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Focus on High School: Using Meaningful Discourse and High Quality Tasks

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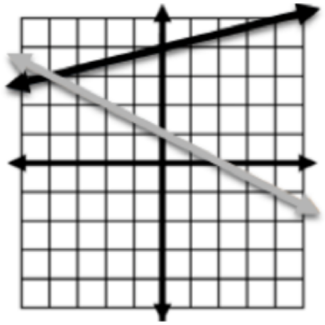
Goals

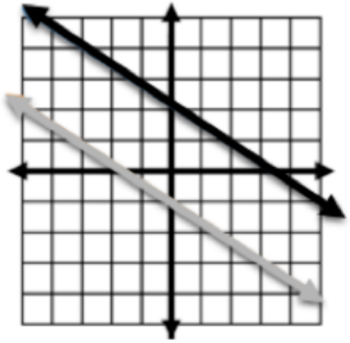
- Use high quality tasks to engage students while meeting mathematical learning goals
- Use technology to enhance hybrid, face to face, and virtual learning experiences
- Use tasks and technology to create discussion and learning opportunities for each and every student
- Share our experiences

Which of these doesn't belong?



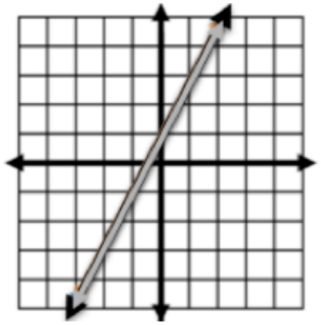
$y = \frac{1}{4}x + 4$

$y = -\frac{1}{2}x + 1$



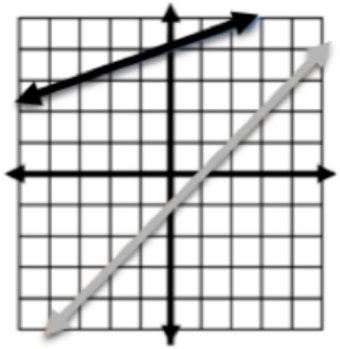
$y = -\frac{2}{3}x + 2$

$y = -\frac{2}{3}x - 1$



$y = 2x + 1$

$2y = 4x + 2$



$y = \frac{1}{3}x + 4$

$y = x - 1$

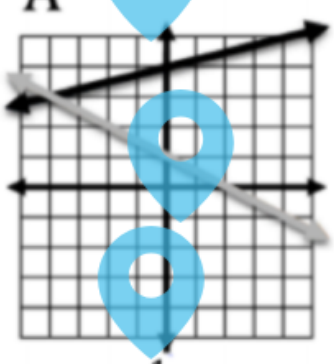
Students, drag the icon!

Pear Deck Interactive Slide
Do not remove this bar

Credit: Jay Sydow
Lexington Public Schools, SC

Which one does not belong? - Drag your marker onto your choice.

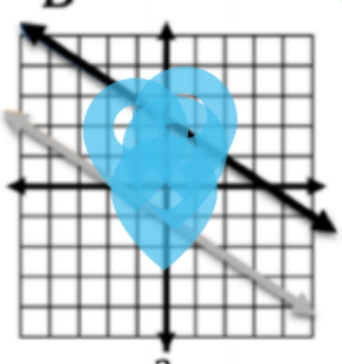
A



$y = \frac{1}{4}x + 4$

$y = -\frac{1}{2}x + 1$

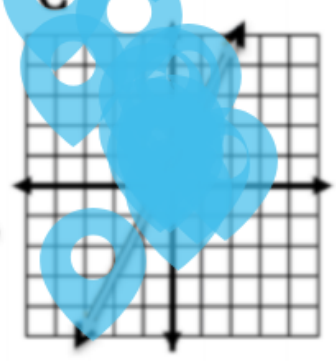
B



$y = -\frac{2}{3}x + 2$

$y = -\frac{2}{3}x - 1$

C



$y = 2x + 1$

$2y = 4x + 2$

D

$y = \frac{1}{3}x + 4$

$y = x - 1$

A because it is the only one where the lines intersect

Explain your reasoning here

Show your work or write about how you made your decision

$m = \frac{-2}{3}$

For both lines so the slopes are the same and the

lines won't intersect

C- The equation y=mx+b is demonstrated throughout each equation except the bottom part of C. All the equations end with y by itself except C. Plus C does not have two separate lines with space in between. The lines are on to of each other instead of saying they intersect or are parallel.

c because there is no fraction in the equations but the rest have them

I chose D because the lines have different slopes and don't intersect on the graph.

