Title

Exponential function, chess legend and Indian paratha

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Table of activities

School subject	*Mathematics*
Topic	*Exponential function*
Age	*16 years*
Required time fo the acitivity	*90 minutes*
Required materials	*Chess table, wheat*
Cultural concept	*Exploring chess legend and its Indian origin*

Education Resilience in Europe

Teaching concept

Chess is a game that originated in India and is very popular worldwide. The name "chess" comes from the word for "king" in the language of its origin. According to legend, the inventor of chess was rewarded by being asked to place one grain of wheat on the first square of a chessboard, two on the second, four on the third, and so on, doubling the number of grains on each subsequent square. By the time they reached the 64th square, the total number of grains would be 18,446,744,073,709,551,615, a huge number resulting from rapid exponential growth.

Cultural concept

In this lesson, students will discover the significant contributions to the world of science that India has made. They will also explore a legend of Indian origin and learn about Indian culture. Indian cuisine is also introduced, and one dish, called paratha, is discussed. Paratha is a type of thin bread made from wheat flour, salt, water, and oil, and is commonly served with pickles, curry, eggs, or meat.

Mathematical concept

An exponential function is a mathematical function that follows the formula $f(x) = a^x$, where the input variable x appears as an exponent and a is a positive constant not equal to 1. Exponential functions are widely used in real-world applications to model phenomena such as population growth or decay, financial investments, and other situations where quantities change exponentially over time. The Legend about chess, which has its origins in India, also involves an exponential function.

Aim of activity

The purpose of this activity is to teach students about the real-life applications of exponential functions, as illustrated in the legend about chess.

Activities

This activity consists of three phases:

First, students will learn about the chess legend. According to the legend, the man who invented chess asked the chessman to place one grain of wheat on the first square, two on the second square, four on the third square, and so on until the 64th square had 18,446,744,073,709,551,615 grains of wheat, due to rapid exponential growth. This quantity of grain is so large that not all the grain in India would meet that demand. One popular Indian dish

is paratha, a thin bread made from wheat flour, salt, water, and oil, served with pickles, curry, eggs, or meat.

In the second part, students will explore more about Indian cuisine and experiment with it based on grains.

The third part of the task is to learn about the features of exponential functions, which include a y-intercept, a horizontal asymptote, and a domain of all real numbers. Students could explore graphical representations of function using free educational software GeoGebra (www.geogebra.com).

Additional materials

Figure 1 Chess board
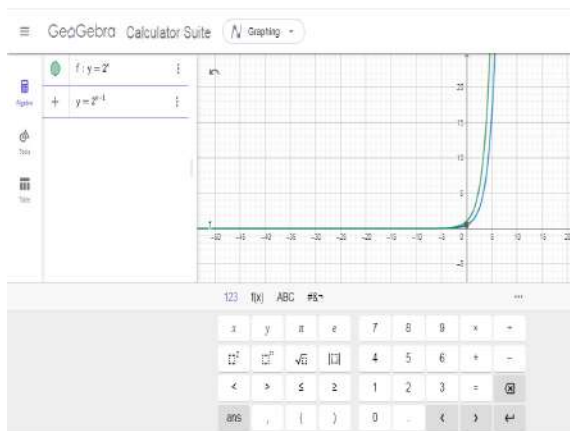

Figure 2 Grains of wheat on the chess board

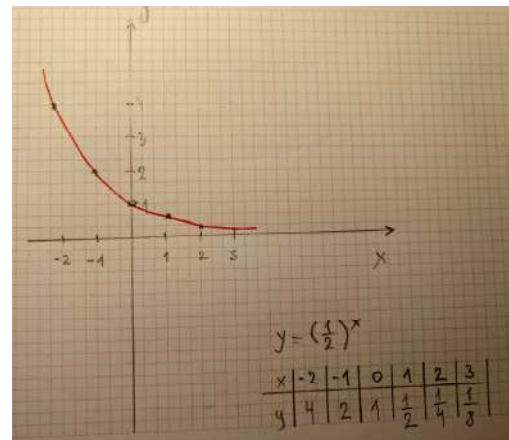Figure 3 Students explore features of exponential function using GeoGebra

Figure 4 Students' work and representation of the function