Abacus

From the desk of the Abacus editor

Hi! I'm Jennifer Weiner (Jack's sister, not his wife!), the new editor of the Abacus. I have just completed the one-year teacher's college program at Brock after previously receiving a degree in Child Studies from Guelph. Currently, I am continuing to take math courses here at Guelph in order to qualify to teach math at the senior level. Over the next year, I will be working very closely with Wendy Ayoub-Wade, Sharon Young and Jane Lind of the Wellington County Board of Education. They, under the auspices of Wellington County, have created and continue to create useful resources and activities for K-8 math classrooms. We will be presenting many of their ideas in this and subsequent issues of the Abacus. However, neither they nor I want to be the sole authors of this section of the Gazette. We want and need your submissions!

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Measurement

Acknowledgement:

The material for this Abacus was created by Wendy Ayoub-Wade, Jane Lind and Sharon Young, consultants for the Wellington County Board of Education. Rather than independent worksheets, Wendy, Jane and Sharon have provided you with a wealth of ideas which you can adapt for your classroom.

Measurement is of central importance to the mathematics curriculum because of its power to help children see that mathematics is useful in everyday life. Measurement brings together the numerical and geometric components of the math program and links them to a world of relevant contexts. Measurement encourages children to be actively involved in solving and discussing problems. The ability to make use of the tools of measurement is one of the most important mathematical skills needed in daily life.

The Measurement Process:

- **Choose a unit**
- **Estimate**
- **Compare unit to object**
- **Report the number and unit**

Measurement is counting. Counting efficiently includes using measuring tools, using rules for counting, and estimation. Measuring places a number label on an objects' attribute. Seldom in real life is measurement exact. This leads to a need to use fractions and decimals. Measurement can and should be integrated within mathematics and other curriculum areas.

Experiences with Cooking

Cooking provides a highly motivating measurement experience for all children. Initial cooking experiences might involve simple preparations, e.g. spread one spoonful of cheese on a cracker or prepare fruit salad and divide it into equal portions for each classmate. Later on, students may work in small groups with a volunteer or follow an assembly line recipe using non-standard or standard units for mass or capacity. Older children will be able to prepare recipes unattended, locate recipes, plan meals or party snacks and calculate costs. Cooking provides a means of integrating curriculum from areas such as language, science, nutrition and mathematics in a real life situation.



Level: K-8

Student Activities:

- Students measure: ingredients, cooking duration
- Students prepare: utensils, ingredients, recipes from instructions
- Students estimate: finished product
- Students compare: quantities of ingredients, cooking times, recipe ingredients to finished product, costs of ingredients, a variety of recipes for the same item, e.g. chocolate chip cookies
- Students graph: cooking times, preferences
- Students solve problems: sharing the product, costs e.g. economy sizes, bulk buying, substituting ingredients
- Students record: recipes, observations, results