How does this task (or something similar to it):

Encourage student discourse about a task

Assess student understanding of a previously learned concept

Set the stage for the day's class

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Link to W1DB

https://docs.google.com/presentation/d/1wsP5KcmUu-eTcXUtw3WFV1K9hWweMiluCFkdIetSvs0/edit?usp=sharing

Effective Mathematics Teaching Practices

- Establish mathematics goals to focus learning
- **Implement tasks that promote reasoning and problem solving**
- Use and connect mathematical representations
- **Facilitate meaningful mathematical discourse**
- Pose purposeful questions
- Build procedural fluency from conceptual understanding
- Support productive struggle in learning mathematics
- **Elicit and use evidence of student thinking**

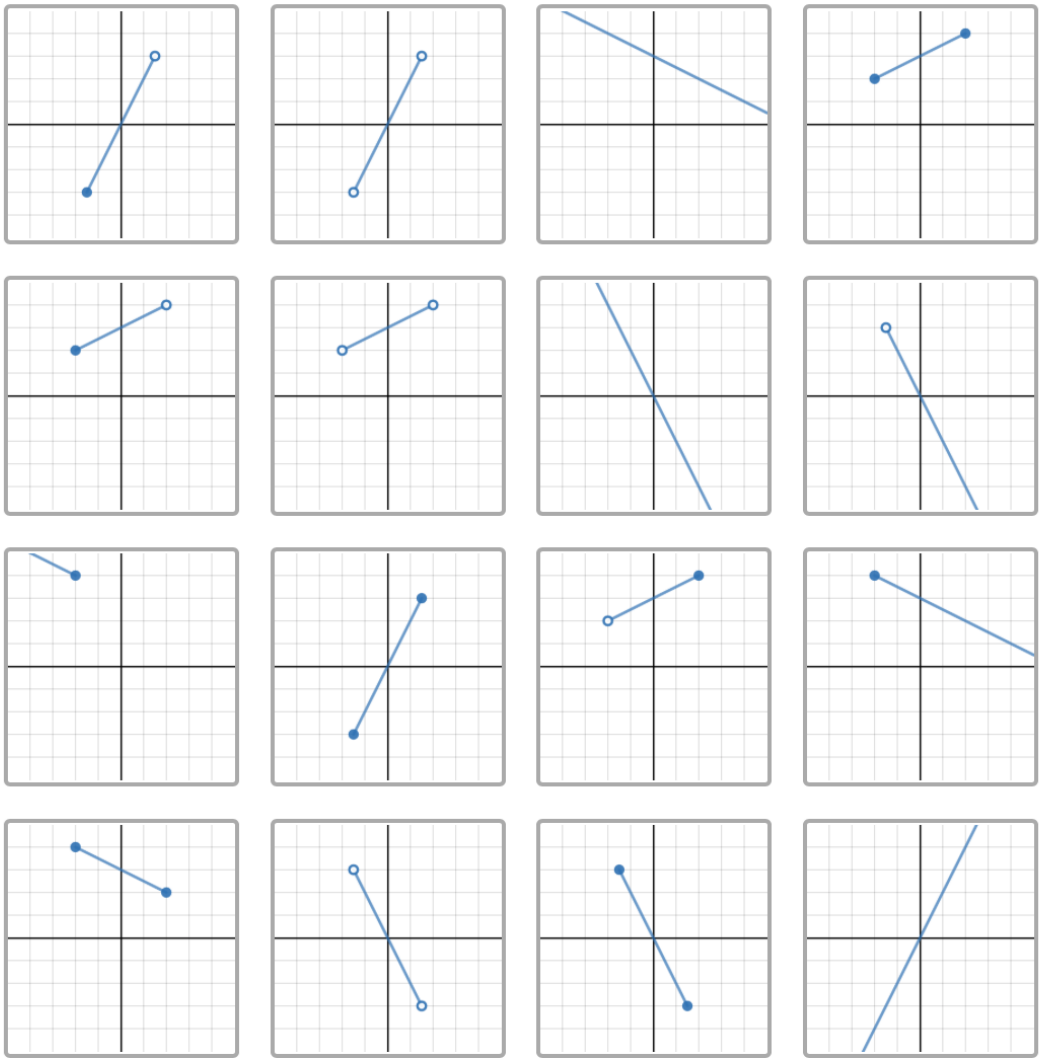
Polygraph

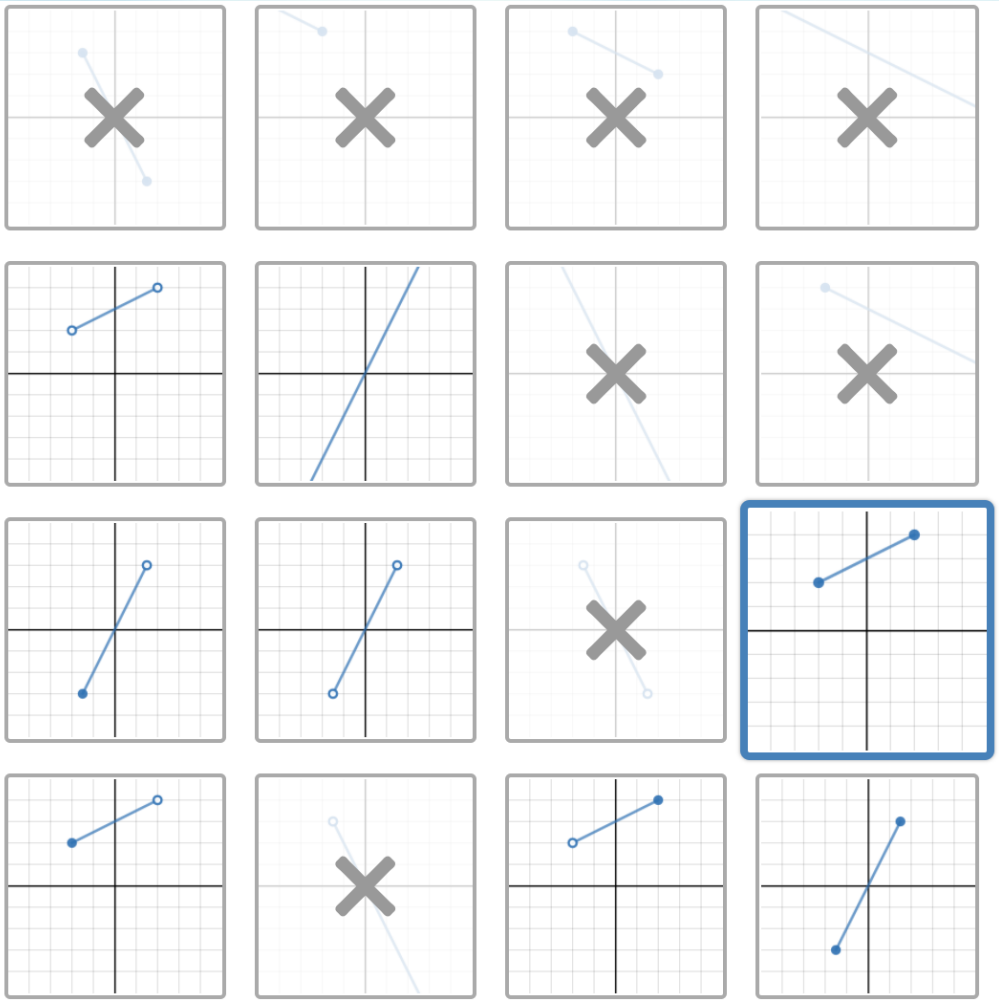
This Desmos activity (Polygraph: Domain and Range NCTM Series) is available at:

https://teacher.desmos.com/polygraph/custom/5fceac911afdfe0d21e130d7

Select a graph that's special to you for any reason.

Next





Your Partner: Mr. Bokar

YOUR PARTNER ASKED

Does your function have a positive slope?

YOU CHOSE

Yes

Watch your partner eliminate graphs based on this information.

Your Partner: Mr. Bokar

YOUR PARTNER ASKED

Does your function have a positive slope?

