



# The Legend of the Chessboard

## #CSandMath

### Project Goal:

Students will understand the power of exponential growth and be able to write programs that allow them to solve problems related to arithmetic and geometric sequences including the Legend of the Chessboard story.

### Standards:

8.2.1.4 Understand that an arithmetic sequence is a linear function that can be expressed in the form  $f(x)=mx+b$ , where  $x = 0, 1, 2, 3, \dots$

8.2.1.5 Understand that a geometric sequence is a non-linear function that can be expressed in the form  $f(x)=ab$  to the  $x$  power, where  $x = 0, 1, 2, 3, \dots$

8.2.2.5 Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.

### Commands:

```
#Variable      #For Loop
value =        For n in range (5):    print(total)
```

**Python Video Tutorials:** Play if students are stuck in one of these areas...

<a href="#">Math Operations</a>	<a href="#">Variables</a> ( @ 2:30 )	<a href="#">For Loops</a>	<a href="#">Functions</a>	<a href="#">Concatenation</a>
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## Student Handout





### Teacher Guide:

Pass out the student guide linked above and have the students read the short story of the Legend of the Chessboard. Then, lead a discussion about the questions that they have. Student will likely ask about how much rice the inventor would actually receive. Intrigue them and ask them to make estimates! Preview this [video clip](#) of the story and if you think it's a good fit, play it for your class.

Please note that you will have to define the vocabulary of arithmetic and geometric sequences have been left to you as the teacher to define and discuss with your students. In addition, there will need to be conversation about starting with a first term versus a zero term.

### Solutions:

1: 3, 5, 7, 9, 11 ...

```
trinket Python3 Run Share
main.py
1 # The Legend of the Chessboard by @Boundsofoutmath
2
3 #Variable
4 value = 3
5
6 #For Loop
7 for n in range (50):
8     print(value)
9     value = value + 2
```

Sequence 2: 8, 11, 14, 17, 20 ...



```
trinket Python3 Run Share
main.py
1 # The Legend of the Chessboard by @Boundsofoutmath
2
3 #Variable
4 value = 8
5
6 #For Loop
7 for n in range (1,64):
8     #print(value)
9     value = value + 3
10 print(value)
```

Initial Code for Legend of the Chessboard:

```
trinket Python3 Run Share
main.py
1 # The Legend of the Chessboard by @Boundsofoutmath
2
3 #Variable
4 value = 1
5
6 #For Loop
7 for n in range (1,64):
8     #print(value)
9     value = value * 2
10 print(value)
```



### Possible solution to Total amount of wheat:

```
trinket Python3 Run Share
main.py
1 # The Legend of the Chessboard by @Boundsofoutmath
2
3 #Variable
4 value = 1
5 total = 1
6
7 #For Loop
8 for n in range (1,64):
9     value = value * 2
10    total = total + value
11    print(total)
```

### Possible Solution Pounds/Tons Conversions:

Note you could teach about different objects such as strings and integers and [concatenation](#) for more robust program displays in these challenges.

```
trinket Python3 Run Share
main.py
1 # The Legend of the Chessboard by @Boundsofoutmath
2
3 #Variable
4 value = 1
5 total = 1
6
7 #For Loop
8 for n in range (1,64):
9     value = value * 2
10    total = total + value
11    print(total)
12
13 lbs = total/7000
14 print(lbs)
15
16 tons=lbs/2000
17
18 print ("That's " + str(tons) + " tons!!")
```

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### Possible Extension Questions:

- 1) How many cubic feet (or meters) of wheat total?
- 2) Claim-Support-Question (CSQ): Was the claim of covering India to a depth of 50 feet an accurate depiction? What information would you need to solve this?
- 3) Create your own funny or amazing fact about the amount of rice with mathematical accuracy. For example, if the rice was stored as great pyramid in Giza, it there would have been \_\_\_\_\_ pyramids.

Functions are a valuable approach to sequences as well and the extension below will guide students through that approach.

## Legend of the Chessboard Function Extension



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