What's Your Function?

Summary

Students are presented with conditions that will require the ability to make sense of a mathematical situation with missing information. They will recognize that some function has taken place and their assignment will be to figure out what it was.

Main Core Tie

Mathematics Grade 2

Strand: OPERATIONS AND ALGEBRAIC THINKING (2.OA) Standard 2.OA.1

Additional Core Ties

Mathematics Grade 2

Strand: NUMBER AND OPERATIONS IN BASE TEN (2.NBT) Standard 2.NBT.7

Mathematics Grade 2

Strand: NUMBER AND OPERATIONS IN BASE TEN (2.NBT) Standard 2.NBT.9

Materials

Bag of beans

- Balance the Beans pdf
- Function Box pdf

Empty half-gallon carton

Duct tape

- Function Box Cards pdf

Math Journal

Pencils

Additional Resources

Books

- *Counting Crocodiles*
  , by Jody Sierra and Will Hillenbrand; ISBN 0-15-200192-1
- *Ten Flashing Fireflies*
  , by Philemon Sturges; ISBN 1558586741
- *Seven Blind Mice*
  , by Ed Young; ISBN 0698118952

Background for Teachers

This activity is designed to give the students an opportunity to demonstrate their cognitive skills. Students will be presented with conditions that will require the ability to make sense of a mathematical situation with missing information. Students will recognize that some function has taken place and their assignment will be to figure out what it was.

Intended Learning Outcomes

1. Demonstrate a positive learning attitude.
2. Understand and use basic concepts and skills

Instructional Procedures

Invitation to Learn

Pass out a cup of beans and the worksheet *Balance the Beans* to each student. Draw a picture of the scale and the shapes on the chalkboard. Explain to the students that they can balance the scale by placing beans in the square, circle, and the triangle. Display the following rules on the chalkboard or on chart paper and then discuss them.

Shapes that are the same must have the same number of beans in them.
Shapes that are different must hold a different amount of beans.
All shapes must have some beans.
The two sides must balance by having the same amount of beans on both sides.

Instruct the students to balance 12 beans. Now try and balance it with 15 beans, and finally have them balance 18 beans. Record in their math journal what they have learned from this experience.

Instructional Procedures

Construct the box -- See *Function Box* blackline for instructions.
Create function box cards of 10's, 12's, 15's, 18's, as well as random amounts. The smaller numeral should be written in black and the larger number should be written in blue.
Review with the students what they have learned about the symbols +, -, = and =.
Explain that the *Function Box* performs math functions using the symbols we have just discussed and a missing addend. The students are to use their knowledge to figure out what function is being used and what is the missing addend.
Introduce the acronym T.I.P.S. T represents Thought -- what function is being used? I represents Information -- what information do you know? P represents Plan -- how are you going to solve this problem? S represents solution -- what is the missing addend?
Model to the students how the box works using the function 10 cards. Put a black 3 in the box and pull out a blue 10.
Have the students discuss what they have observed and then using T.I.P.S., record what happened in the function box in their math journals. Model on the chalkboard how this should look in their journals. Students could also include thoughts and pictures (students should have access to beans or another type of manipulative to help if necessary).
Continue working with the function 10 cards, students should create a T.I.P.S. record for all of the problems in their journal.
The next day change which color goes into the box first blue 10 into the box black 3 out of the box. Students should discuss their observations and record their findings in their math journal.
Remind them of T.I.P.S. 10. Continue working with the function 10 cards, students should create a T.I.P.S. record for all of the problems in their journal.
Now model the *Function Box* using the random function cards. This can produce an addition sentence or subtraction sentence. Students should discuss their observations and record their findings in their math journal.
The next day, create a *Function Box* and *Function Box cards* for each student.
Have students work in pairs alternating turns with their *Function Box*. After each turn they should discuss and then record in their journals using T.I.P.S. what they observed.

Extensions

Have students write a story involving the Function Box.
Create easier or more difficult Function Box cards depending upon students' mastery of the skill.
This activity can be adapted to make a station for a math center.

Family Connections

Have the students take home their Function Box and share it with their families.
Have family members create missing addend problems that can be used with the student's function box.

Assessment Plan

Observe how the students work together -- does one student dominate the activity?
Have the students share with you what they are recording in their math journal.
Have a student demonstrate how the box works, walking you through a step-by-step process.

Bibliography

Research Basis

Walters, L. S., (2000). Putting Cooperative Learning to the Test. *Harvard Education Letter*. May/June 2000. (1-6)

Cooperative learning in the classroom has a strong research base in which teachers are moving away from the traditional teaching methods, rearranging their students into groups where they are encouraged to talk and share ideas as they shift to accommodate more teamwork within the classroom. Two essential components need to exist for cooperative learning to lead to significant gains in achievement. The first key component promotes interdependence with groups -- fostering the perception that students must work together to accomplish the goal. The second key component is to hold students individually accountable for demonstrating their understanding of the material. Students cannot "hitchhike" within the group.

Lacampagne, Carole, B. (1993). *State of the Art: Transforming Ideas for Teaching and Learning Mathematics*. Office of Educational Research and Improvement, July 1993. (1-14)

This research covers some fundamental shifts for the teaching and learning of mathematics. For teachers, administrators, and parents, it presents ten ideas for transforming mathematical teaching. A major focus is that all students can and must learn mathematics. Mathematics is not linear and hierarchical teaching rote skills first followed by problems solving later; but builds on that students learn best when they are intellectually challenged so that they are motivated to fill in mathematical gaps when necessary. Teachers need to provide stimulating problems and an environment to motivate mathematical learning.

Authors

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