

1. It is possible to fold a piece of paper up to seven times.
Repeatedly fold a strip like this:



Halve the strip lengthwise



Halve again lengthwise

Continue until you have halved the strip seven times. How many parts has the strip been folded into?

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2. Viruses spread through contact. For example, the Zika virus is mainly transmitted by mosquito bites.

The basic reproduction rate (BRR) estimates how many new people will be infected by each person with the disease. Zika has a BRR of about 2.5.

- a. Imagine that there are ten people with Zika virus.
How many new people would get infected by those ten people?
- b. Left unchecked, the newly infected people each infect an average of 2.5 people. After round three how many people are infected with Zika.
- c. How many rounds will it take until 1 million people get infected from the ten people who started with Zika?



3. The inventor of the game of Chess is said to have shown it to the Emperor of India. He was offered a reward.

This was his request:



Put one grain of rice on the first square of the board, two grains on the second square, four on the third square. Carry on like that doubling the number of grains from the previous square.

How many grains of rice will be on the whole board by the end?

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4. Swifty, the Swan, has noticed that every year the area of weed on her lake doubles in size.

This year there is weed over one quarter of the lake.

Should Swifty be worried?

How many years will it take before the whole lake is covered in weed?

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5. Suppose you borrow \$1 off a loan shark. The interest rate is 100% each week. Each week your debt doubles, \$1 then \$2 then \$4, etc.

You start paying \$8 per week off what you owe in week 5.

How long is it before you pay off the loan?



If you increase your payments from \$8 to \$8.50 per week does that make a difference?

6. Extra for experts!

In 1965 Gordon Moore, co-founder of Intel, predicted that the power of computers would double about every eighteen months.

Carry out an internet search using “Transistor count per chip Moore’s law.”

Was Moore correct?

Use data from your search to justify your answer.

