

Three Maths Problems

This worksheet contains three challenging and interesting mathematical problems. The solutions will not come easily. If you can solve any of these problems, you can be proud of your accomplishment. One aspect of learning that we hope to instill in AMSCO students is **persistence**. This means that you will not give up on a hard problem, but will keep attacking a problem, from various directions, until you have cracked it.

In the real world, mathematics is done by **collaboration**, which means working with others. You should work on these problems with your friends, family members and neighbors. You may need to search for useful resources at your local library or on the Internet.

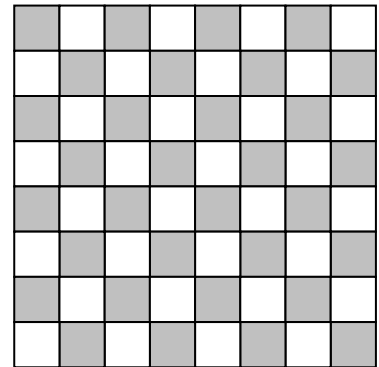
If you have Internet access, you may wish to visit the Dr. Math website, at <http://forum.swarthmore.edu/dr.math/ask.html>

To use this service efficiently, you should first search their archives for an answer to your question. If you can't find the answer in the archives, then you can ask your question by completing a form that is on the web page itself.

Good luck, and I hope you enjoy these problems!

The Chessboard Problem

The game of Chess was invented in ancient Persia over 1000 years ago. The Emperor of Persia was so passionate about this new game that he summoned the slave who invented Chess.



The Emperor said to the slave, "To reward you for inventing this marvelous game, I will grant you one favour."

The humble slave said, "Emperor, I only ask for enough grain to feed my family. Please give me 1 grain of wheat on the first square of the chessboard, 2 grains on the next square of the chessboard, 4 grains on the 3rd square, 8 grains on the 4th square, and so on, up to the 64th square of the chessboard"

The Emperor said, "Is that all you want? I will grant your favour." (Truthfully, the Emperor thought the slave was a fool for asking for so little.)

Budding Genius

How many grains of wheat *in total* were on the chessboard after the first 10 squares were covered? Is this more than you expected?

Genius

How many grains of wheat did the humble slave receive altogether?

Supreme Genius

Assume 10 000 grains of wheat weigh 1 kilogram. Recall that 1000 kilograms equals 1 tonne. A super-tanker can carry 100 000 tonnes of wheat.

How many super-tankers are needed to hold the wheat given to the slave?