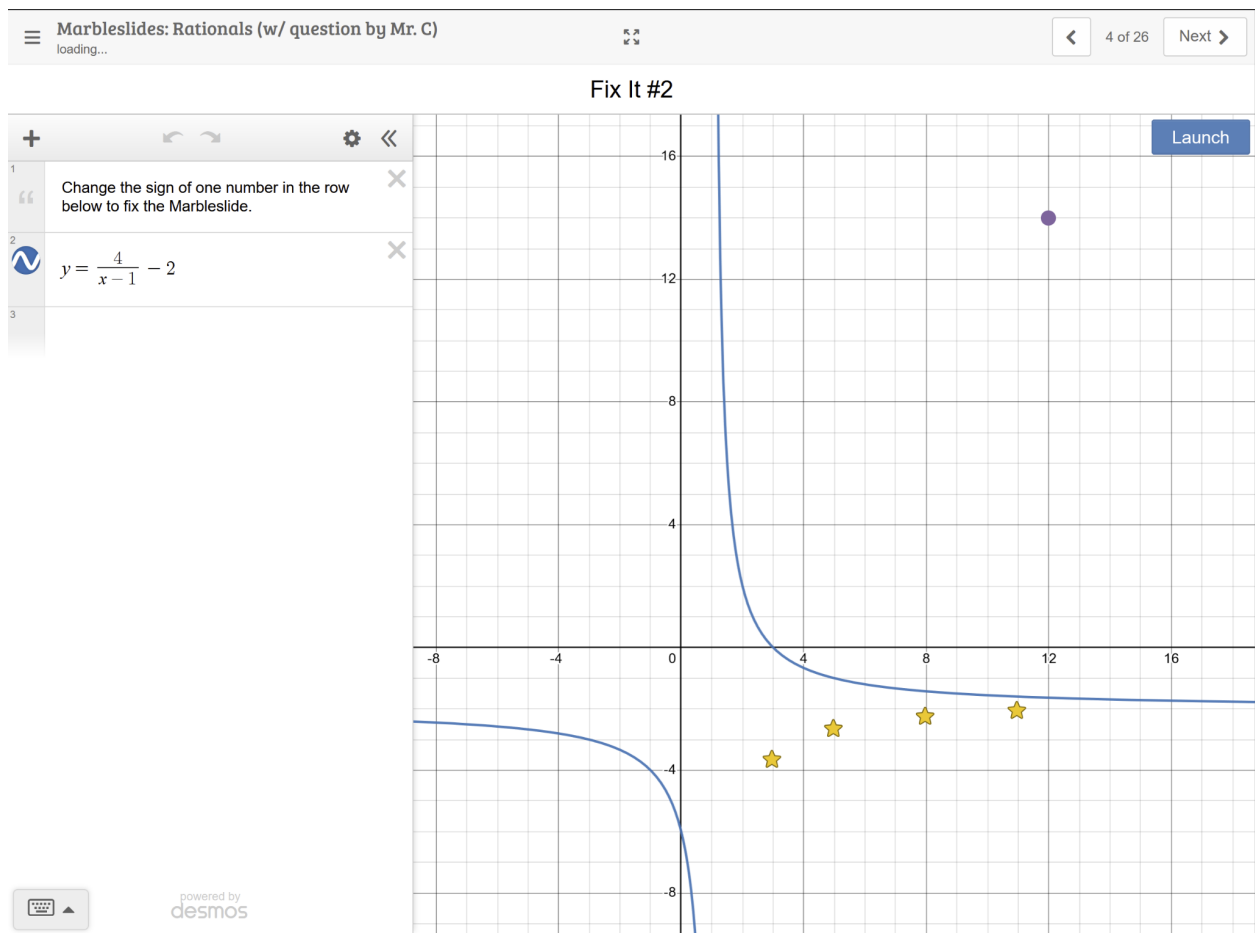


Lesson 1 Instructional Materials:

The following are various slides from the Desmos activity I'll give in Lesson 1, where students need to create rational functions to solve problems. Their goal will be to create a rational function of the correct shape such that a marble (shown in purple) can slide down the function and hit all the stars (shown in yellow). This will require students to translate and transform their rational functions until they've made the desired shape. Note that I've only included a few slides that are representative of the whole activity.