YOU CHOSE

Yes

YOUR PARTNER ELIMINATED

× × × × × × × ×

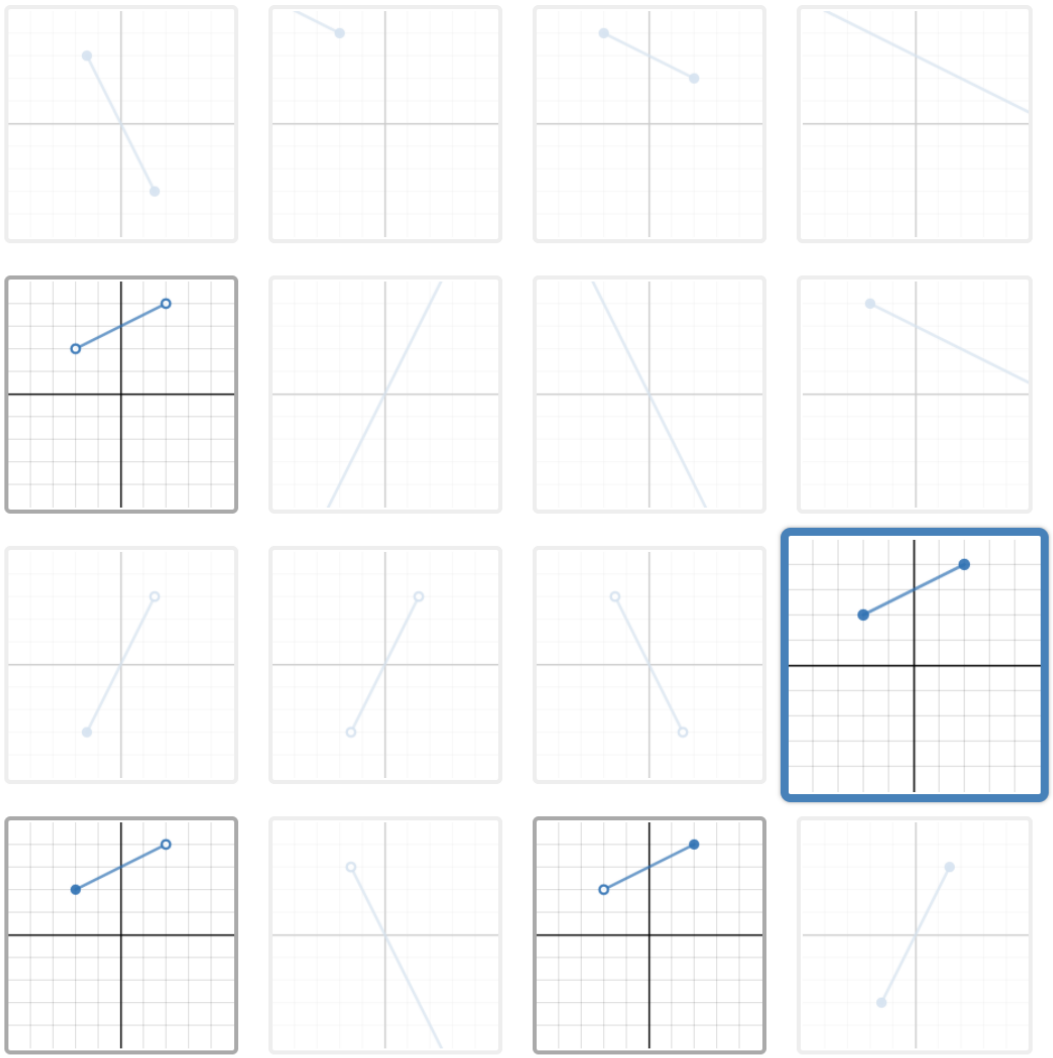
YOUR PARTNER ASKED

Does it have one open circle?

YOU CHOSE

I Don't Know

Watch your partner eliminate graphs based on this information.



Your Partner: Mr. Bokar

Does your function have a positive slope?

YOU CHOSE
Yes

YOUR PARTNER ELIMINATED
× × × × × × × ×

YOUR PARTNER ASKED
Does it have one open circle?

YOU CHOSE
I Don't Know

YOUR PARTNER DIDN'T ELIMINATE ANY GRAPHS

YOUR PARTNER ASKED
Does your function go through (0,0)?