Resources: Children's cookbooks, Milk Marketing Board Materials, Cook and Learn

Seeds

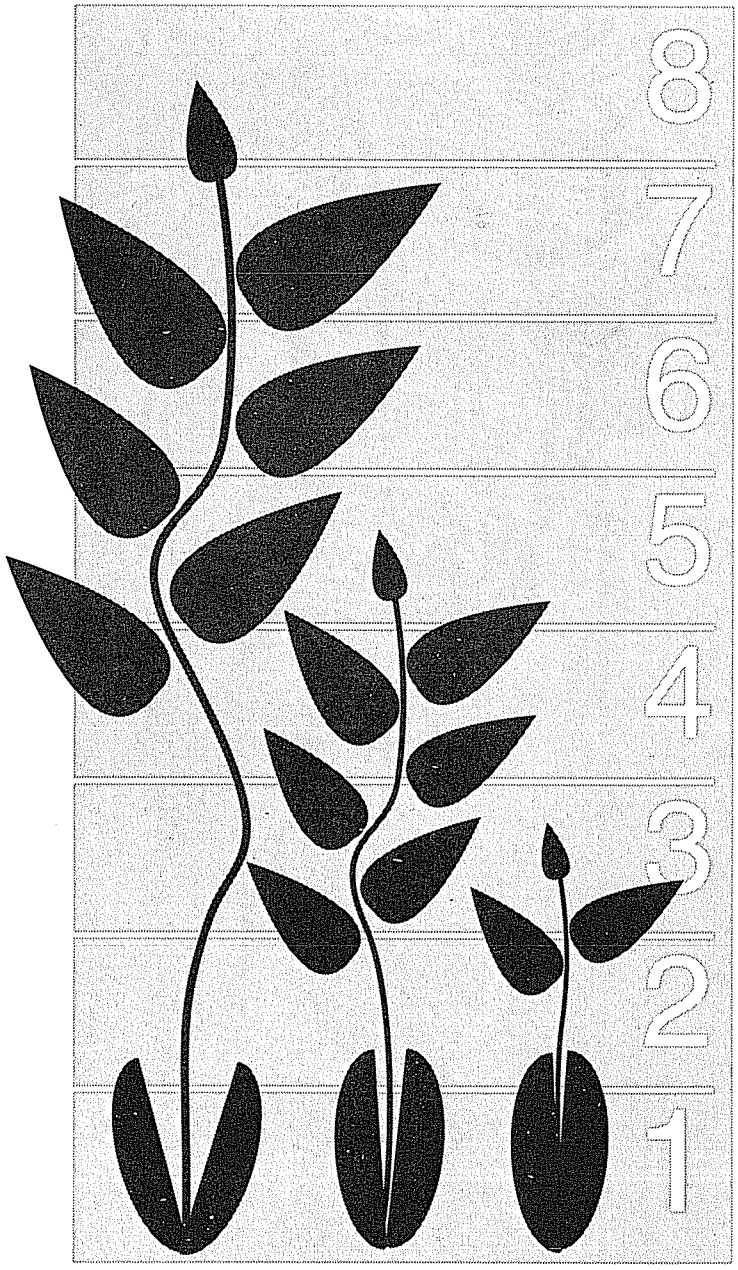
Level: K-6

Objectives:

- To explore a variety of measurement strands
- To estimate and measure using seeds

Materials:

- a large variety of seeds including very small seeds (carrot) and very large seeds (coconut/avocado)



Teaching Strategies & Student Activities:

Students Explore:

Seeds:

- observing, touching, smelling and talking about seeds, sorting/comparing seeds

Linear Measurement:

- seriating seeds by length
- estimating how many of one type of seed it takes to go from one side of the rug to the other, measure
- repeating the above activity with other seeds and comparing results
- graphing results, e.g. real objects or pictograph
- making a non-standard unit of measure by gluing seeds onto a paper strip

Area measurement:

- finding out how many of one type of a seed it takes to cover a book, comparing results to other types of seeds or objects
- repeating the above activity covering a standard sized surface (e.g. a 2 centimetre square)
- tiling using flower pots or a variety of sizes of seed packages

Duration/time measurement:

- comparing how long it will take different seeds to sprout/grow (e.g. Do all the plants grow the same amount during the same time? Which will be the tallest? How could we measure the height? Is the seed that sprouted first the largest sprout now?)
- keeping a journal of the time it takes for sprouts to grow and the height grown over set periods of time

Capacity/volume measurement:

- estimating how many of one type of seed it takes to fill a container, e.g. a spoon, an egg cup, margarine container, one litre container
- comparing the results to other types of seeds/containers, comparing the volume and

mass of mung, chick peas or bean seeds soaked overnight with unsoaked seeds

- predicting the number of seeds in a package, estimating how many spoonfuls of seeds are in the package
- estimating how many objects e.g. bean seeds, buttons will fill the seed package

Mass measurement:

- comparing weights of different types of seeds (non-standard or standard), e.g. How many beans weigh the same as a unit of dried peas? How many pumpkin seeds equals 1 gram?, weighing packets of seeds and seriating by mass
- finding an object in the room that weighs the same as 1 measure of a type of seed

Evaluation:

- an understanding of the different measurement strands
- use of suitable methods of measuring
- use of appropriate units
- estimating with increased accuracy
- accuracy of measurements and recording

Extensions/Modifications:

- explore time by investigating growing seasons
- have the students blow dandelion seeds and measure how far they travel
- compare prices of seeds, crops, determine profits

Resources: Explorations in Science I and II, Munchable Math, The Tiny Seed, The Carrot Seed, The Science Book of Things That Grow, Miss Rumphius



CENTICUBES

Level: K-6

Objectives:

- To investigate the properties of length, area, volume, mass
- To construct to given measurements

