

Spirograph activity

Group introduction/discussion:

What do you notice?

- Minute: 0:32 (mod 10 from original table)
- Minute 0:52
- Lead them through this one - Minute 1:08 $2x \pmod{10}$
- Minute 1:12 $3x \pmod{10}$

Breakout groups:

Assign groups 4x, 5x, 6x, 7x, 8x, 9x to discuss what they notice on their own (15 minutes). Each group “presents” the patterns on their screen.

- 1:42--write a paragraph about your reactions to this pattern. What do you notice? What is interesting to you?
- Watch the rest. Select a frame of the video that is beautiful to you. What is the timestamp? What about it is beautiful? Describe the mathematics, what do you think is going on?

Classwork:

1. Watch this <https://www.youtube.com/watch?v=oZ9kJQVJPjw&feature=youtu.be>
2. Write your reactions to this video. What mathematics do you think it's related to?
3. Now re-watch the movie with narration. You may need to re-watch segments of it to truly understand what is going on. Be patient.
4. Once you understand that narrated frames, answer the following questions related to the original video: <https://www.youtube.com/watch?v=oZ9kJQVJPjw&feature=youtu.be>
5. Stop the video at minute 1:12. Describe what is going on, in your own words. (Similar to the narration.)
6. Re-watch from the beginning of the video up to minute 1:36.
 - 1) Which of these (name the modulo) is the most interesting to you?
 1. Why?
 - 2) Describe what is going on in the frame you chose.
7. Stop the video at minute 1:42--write a paragraph about your reactions to this pattern. What do you notice? What is interesting to you?
8. Watch the rest. Select a frame of the video that is beautiful to you. What is the timestamp? What about it is beautiful? Describe the mathematics, what do you think is going on? Include any other insights. This should be at least one paragraph. You may include doodles if you'd like.