YOU CHOSE
No

YOUR PARTNER ELIMINATED
× × × ×

Waiting for your partner's question...

Other students in your class asked their partners these questions:

MR. BOKAR
Does your function include the point (-2,2)?

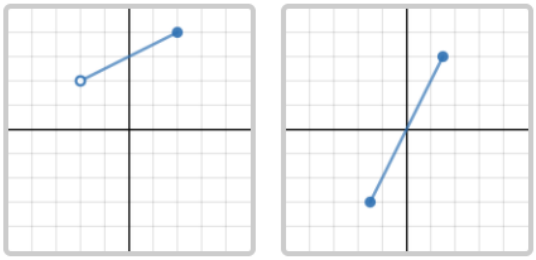
MR. BOKAR
Does your function go through (0,0)?

MR. BOKAR
Is the point (2,4) on your graph?

MR. BOKAR
Does it have one open circle?

MR. BOKAR
Does your function have a positive slope?

At the end of the game, you have these two graphs remaining:



Ask a question to help you figure out the difference between these two cards.

Is the slope greater than 1?

Submit

Discourse

What questions do you want the class to discuss after playing two or three rounds of Polygraph?

How can this Polygraph help you introduce and/or strengthen:

Concept of domain

Concept of range

Notation

Vocabulary

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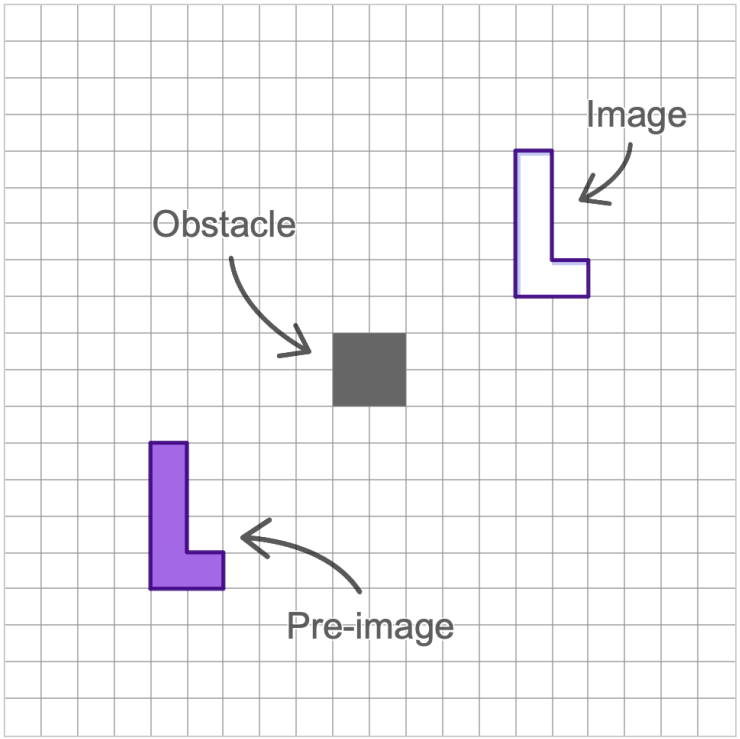
Writing About Learning

STUDENT SCREEN PREVIEW

Welcome!



In this activity, you'll use your understanding of translations, reflections, and rotations to complete a round of transformation golf.

For each challenge, your task is the same: Use one or more of those transformations to transform the pre-image onto the image.

Good luck!

Transformation Golf Rigid Motion available at Desmos.com

https://teacher.desmos.com/polygraph/custom/5d44a1079ef24b0e0b60107d?collections=5d9386f6383d2d0c53a026b5

Using a Google Doc

In your groups, summarize your ideas about how you combined transformations to successfully move one object onto the other object. Each person can add their own thoughts to the document. Here are the appropriate discussion rules:

1) Everyone has a chance to speak. Speak only when others are done speaking.
2) It's okay to disagree, but you need to listen to others and explain your point of view, too.
3) Polite language is expected.
4) Ask questions and help each other; it's one of the best ways to learn.
5) Everyone can edit this document to share their ideas - **respect** everyone's ideas.

Describe your thought processes about moving one figure onto the other in this Desmos activity.

