Introduction

Brain-compatible maths activities are fun and exciting! These activities are often hands on and involve partners, group work and class movement, which many students enjoy. Students frequently say that mathematics is difficult for them. Therefore, as an educator, it is your job to choose materials that are likely to be effective in light of current research on how the brain learns mathematics. This book is filled with activities that are centred on brain research and that are structured to maximise the brain's learning potential.

The activities in this book are designed using a brain-compatible lesson plan format. There are nine components of the plan, but not all nine are necessary for every lesson. Those components that are most relevant to the learning objective should be emphasised:

1. anticipatory set,
2. learning objective,
3. purpose,
4. input,
5. modelling,
6. checking for understanding,
7. guided practice,
8. closure, and
9. independent practice.

Each of the components is described in detail in the book titled *How the Brain Learns Mathematics* (Sousa, 2008). Refer to that book for more brain-compatible maths research and other teaching strategies. When using the activities in this book, read through the activity first. Then begin preparations for the lesson. It is best to follow the lesson plan format to ensure maximum learning potential. However, meeting the needs of each student in your classroom is always first and foremost. Be flexible to ensure that all students are learning. Last, have fun! These activities may force you to step out of your comfort zone. Embrace the change, and watch your students' brains at work.

BLOCKS OF DIVISION

Objective

Students will use place-value blocks and pictures to solve long division.

Anticipatory Set

Write the following situation on the board, and give students a few moments to think about the answer before asking them to respond:

"Gumballs are sold in bags, in tubes and individually. Each bag holds 100 gumballs, and each tube holds 10 gumballs. If three children are given a total of 3 bags, 4 tubes and 2 individual gumballs to share equally, how can we figure out how many gumballs each child gets?" (*divide*).

Purpose

Remind students that *division* is the process by which a starting number, or amount, is divided or distributed into equal groups. Then tell them that they will use place-value blocks and pictures to show what it actually means to divide a large number into equal groups through *long division* before they write and solve it numerically.

Input

Display a set of place-value blocks, and remind students that each square flat represents 100, each stick represents 10 and each small cube represents 1. Stack the blocks to show the equivalent amounts (1 flat = 10 sticks; 1 stick = 10 cubes).

On the board, draw simple picture representations of the place-value blocks, drawing a large square for the hundreds flat, a vertical line for the tens stick and a dot for the ones cube. Label the pictures "1 hundred (100)", "1 ten (10)" and "1 one (1)".

Explain to students that they can use place-value blocks and pictures to help them solve a division problem, such as the gumball example, showing how to distribute and regroup amounts as they solve each step of the division process.

Arithmetic and mathematical knowledge should be based first on concrete situations rather than abstract concepts. Numerical representations help students develop mental models of arithmetic that connect to their intuitive number sense.

Modelling

Return to the gumball example, and remind students that each bag contains 100, just like the hundreds flat, and each tube contains 10, just like the tens stick. Then write the following on the board, using place-value blocks to model the 3 bags (flats), 4 tubes (sticks) and 2 individual gumballs (cubes):

3 bags, 4 tubes, 2 individual gumballs =
3 hundreds, 4 tens, 2 ones =
300 + 40 + 2 =
342

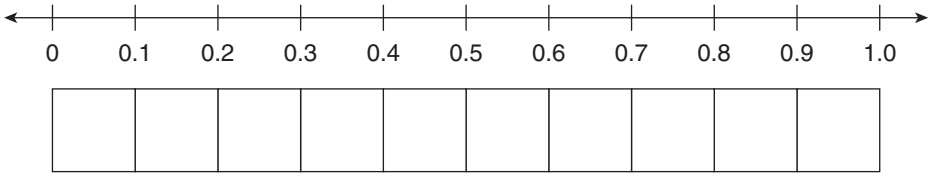
PUT THE DOT ON THE SPOT

Objective

Students will compare and order decimals on a number line.

Anticipatory Set

Draw a large horizontal number line on the board from 0 to 1.0. Mark off every tenth, and label the number line "0", "0.1", "0.2" and so on, up to "1.0". Below the number line, draw a rectangle of the same length. Divide the rectangle into 10 equal parts that correspond with the points on the number line.



Invite students to look at the number line. Count by tenths together in unison from 0 to 1. Point to the number line as you count, moving your hand from left to right. This movement helps demonstrate the order of decimals on a number line.

Compare the number line to the model of the rectangle. Shade in each part of the rectangle as you count from one tenth all the way up to one, moving from left to right to demonstrate that the numbers are getting larger.

