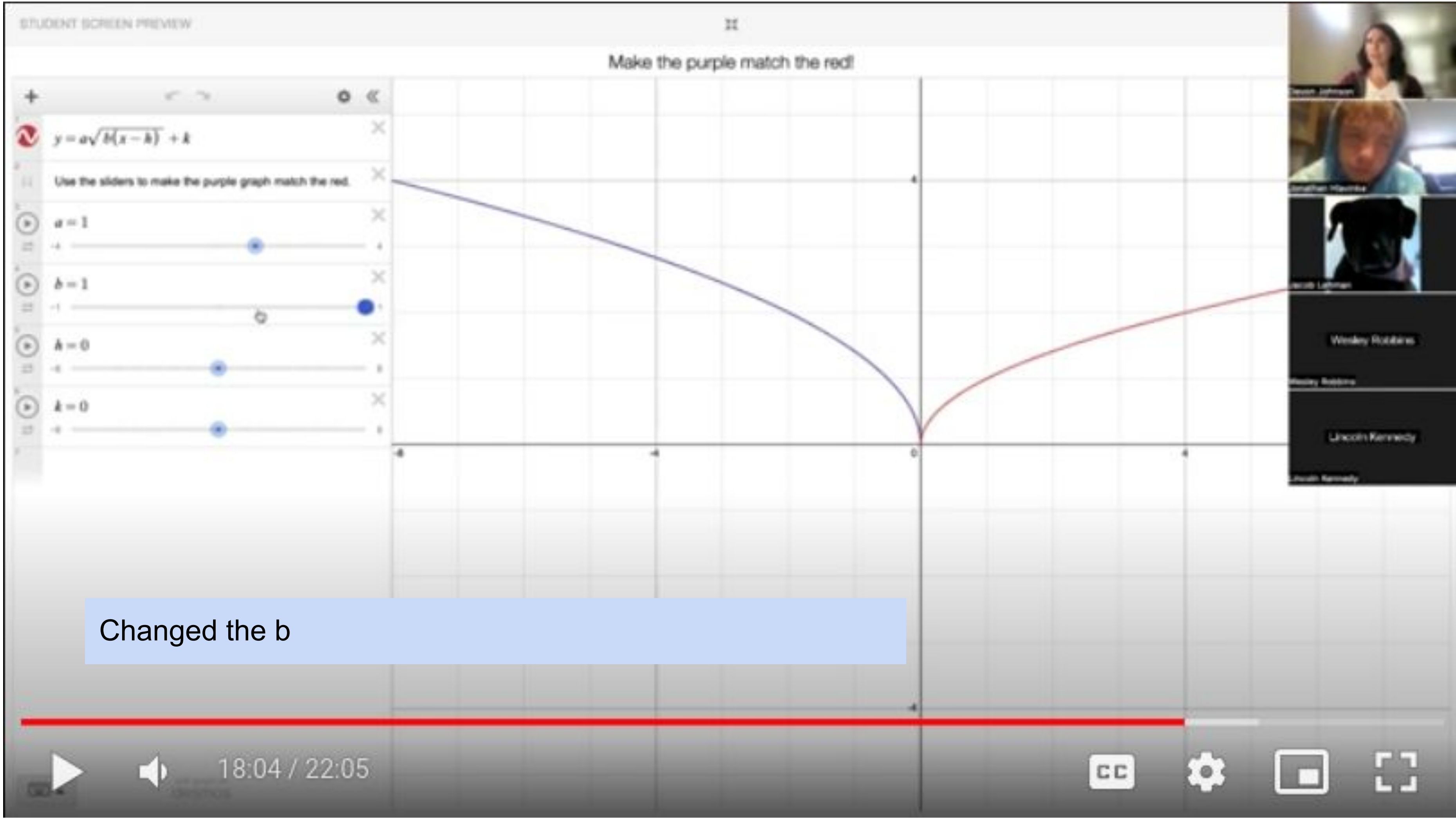
Change the b

05_31_23.mp4

Open with



Change the k to raise up of lower down


STUDENT SCREEN PREVIEW
Make the purple match the red!
y = a√(b(x − h)) + k
Use the sliders to make the purple graph match the red.
a = 1
b = 1
h = 0
k = 0
Changed the b
18:04 / 22:05

