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Spinner Rotation vs Time - Sine

The tasks in this handout refer to three outside resources: 1) the Spinner Simulator; 2) the Spinner Simulation Tasks; and 3) the Spinner Rotation Videos. These resources can be found online at the Spinner Math homepage at http://www.harryomalley.com/spinnermath.

Math To Simulations To Words

Let *x* = time, in seconds and *f(x)* = spinner rotation, in degrees. Let $f(x) = 50sin(x)$, $0 \leq x \leq 5$ describe the relationship between rotation and time for the spinner. Using the Spinner Simulator, find the value of $f(0), f(1), f(2), f(3), f(4),$ and $f(5)$ and be prepared to explain the meaning of the input and output for each. Fill out your answers in the table below.

x	$f(x)$
0	
1	
2	
3	
4	
5	

Without pressing the Play button on the Spinner Simulator, try using the data in the table to describe, in your own words, what the spinner does from 0 to 5 seconds.

Press the play button on the Spinner Simulator to watch what the spinner does. Add more detail to your description below based on anything new that you notice from the simulation:

Words to Words

Each of the following shows precise and accurate language to use when describing a spinner that is spinning according to the functions in this module. For each one, read it and rehearse it in your head until you think you can re-write it without looking at it. Then try to write it. Only look if you really need to.

1. A spinner oscillates between -50 degrees and 50 degrees with a period of 2π seconds from 0 seconds to 5 seconds.

2. A spinner oscillates between 20 degrees and 230 degrees with a period of 1 second from 3 seconds to 13 seconds.

Math to Simulation to Words

For each problem, mentally predict what its simulation will do. Then simulate it. Finally, for each one, describe the rotation of the spinner over time in words.

3. $f(x) = 50sin(x), \quad 0 \le x \le 20$

4. $f(x) = 50sin(x) + 60, \quad 0 \le x \le 20$

5. $f(x) = 50sin(2x) + 60, \quad 0 \le x \le 20$

6. $f(x) = 80sin(2\pi x) + 30, \quad 5 \le x \le 30$

Words to Math to Simulation

Translate the following descriptions into mathematical functions. Verify your results by simulating them.

7. A spinner oscillates between -70 degrees and 70 degrees with a period of 2π seconds from 0 seconds to 6 seconds

8. A spinner oscillates between -70 degrees and 70 degrees with a period of 1 second from 8 seconds to 23 seconds.

9. A spinner oscillates between 40 degrees and 320 degrees with a period of π seconds from 300 seconds to 330 seconds.

10. A spinner oscillates between -90 degrees and -210 degrees with a period of 3 seconds from 0 seconds to 60 seconds.

Simulation to Simulation

Problems 11-14 involve completing the 4 Sine Spinner Simulation Tasks online. The answer to each puzzle is a function. Once you've solved each puzzle, record the answer function below.

11. _____

12. _____

13. _____

14. _____

Concrete to Words

Problems 15 and 16 involve watching the Sine Spinner Rotation Video. In the video, there are two different spinner rotation sequences. Describe each rotation sequence in words. You will have to estimate many of the values.

15. Description of the first spinner movement:

16. Description of the second spinner movement:

Concrete to Math to Simulation

Problems 17 and 18 involve watching the Sine Spinner Rotation Video. In the video, there are two different spinner rotation sequences. Write a function to describe each. Verify your results by simulating them.

17. Function for the first spinner movement:

18. Function for the second spinner movement:

Concrete to Concrete

Problems 15 and 16 involve watching the Sine Spinner Rotation Video and trying to copy what you see using your own fidget spinner and straw. For best results controlling the spinner with your straw, use a flexible elbow straw. Lay the straw flat on the surface that the spinner is on and bend the elbow up to blow. Having the straw laying flat on the surface makes controlling the spinner a lot easier.

19. I recreated the first spinner movement:

☐

20. I recreated the second spinner movement:

☐

Math to Concrete

Using a real fidget spinner, translate the following math functions into reality. Check off each one when you finish.

☐ 21. $f(x) = 60sin(x)$, $0 \leq x \leq 8$

☐ 22. $f(x) = 180sin(\pi x)$, $0 \leq x \leq 8$

☐ 23. $f(x) = 40sin(\pi x) + 180$, $4 \leq x \leq 10$

☐ 24. $f(x) = 10sin(4\pi x)$, $2 \leq x \leq 9$

Words to Concrete

Translate the following descriptions into reality. In other words, make your spinners do what these words describe. Check off each one when you finish.

☐ 25. A spinner oscillates between -60 degrees and 60 degrees with a period of 2 seconds from 0 to 4 seconds.

☐ 26. A spinner oscillates between -100 degrees and 100 degrees with a period of 4 seconds from 0 to 4 seconds

☐ 27. A spinner oscillates between 30 degrees and 130 degrees with a period of 2π seconds from 0 seconds to

☐ 28. A spinner oscillates between -50 degrees and 50 degrees with a period of 2π seconds.

Manifest

Create your own spinner rotation. Describe it in words and math symbols. Then simulate it and make it a reality with your spinner. Post your results at #spinnermath !