Purpose

Tell students that they will be using decimals on a number line to play a game. They will learn how to compare and order decimals on a number line to help their teams earn points during the game.

Input

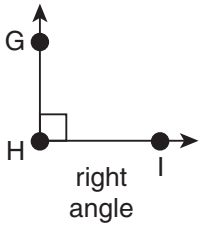
Students are familiar with number lines that show whole numbers. Point out that whole numbers go in order from smallest to largest, moving from left to right. Inform students that decimals also have an order on the number line: "A number line with decimals also has the smallest number on the left and the largest number on the right. When comparing numbers, such as decimals on a number line, the smallest number has the least value, and the largest number has the greatest value."

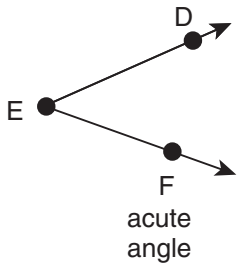
Modelling

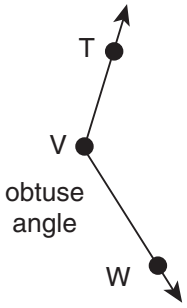
In this activity, volunteers will place a sticky note with a large dot on it on the board to locate a number on the number line. Make sure to have plenty of dot sticky notes available. Model several examples with students.

Name _____ **Date** _____

Detective Angle







My name is Detective Angle. I always solve the case! How do I do it? Easy! I just look for the right angle. Take, for example, the case I had this morning. My neighbour, Snooks, ran over to my house. His cat, Harriet, ran behind him.

"Help!" shouted Snooks.

"Meow!" cried Harriet.

"What's the angle?" I asked.

Snooks explained the situation. "My aunt ran out of cat food, so she took Harriet's! Harriet is really hungry. But my aunt left me a note. Read it!" Snooks shoved the note in my face. I got out my magnifying glass and read the note: *Sorry! I took all the cat food, but I hid one can where you would be sure to find it. Here is the clue: Look for something with four right angles that sits on a shelf. It is Harriet's favourite.*

I looked at Snooks. "Why did your aunt hide the cat food from Harriet?"

"Harriet knows how to use the can opener," Snooks said.

"Meow!" cried Harriet.

"Strange cat," I said. "But I can solve this case. I'll just look for the right angle!"

First, I grabbed my handy dandy Right Angle Tool. Then we ran over to Snooks's house. First thing I did was look for a shelf. There was a bookshelf next to the couch. I pulled off a book. I used my Right Angle Tool to measure the angles of all four corners.

"Bingo!" I cried. "A book has four right angles!"

"How do you know?" asked Snooks.

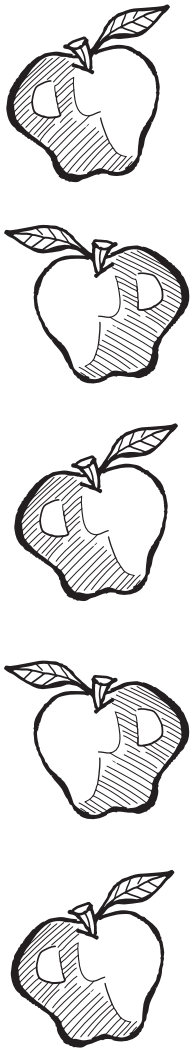
"Because I'm using my handy dandy Right Angle Tool," I explained.

"But you're just using a sheet of paper," Snooks said.

Name _____ Date _____

From Farm to Factory

Directions: Congratulations! You are the proud owner of an apple farm that is ready for harvest. Solve each problem to find out how much money you will make from your apple crop.



Apple Farm Facts

- Apple trees are planted 6.1 m × 6.1 m apart.
- 1 hectare (ha) of land = 10,000 m^2.
- Each tree yields 100 to 200 apples.
- Apples with a diameter ≥ 6 cm are sellable.

Collection Containers

- Rectangular bag: l = 12 cm, w = 8 cm, h = 32 cm.
- Cylindrical basket: d = 37 cm, h = 16 cm.
- Rectangular carton: l = 30 cm, w = 24 cm, h = 20 cm.
- Cylindrical barrel: d = 48 cm, h = 72 cm.
- Rectangular bin: l = 72 cm, w = 80 cm, h = 48 cm.

1. Your apple orchard is 1 hectare in size. About how many trees are in the orchard? _____

2. If each tree produces 100 to 200 apples, what is the minimum number of apples you can expect from your orchard? _____

   What is the maximum number? _____