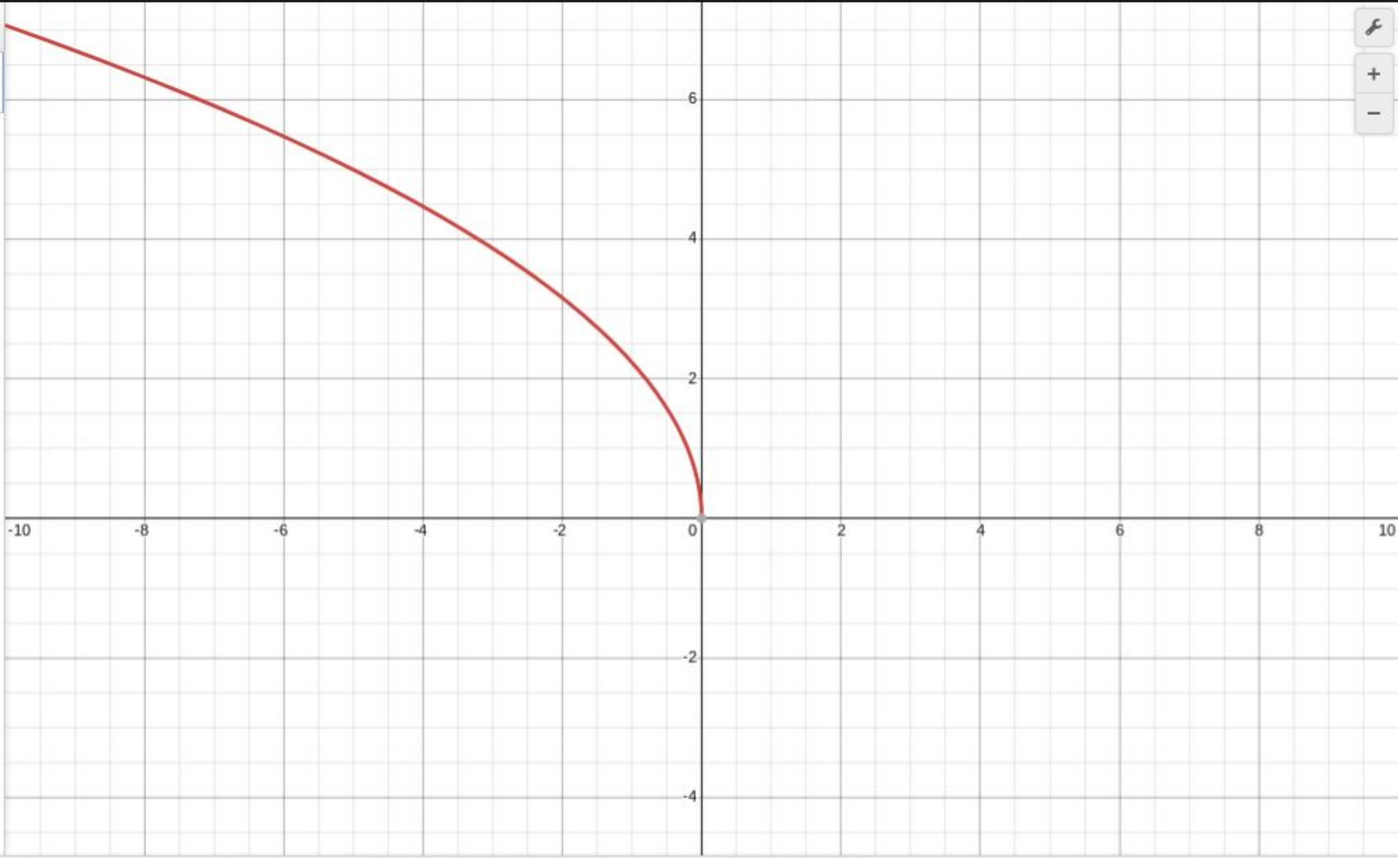
Untitled Graph Save

desmos

