Best Salary

Summary

This lesson will help students learn that recognizing and using patterns is a valuable problem solving tool.

Main Core Tie

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.2

Additional Core Ties

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.4

Mathematics Grade 6

Strand: STATISTICS AND PROBABILITY (6.SP) Standard 6.SP.4

Materials

- *The King's Chessboard*
- *Which Salary is the Best?* worksheet

Centimeter graph paper

Additional Resources

Books

- *The King's Chessboard*
  , by David Birch; ISBN 0-14-054880-7
- *One Grain of Rice: A Mathematical Folktale*
  , by Hitz Demi; ISBN 059093998X
- *Navigating Through Algebra in Grades 3-5*
  , by Gilbert J. Cuevas and Karol Yeatts; ISBN 0-87353-500-7

Background for Teachers

Finding patterns is the underlying theme of mathematics. Recognizing and using patterns is a valuable problem-solving tool. By exploring, discovering, and analyzing patterns, students can begin to make sense of things in mathematics. Searching for patterns begins with concrete activities, but moves to discovery, application, and a greater sense of understanding.

Intended Learning Outcomes

2. Become mathematical problem solvers.
3. Reason mathematically.

Instructional Procedures

Invitation to Learn

Read *The King's Chessboard* to the point where the wise man makes his request and leaves the hall. Ask the students how much rice they think the wise man will receive before the chessboard is full. Was it a good request for his reward? Why were the counselors and nobles laughing at the wise man's request?

The class will see if the wise man's request was truly wise after the activity.

Instructional Procedures

Pass out copies of the *Which Salary is the Best?* worksheet and discuss the scenario:

You want to buy a go-cart for $1,000 and need to find a job to raise the money. You found job openings to mow lawns with two different companies that have different pay scales. One company, Lawns Are Us, will double your salary each day. You will earn $1 the first day, $2 the second day, $4 the third day, $8 the fourth day, and so on. The second company, Smith Lawn Care will increase your salary by $4 each day. You will make $4 the first day, $8 the second day, $12 the third day, $16 the fourth day, and so on. Which company will help you reach the $1,000 needed to buy a go-cart the fastest?

2.

After reading the scenario, ask students to predict which company would enable them to reach their $1,000 goal the fastest and explain their reasoning in their math journals.
Students create a table for each of the two companies and complete the tables until day 5. Which company pays the most at this point? Write a short paragraph in their journals about which company they would choose at day 5 and why.
Students complete the chart until $1,000 is made by both companies. Which company was the best choice? Why? Have students write a paragraph in their journals explaining what happened with the salaries.
As a class, write a function to find out which salary would pay more on the *n*th day.
Create a multiple line graph on the centimeter graph paper. The x-axis should be Total Earnings and the y-axis should be Number of Days. Have them graph the total earnings of each company in different colors.
Discuss the graph. For what days does Lawns Are Us yield better total earnings? For what days does Smith Lawn Care yield better total earnings?
Does the chart or graph illustrate the information more effectively? Why? Have students record their thoughts in their math journal.
Finish reading *The King's Chessboard* and discuss.

Extensions

Exponential growth is a number pattern that occurs in mitosis, or cell division. An *e-coli* cell is one of the fastest growing bacteria cells. It can reproduce itself in 15 minutes. Have students create a table showing mitosis of an *e-coli* cell in one hour. Have them find a pattern in the growth rate.
Using Excel, have students create a double bar graph comparing the salary of the two different jobs.

Family Connections

Students poll their family members about which job they would choose. Would they rather get $1 the first day, $2 the second day, $4 the third day, $8 the fourth day, and so on? Or would they rather get $4 the first day, $8 the second day, $12 the third day, $16 the fourth day, and so on?
After they get their families opinions, students explain which job is better and why.
Students read *The King's Chessboard* or *One Grain of Rice* with their family.

Assessment Plan

Observation of students creating their tables and graphs.
Class discussion.

- *Which Salary is the Best?*
worksheet and graph.

Bibliography

Research Basis

Brenner, M.E. (1995) The Role of Multiple Representations in Learning Algebra. http://eric.ed.gov ERIC # ED391659
Prealgebra students learned about functions by representing problems in multiple formats. Students' learning that was anchored by a meaningful thematic context had gains in translating word problems into equations, tables, and graphs. The same results were found in lower achieving students and language-minority students.
Capraro, R.M., Kulm, G. & Caprano, M.M. (2002) Investigating the Complexity of Middle Grade Students' Understanding of Mathematical Constructs: An example from Graphic Representation. http://eric.ed.gov ERIC # ED465799
This study examined four components of prior understanding required for graphic representation: coordinate relationships, graphs showing a variety of relationships, reading simple tables, and graphic displays.

Authors

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