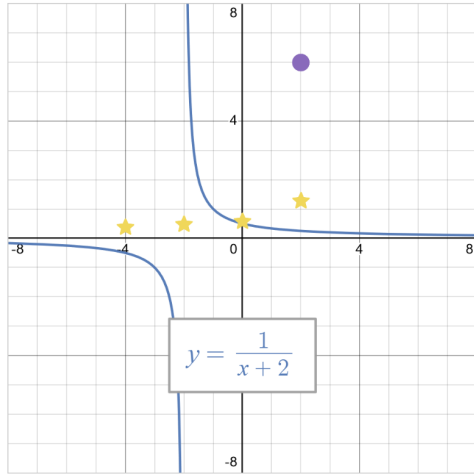
Slide 4: Manipulating an existing rational function so that the marble will hit all the stars



Slide 14: Predicting the results of specific transformations of rational functions

Marbleslides: Rationals (w/ question by Mr. C) loading... 14 of 26 Next >

Predict #4



Your friend won't get many stars like this! What changes would you make to the equation to help your friend collect all the stars? Why are those changes going to work?

Share With Class

Slide 15: Verifying predictions

Marbleslides: Rationals (w/ question by Mr. C) loading... 15 of 26 Next >

Verify #4

1 Use your own advice from the last screen. Did it help? ✕

2 $y = \frac{1}{x+2}$ ✕

3

Launch

Slide 21: Freeform challenge constructing a rational function from scratch

Marbleslides: Rationals (w/ question by Mr. C)
loading...

21 of 26 Next >

Challenge Slide #5

Launch

1 In the rows below, type as many equations of rational functions as you need to collect all the stars.

2

3

Slide 26: Opportunity to share observations, questions and confusions

Marbleslides: Rationals (w/ question by Mr. C)
loading...

26 of 26 Next >

Observations, Questions and Confusions (from Mr. C!)

After exploring Rational Functions today (either through Desmos, Khan Academy, or something else), add any observations, questions and confusions you may be having in the box below.

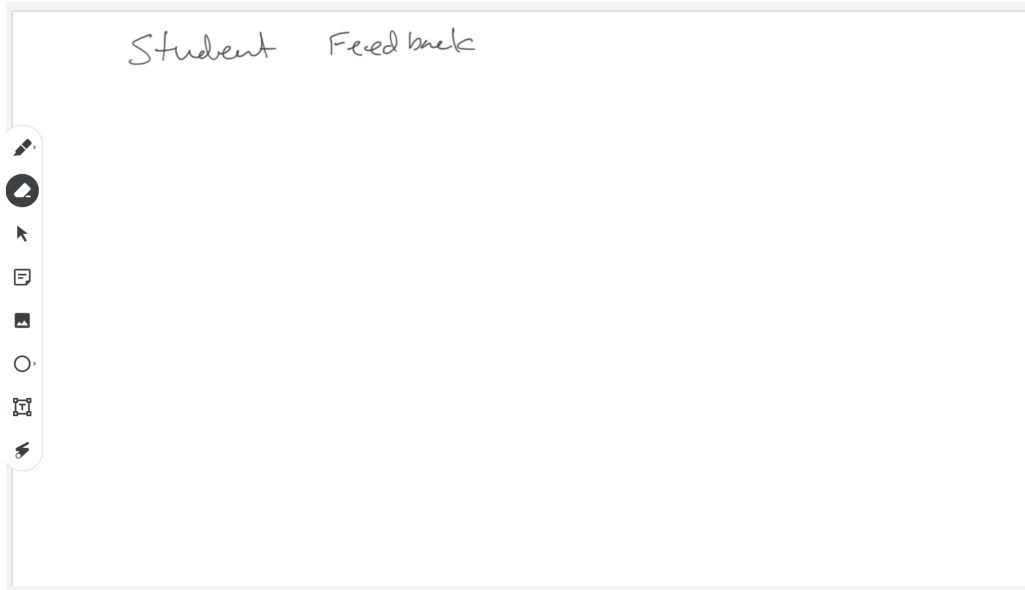
Remember! You're exploring a brand new topic: unanswered questions and a basket of unknowns are the best thing you can have. Please share them with me, as I'll track these and see how we progress over the course of the week. -- Mr. C

Share With Class

Lesson 2 Instructional Materials:

In lesson 2, I'll give students direct instruction on rational functions. I created an unfinished set of slides that I'll use to help guide my note-taking activity, which I will fill in with more detail during instruction. I've included the slides below.

Note-taking Slide 1: Student feedback from Lesson 1. This slide is intentionally empty. I will fill in this slide after lesson 1 is complete, and use this as a jumping off point for lesson 2.