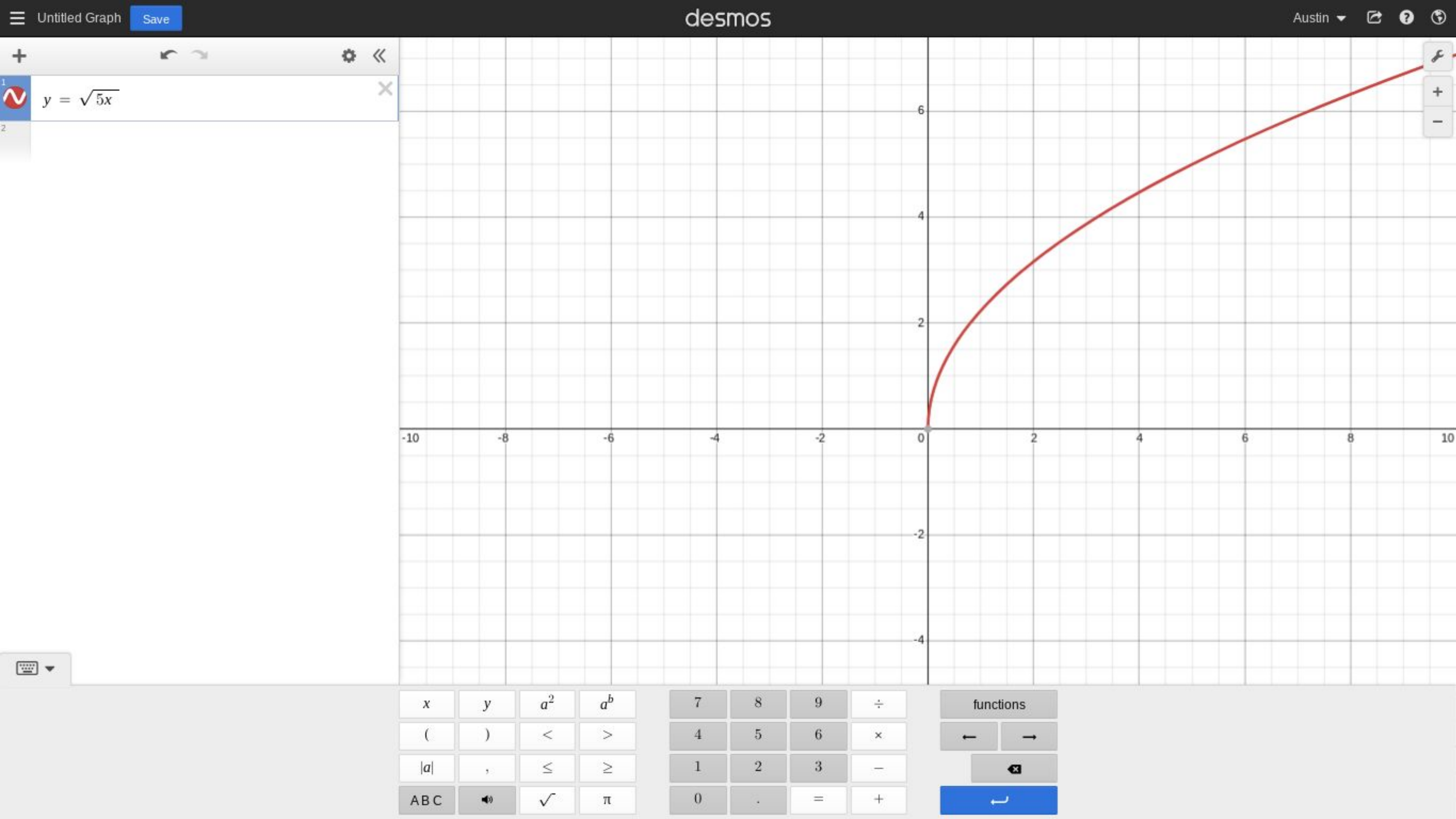
Austin

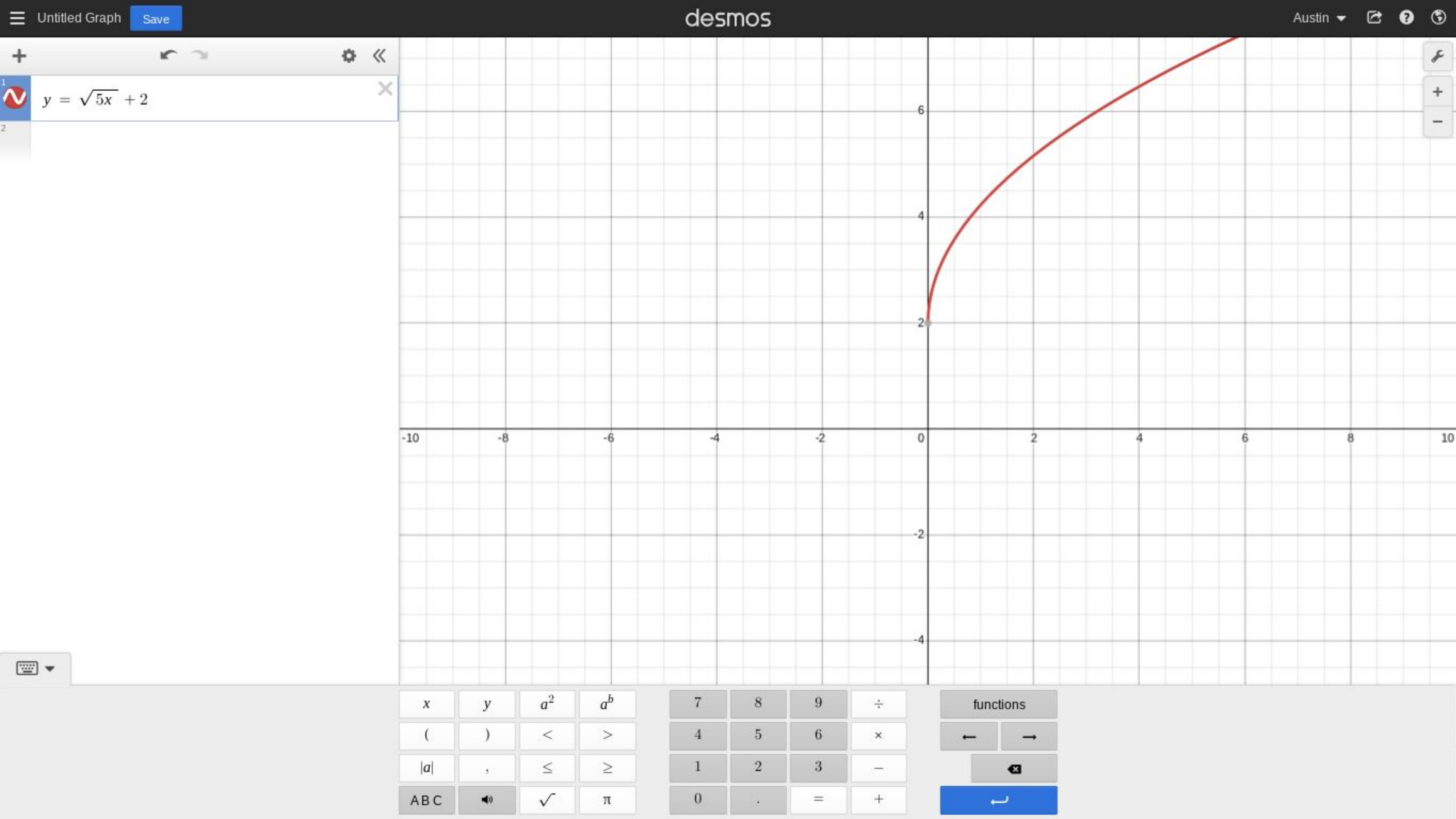