Using a Google Doc

Group Discussion Below Here
Bella- i keep rotating the L first, and then I translated the L and it still isn't lined up. And I still didn't get it. Sam - sydney, you'll probably have to reflect in the middle of the L. I'm not sure what your screen looks like. Sydney- I reflected the L, then translated the L, I did another translation, and lastly I did one more reflection to flip the L and then it fit. Sydney- For the second one, I translated it over to the right. I translated it down, did a reflection, and then I reflected it one more time to fit the L shape. It was a success.

Getting Feedback

Group 5

Your task - discuss these questions and summarize your group's discussion in your box.

- Which words or phrases were **most helpful** to you in this polygraph?
- Which words or phrases were **least helpful** to you in this polygraph?
- What are some things from this activity that you wish you knew the proper word or phrase for?
- What questions do you have after this activity?

Group 5's discussion box. Enter your responses in the next row.
Helpful Does the graph have a triangle in it? Does it have an N in it? Is it in ___ quadrant? Is the graph mirrored? Is it a dilated shape? Does it involve a shape? Not helpful none

Link to Feedback doc

https://docs.google.com/document/d/1jq1-Q1uRBPPhGn6HFqSt3iZ8p2pWs8q_O9QEKl9K2Ho/edit?usp=sharing

Google Doc

What comments and/or questions do you have for this student?

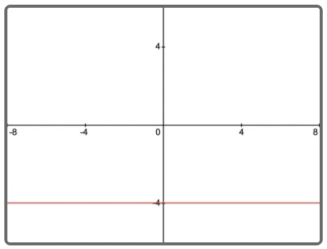
How could you share this in class to ensure discussion?

Desmos Card Sort

https://teacher.desmos.com/activitybuilder/custom/5f94e817ddf6570cf2bc6d56

Put these nine cards into three groups of three according to similarities you see.

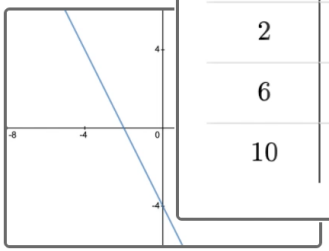
$y = -2x - 4$



x_1	y
-2	0
-1	-2
0	-4
2	-6
3	-8

$y + 4 = \frac{1}{2}x$

x_1	y
-2	-5
0	-4
2	-3
6	-1
10	1



x_1	y_1
-2	-4
-1	-4
0	-4
1	-4

$y = -4$

Desmos Card Sort

What comments and/or questions do you have for this student?

How could you share this in class to start a discussion?

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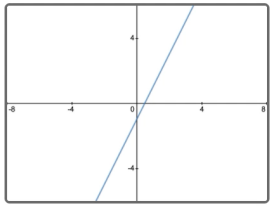
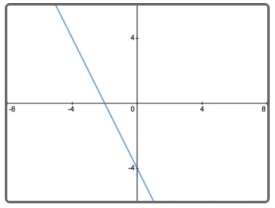
Desmos Card Sort

Put these nine cards into three groups of three according to similarities you see.



x_1	y
-2	0
-1	-2
0	-4
2	-6
3	-8



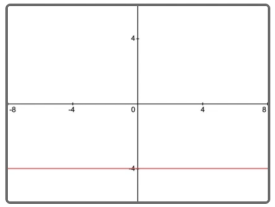
$y = -4$

$y = -2x - 4$

x_1	y
-2	-5
0	-4
2	-3
6	-1
10	1

x_1	y_1
-2	-4
-1	-4
0	-4
1	-4
2	-4

$y + 4 = \frac{1}{2}x$



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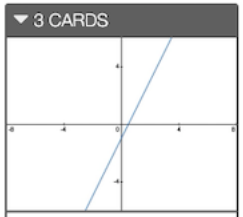
Desmos Card Sort