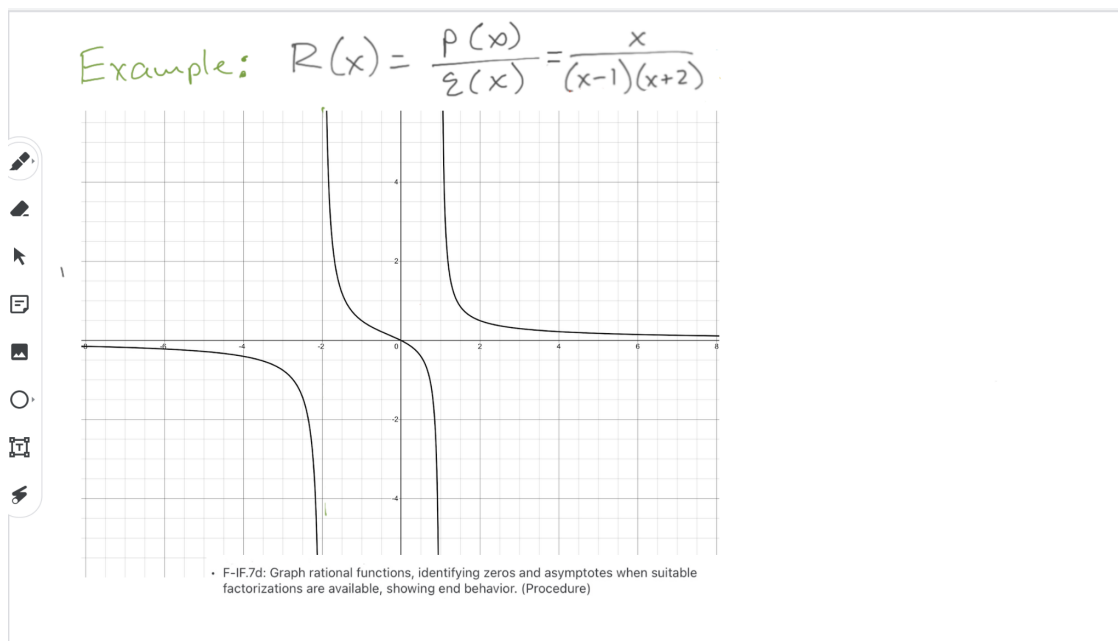


Note-taking Slide 2: Definition of a rational function. I plan to use the empty space to show examples and talk about specific functions.

- A-APR.7: Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression. (Concept)

A digital whiteboard slide with a light gray border. At the top, the words "Rational Functions" are written in a cursive, handwritten font and underlined. Below this, the text "A rational function" is written. The equation $R(x) = \frac{P(x)}{Q(x)}$ is written, followed by the word "where". Below the equation, the text "p and q are polynomials" is written, followed by "and q is not zero" and "(not the zero polynomial)" in parentheses. On the left side, there is a vertical toolbar with icons for a pencil, a circular arrow, a pointer, a document, a square, a circle, a grid, and an eraser.

Note-taking Slide 3: Example rational function. I'll use this example throughout the instruction, and use the empty space on this slide to compute properties of this specific function.



Note-taking Slide 4: Definition of specific properties of rational functions.

- A rational function is zero when $p(x) = 0$. *
- A rational function has a vertical asymptote when $q(x) = 0$. *
- A rational function has a hole (removable discontinuity) when $p(x) = 0$ AND $q(x) = 0$.
- End behavior: Value of $R(x)$ when $x \rightarrow \infty$ and when $x \rightarrow -\infty$.
- Positivity/negativity: Where $R(x)$ is positive and negative.

Example:
 $R(x) = \frac{x}{(x-1)(x+2)} = \frac{p(x)}{q(x)}$

Note-taking Slide 5: In-class activity, giving students a chance to apply what they have learned.

Your turn:

- 1) Find the zeros and asymptotes of the following function, without graphing.
- 2) Determine the intervals where it is positive and negative.

$$f(x) = \frac{x+1}{x(x+4)} = \frac{P(x)}{Q(x)}$$

Note-taking Slide 6: Displaying the process of drawing a rough graph of rational functions.

Put it all together:

$$f(x) = \frac{(x^2 + 3x + 2)(x - 2)}{(x^2 - 6x + 8)}$$

- 0) Factor!
- 1) Find zeros
- 2) Find asymptotes
- 3) Find holes
- 4) Determine positivity/negativity
- 5) Find end behavior
- 6) Draw rough graph!

Note-taking Slide 7: Homework assignment, due at the beginning of Lesson 3.

- Homework due Thursday (from two sections - crazy I know):
 - Ch. 4.2, p200 - 201
 - 6 - 9 all
 - 11, 15, 21
 - 26, 27
 - Ch. 4.3, p210 - 212
 - 5, 6
 - 7, 32, 33, 37
 - 63

Lesson 3 Instructional Materials:

Lesson 3 consists of an in-class lab activity guided by a worksheet. See the worksheet on the following pages. Please note that I've included the KEY pages for the activity, though some were omitted to ensure proper page count.

Students used meter sticks, small mirrors, wood blocks, laser pointers and masking tape to complete this assignment, creating a lab setup similar to the image below.