1 $y = \sqrt{-5x}$

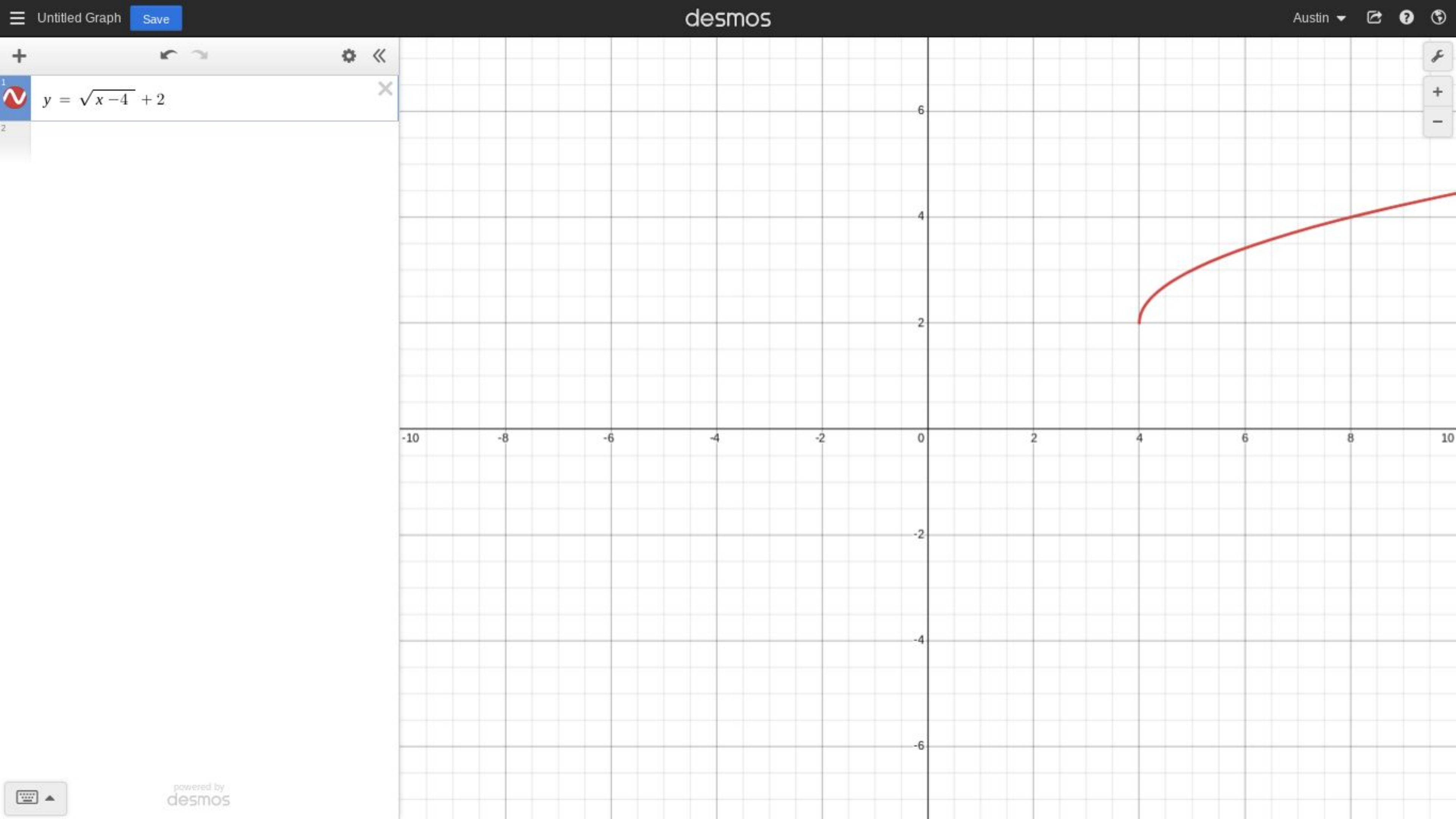
2

