

Logarithms: How Long Until I Double My Money?

Project Goal:

Students will use logarithms to determine the amount of years it will take to increase their money to a desired multiplier (i.e. Doubling or Tripling)

Standard:

[CCSS.MATH.CONTENT.HSF.BF.B.5](#)

(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

Student Guide

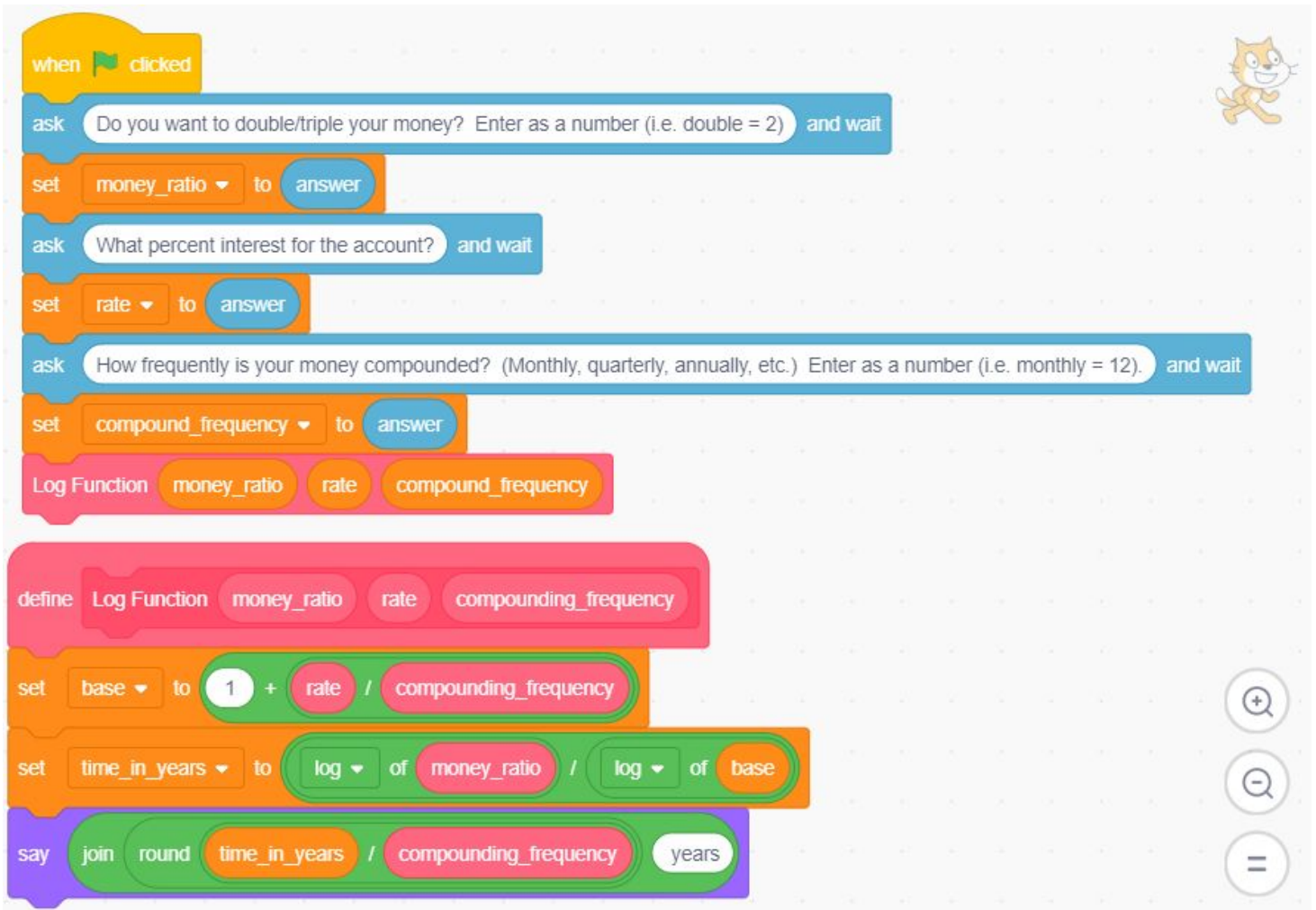
Teacher Notes:

Previous to running this lesson it's ideal if students have had lessons both on compound interest and the structure of logarithms.

You should follow the link to the student guide above so that you have experienced the lesson as a student prior to running in your classroom. In algebra II courses the lesson has taken 45 minutes on average to complete. If the class gets stuck on a step in task 2, it can be very empowering if you let a student share their approach to the class, but make sure they don't give information into past the step being examined.

Best of Luck!

Possible Solution:



The image shows a Scratch script for calculating the time to reach a certain amount of money with compound interest. The script starts with a 'when clicked' event, followed by three 'ask' blocks to get user input for the money ratio, interest rate, and compounding frequency. These inputs are stored in variables. A 'Log Function' block is used to calculate the time in years, which is then rounded and displayed with a 'say' block.

