From Flatland to Numberland   Names:

Geometric functions normally live in Flatland. In this lesson you will take them to visit Numberland. The lesson is here: geometricfunctions.org/fc/unit4/flatland-to-numberland/

WARMUP

In the Warmup activity your task is to find two different ways to help the Reflect function get into Lineland together, without leaving the dependent variable outside.

1. For sketch page 1, describe how you adjusted the mirror to get $r_m(x)$ into Lineland.

2. For sketch page 2, describe another way to get $r_m(x)$ into Lineland, and explain how the two ways are similar and how they're different.

INTRODUCE

There's a novel and several movies about adventures in Flatland, including a trip to Lineland.

REDUCE THE DIMENSION

On each page of the sketch, follow the construction directions under the sketch.

Sketch Page 1 (Reflect):

3. Does $r_m(x)$ stay in Lineland as you vary x?

4. How does $r_m(x)$ move in relation to x?

5. What happens when you change the function rule by dragging P and $Q?$

Sketch Page 2 (Rotate):

6. Does $R_{C,\theta}(x)$ stay in Lineland as you vary x?

7. How does $R_{C,\theta}(x)$ move in relation to x?

8. What happens when you change the function rule by dragging C and θ?

Sketch Page 3 (Translate):

9. Does $T_v(x)$ stay in Lineland as you vary x?

10. How does $T_v(x)$ move in relation to x?

11. What happens when you change the function rule by dragging the vector endpoints?

Sketch Page 4 (Dilate):

12. Does $D_{C,s}(x)$ stay in Lineland as you vary x?

13. How does $D_{C,s}(x)$ move in relation to x?

14. What happens when you change the function rule by dragging C and s?

Sketch Page 5 (Glide Reflect):

15. Does $G_v(x)$ stay in Lineland as you vary x?

16. How does $G_v(x)$ move in relation to x?

17. What happens when you change the function rule by dragging the vector endpoints?

Summarize:

18. Which families have the most interesting experiences? Explain.

NUMBER THE DOMAIN

Sketch Page 1 (Reflect):

19. Describe what you notice about the values in a sentence or two.

20. Use mathematical symbols to summarize your description.

21. Why do you think this happens? Explain.

Sketch Page 2 (Rotate):

22. Describe what you notice about the values in a sentence or two.

23. Use mathematical symbols to summarize your description.

24. Why do you think this happens? Explain.

Sketch Page 3 (Translate):

25. Describe what you notice about the values in a sentence or two.

26. Use mathematical symbols to summarize your description.

27. Why do you think this happens? Explain.

Sketch Page 4 (Dilate):

28. Describe what you notice about the values in a sentence or two.

29. Use mathematical symbols to summarize your description.

30. Why do you think this happens? Explain.

Sketch Page 5 (Glide Reflect):

31. Describe what you notice about the values in a sentence or two.

32. Use mathematical symbols to summarize your description.

33. Why do you think this happens? Explain.