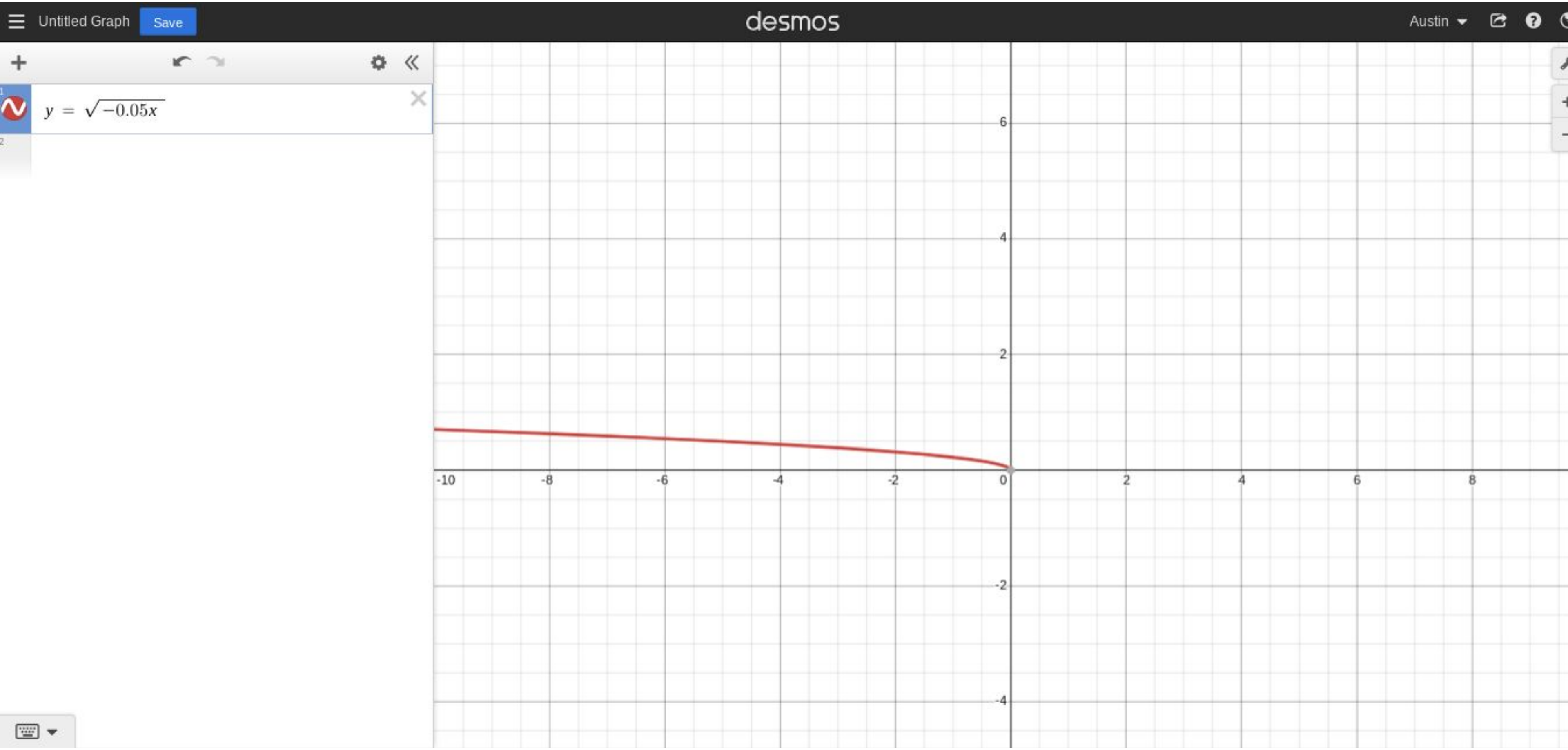


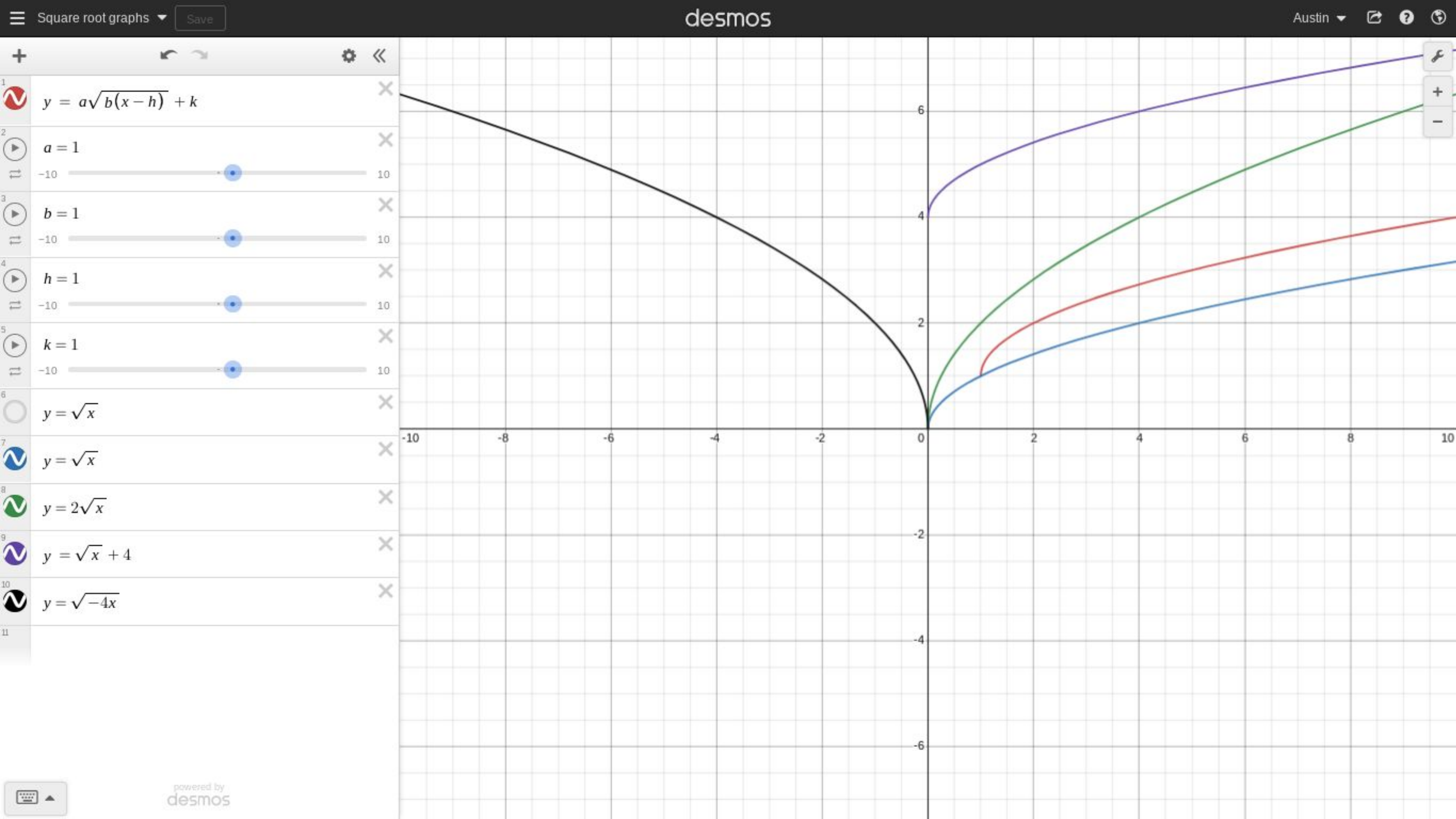
x	y	a^2	a^b	7	8	9	÷	functions
(	)	<	>	4	5	6	×	← →
|a|	,	≤	≥	1	2	3	−	
ABC		√	π	0	.	=	+	