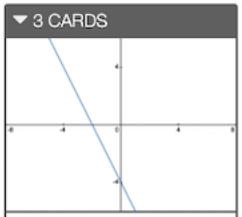
3 CARDS



$y + 4 = \frac{1}{2}x$

x_1	y
−2	0
−1	−2
0	−4
2	−6
3	−8

3 CARDS



$y = -2x - 4$

x_1	y
−2	−5
0	−4
2	−3
6	−1
10	1

3 CARDS

$y = -4$

x_1	y_1
−2	−4
−1	−4
0	−4
1	−4
2	−4

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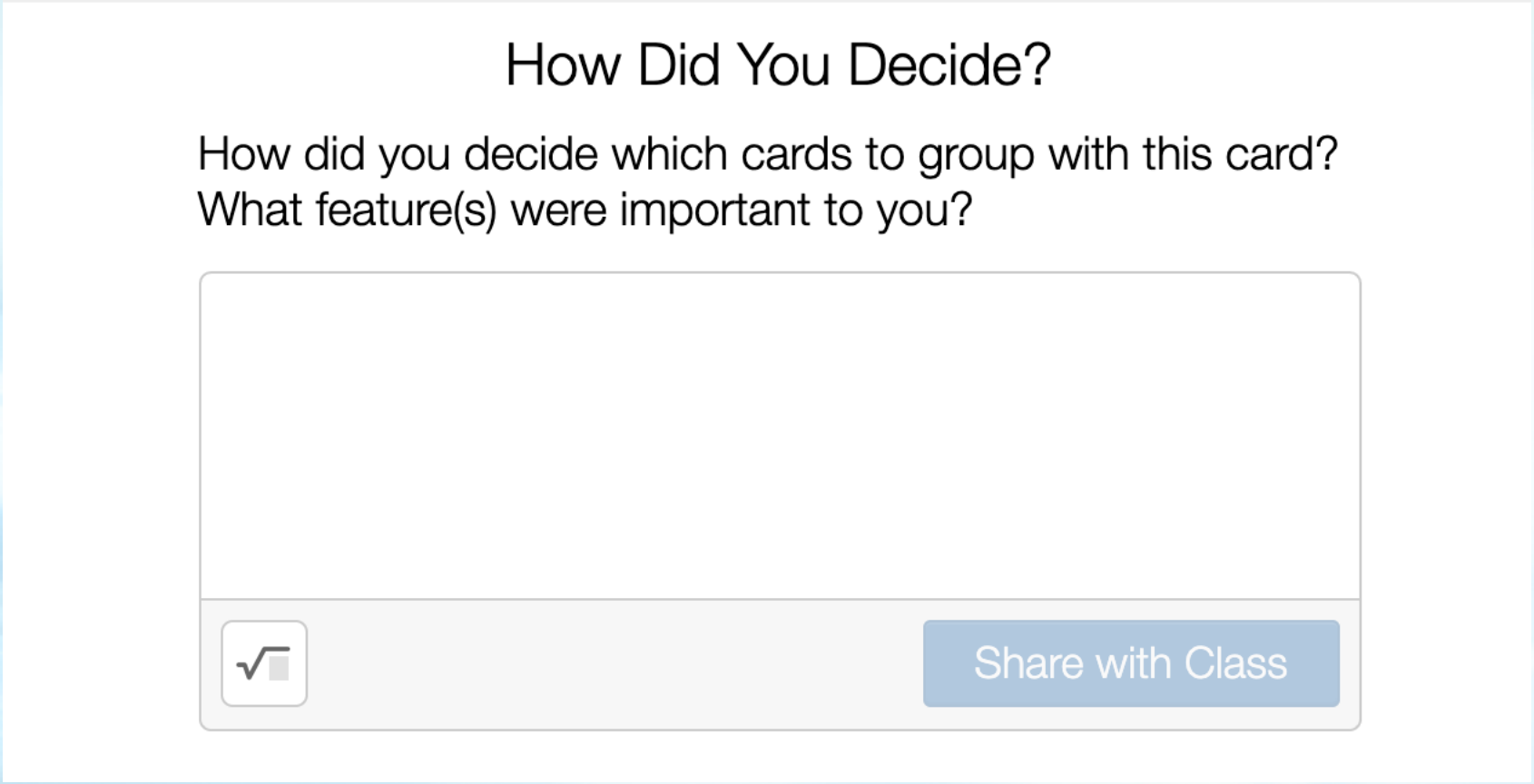
Desmos Card Sort



Using a Card Sort

What are things you could try with a card sort?

How could you use Anthony's Google Doc to learn about student reasoning?

How could a Zoom Breakout room help students discuss what happened?

Questions?

What questions do you have?

Thanks for being here!

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