

The Yo-Yo Problem

Adapted from PBS Mathline: <http://www.pbs.org/teachers/mathline/lessonplans/pdf/hsmp/yoyo.pdf>

Mathematical Goals

- Explore linear patterns.
- Create one variable and two variable linear equations.
- Graph equations on coordinate axes with labels and scales.

Common Core State Standards

MCC9-12.A.CED.1

MCC9-12.A.CED.2 MCC9-12.A.CED.3

MCC9-12.N.Q.1

MCC9-12.N.Q.2

MCC9-12.N.Q.3

MCC9-12.A.SSE.1

MCC9-12.A.SSE.1a

MCC9-12.A.SSE.1b

Standards for Mathematical Practice

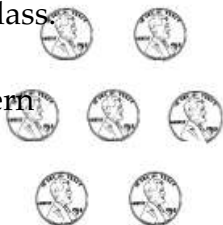
- 1. Make sense of problems and persevere in solving them.**
- 2. Reason abstractly and quantitatively.**
- 4. Model with mathematics.**
- 6. Attend to precision.**
- 7. Look for and make use of structure.**
- 8. Look for and express regularity in repeated reasoning.**

Part 1: The Yo-Yo Problem

Andy wants to buy a very special yo-yo. He is hoping to be able to save enough money to buy it in time to take a class in which he would learn how to do many fancy tricks. The 5-ounce aluminum yo-yo costs \$89.99 plus 6% sales tax. Andy has already saved \$17.25, and he is earning \$7.20 a week by doing odd jobs and chores. How many weeks will it take him to save enough money for the yo-yo?

1. How much sales tax will Andy have to pay?
2. What will be the total cost of the yo-yo, including tax?
3. Let w be the number of weeks that it will take Andy to save enough money to buy the yo-yo. Write an algebraic equation that will help you solve the problem.
4. Solve your equation for w , and check your answer. Be prepared to present your solution to the class.

Part 2: The Penny Pattern



5. Create a pattern using pennies. Stage one of the pattern is shown above—one penny surrounded by six additional pennies. To create each additional stage of the design, place more pennies extending out from the six that surround the center penny. Continue making this design until you have used up all of your pennies. On the back of this sheet, sketch the first four stages of the pattern.

6. Using your penny pattern or the sketches of your penny pattern, create a table of values.

Stage Number, n	1	2	3	4	5
Number of Pennies Required					

7. How many pennies are needed to make stage 6, stage 7, and stage 8 of the penny pattern? How did you determine your answer?

8. Write an algebraic model that expresses the relationship between the stage number, n , and the number of pennies required to make that design, p .

9. Use your model to determine how many pennies are needed to make stage 80, stage 95, and stage 100 of the penny pattern.

10. If you use 127 pennies to make the penny pattern, how many pennies will be in each spoke coming out from the center penny?