Untitled Graph
Save
desmos
Austin
$y = \sqrt{5x}$
-10
-8
-6
-4
-2
0
2
4
6
8
10
6
4
2
-2
-4
functions
ABC


Untitled Graph
Save
desmos
Austin
$y = \sqrt{5x} + 2$
-10
-8
-6
-4
-2
0
2
4
6
8
10
6
4
2
-2
-4
functions
ABC


Untitled Graph
Save
desmos
Austin
$y = \sqrt{x - 4} + 2$
6
4
2
0
-2
-4
-6
-10
-8
-6
-4
-2
2
4
6
8
10
powered by desmos


Untitled Graph
Save
desmos
Austin
$y = \sqrt{-0.05x}$
6
4
2
-2
-4
-10
-8
-6
-4
-2
0
2
4
6
8


Square root graphs
Save
desmos
Austin
$y = a\sqrt{b(x-h)} + k$
$a = 1$
−10
10
$b = 1$
−10
10
$h = 1$
−10
10
$k = 1$
−10
10
$y = \sqrt{x}$
$y = \sqrt{x}$
$y = 2\sqrt{x}$
$y = \sqrt{x} + 4$
$y = \sqrt{-4x}$
powered by desmos
-10
-8
-6
-4
-2
0
2
4
6
8
10
6
4
2
-2
-4
-6

To sum this all up... different variables change different parts of the graph!

Transformation	Variable	Examples	
Horizontal Translation Graph shifts left or right.	*h*	$g(x) = \sqrt{x-2}$ $g(x) = \sqrt{x+3}$	2 units right 3 units left
Vertical Translation Graph shifts up or down.	*k*	$g(x) = \sqrt{x} + 7$ $g(x) = \sqrt{x} - 1$	7 units up 1 unit down
Reflection Graph flips over *x*- or *y*-axis.	*a* & *b*	$g(x) = \sqrt{-x}$ $g(x) = -\sqrt{x}$	in the *y*-axis in the *x*-axis
Horizontal Stretch or Shrink Graph stretches away from or shrinks toward *y*-axis.	*b*	$g(x) = \sqrt{3x}$ $g(x) = \sqrt{\frac{1}{2}x}$	shrink by a factor of $\frac{1}{3}$ stretch by a factor of 2
Vertical Stretch or Shrink Graph stretches away from or shrinks toward *x*-axis.	*a*	$g(x) = 4\sqrt{x}$ $g(x) = \frac{1}{5}\sqrt{x}$	stretch by a factor of 4 shrink by a factor of $\frac{1}{5}$


re that
ut finishing your