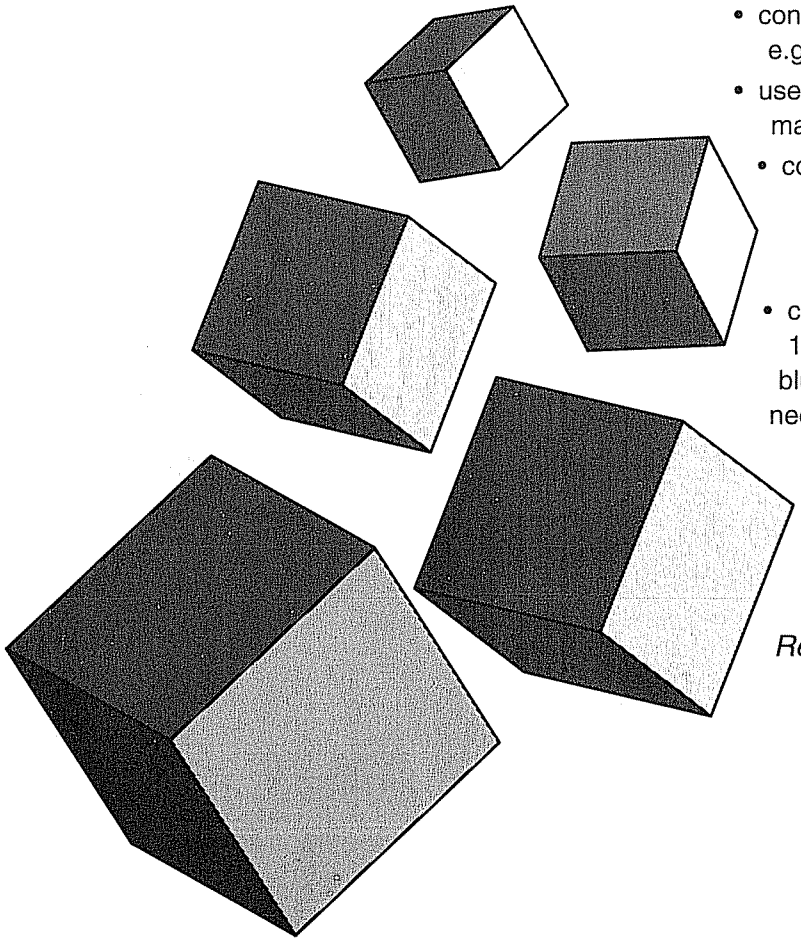
Materials:

- centicubes, multilinks

Teaching Strategies and Student Activities:

Teacher: invites students to construct an object with centicubes, e.g. animal, cup, car

Students: analyze objects for properties of length, area, volume and mass; use constructed figures and seriate by length, area, volume and mass, record and discuss results

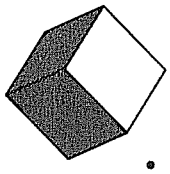


Evaluation:

- chooses appropriate measuring tool
- measures in appropriate units
- records in appropriate units
- understands each measurement strand (e.g. knows how to find the mass)
- accuracy of measurements
- estimates with closer approximations

Extensions/ Modifications:

- construct objects that have a given property: e.g. a mass of 10 grams, a length of 10 centimetres, one face of an object having an area of 10 square centimetres
- construct an object using 2 or more colours, determine fractions, e.g. fraction of red on the back view, side view, front view, top and bottom



- construct containers that have the same volume but different capacity
- explore area by making a variety of enclosures with centicubes
- construct an enclosure for a given area, e.g. 6 cm^2
- use a specific number of centicubes to make as many different rectangles as possible
- construct rectangles that have the same area but different perimeters with a specific number of centicubes, e.g. 30 centicubes or 20 centicubes
- construct a figure, e.g. a centicube cow using 100 centicubes (20 each of red, yellow, green, blue and white), not hollow, having a head, neck, body, tail and four legs; report dimensions of different parts (e.g. leg 5 cm long, body is a cuboid 5 cm x 4 cm x 3 cm with a volume of 60 cm^3), total mass
- use constructions to calculate displacement

Resources: Wilbur's Space Machine

Cereal Box

Level: K-6

Objectives:

- To have students estimate, classify, order and measure
- To reinforce measurement concepts
- To practise measurement skills

Materials:

- cereal boxes

Teaching Strategies and Student Activities:

Teacher:

- collects many cereal boxes
- divides the class into small groups
- distributes several cereal boxes to each group
- presents a variety of challenges orally or on cards

Students:

- order the boxes from smallest mass to greatest mass as indicated on the box
- find the perimeter of the face of one cereal box
- using the faces of cereal boxes, estimate which has the largest area, calculate the areas
- tile the surface of a cereal box using only 2 pattern shapes
- estimate the volume of one cereal box - use length, width and height to calculate the actual volume
- estimate and calculate the capacity of one cereal box estimate the height of one cereal box and measure using non-standard units
- estimate and measure height of students in cereal box units
- use a cereal box to measure the length of the classroom, the width of the classroom, height of the door, etc.
- construct the tallest tower possible, record how many boxes were used and the height of the tower

Evaluation:

- makes comparisons
- classifies using differing criteria
- orders with increased complexity both increased numbers of objects and fewer observable differences
- estimates with closer approximations
- works co-operatively

Extensions/Modifications

- compare the nutritional value of two boxes of cereal per 30 gram serving
- design a cereal box cover
- design a cartoon character for a new cereal
- make a collage
- create a picture using a variety of cereals
- write a commercial for a cereal; video or audio tape it
- price cereals; use for problem solving, e.g. Which cereal is the best value? Which cereal combinations could you buy with $10.00?
- choose 2 cereal boxes, list similarities and differences
- survey breakfasts, e.g. Do you usually eat breakfast? What did you eat for breakfast today?
- research where cereals are manufactured
- plan, purchase and prepare a class breakfast

Resources: Never Judge a Cereal Box By Its Cover, Aliens for Breakfast