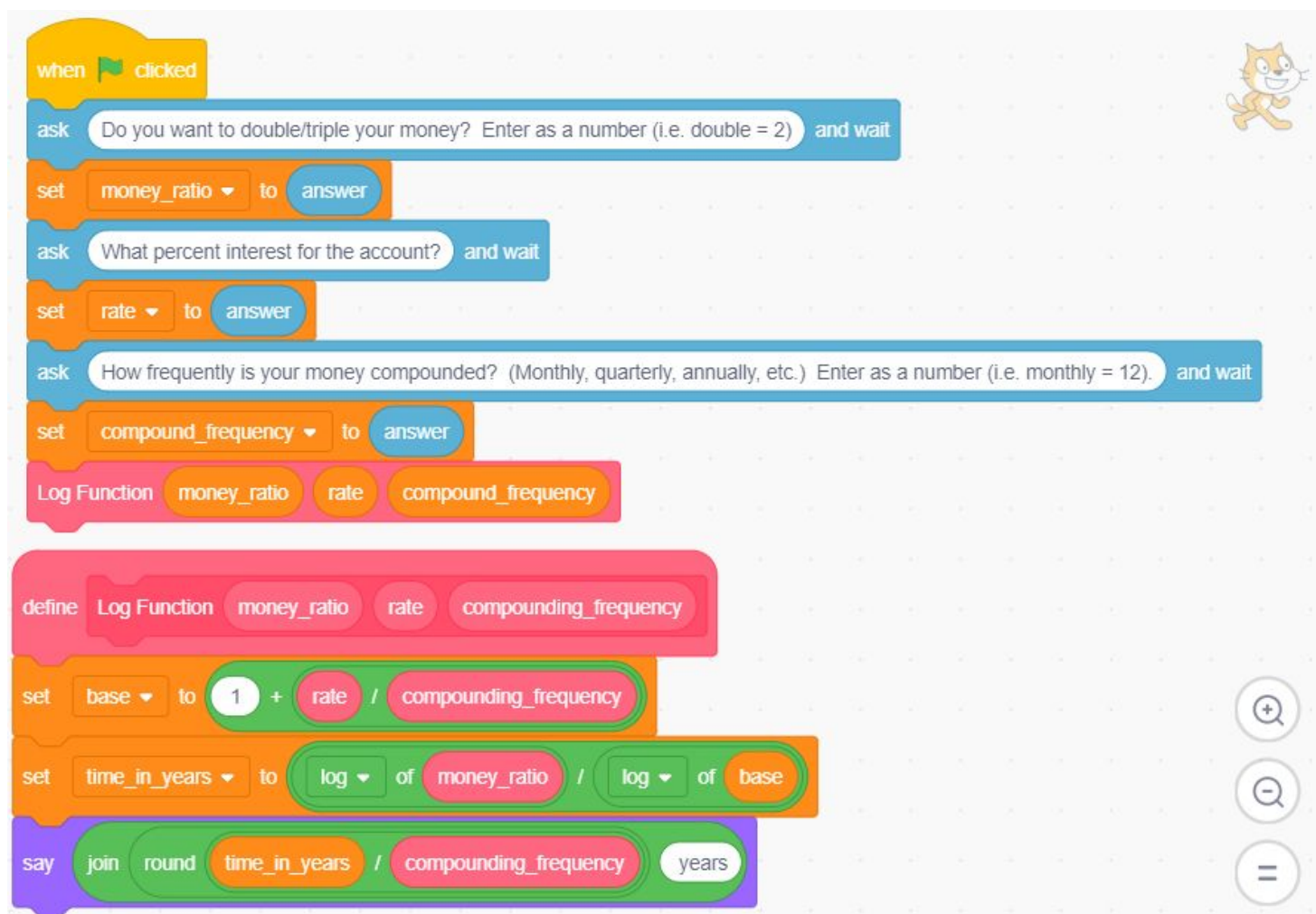
```
when clicked clicked
ask "Do you want to double/triple your money? Enter as a number (i.e. double = 2)" and wait
set money_ratio to answer
ask "What percent interest for the account?" and wait
set rate to answer
ask "How frequently is your money compounded? (Monthly, quarterly, annually, etc.) Enter as a number (i.e. monthly = 12)." and wait
set compound_frequency to answer
Log Function money_ratio rate compound_frequency

define Log Function money_ratio rate compounding_frequency
set base to 1 + rate / compounding_frequency
set time_in_years to log of money_ratio / log of base
say join round time_in_years / compounding_frequency years
```

#CSandMath



@BoundsofoutMath & @ashleyantewes



The image shows a Scratch script for calculating the time to double or triple money with compound interest. The script starts with a 'when clicked' event, followed by three 'ask' blocks for user input: 'Do you want to double/triple your money? Enter as a number (i.e. double = 2)', 'What percent interest for the account?', and 'How frequently is your money compounded? (Monthly, quarterly, annually, etc.) Enter as a number (i.e. monthly = 12)'. Each 'ask' block is followed by a 'set' block to store the input in variables: 'money_ratio', 'rate', and 'compound_frequency'. A 'Log Function' block is used to call a custom function. The custom function 'Log Function' is defined with three arguments: 'money_ratio', 'rate', and 'compounding_frequency'. Inside the function, 'base' is set to $1 + \frac{\text{rate}}{\text{compounding_frequency}}$. 'time_in_years' is set to $\frac{\log(\text{money_ratio})}{\log(\text{base})}$. Finally, a 'say' block displays the result as 'round(time_in_years / compounding_frequency) years'.

```
when clicked
ask Do you want to double/triple your money? Enter as a number (i.e. double = 2) and wait
set money_ratio to answer
ask What percent interest for the account? and wait
set rate to answer
ask How frequently is your money compounded? (Monthly, quarterly, annually, etc.) Enter as a number (i.e. monthly = 12) and wait
set compound_frequency to answer
Log Function money_ratio rate compound_frequency

define Log Function money_ratio rate compounding_frequency
set base to 1 + rate / compounding_frequency
set time_in_years to log of money_ratio / log of base
say join round time_in_years / compounding_frequency years
```

#CSandMath



@BoundsofoutMath & @ashleyantewes