Abacus

From the desk of the Abacus editor

You will notice that both the last issue of the *Abacus* and this one consist of articles and activities drawn from other mathematics journals. I am fortunate to have access to all of these publications because of OAME's affiliation with the NCTM family of journals. The *Gazette* editor is on the mailing list and continually receives journals from math organizations in most other Canadian provinces, and 10 or 12 states in the U. S. (Note: There's another incentive to apply for the editorship of our journal in the future!) Although many of the articles I have chosen are from American journals and there is an apparent lack of Canadian content in the *Abacus,* I felt that the items I selected were the most relevant and useful for you. Only minor modifications are necessary to adapt the activities to suit Canadian classrooms. However, it does not take a genius to deduce the real reason behind the *Abacus* content. I have not received ANY submissions over the past six months. To all elementary school math teachers: PLEASE SUBMIT SOMETHING TODAY! (Oh, and happy holidays, too!)

Jennifer

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Cheque It Out

Acknowledgement: This column by Cathy Storey has been reprinted from the Wisconsin Teacher of Mathematics, Winter 1995 edition. Cathy teaches at Burleigh Elementary School in Brookfield, Wisconsin.

Application...real world...application. Aha!!! I had just finished with a unit on multiplying decimals and I didn't want to move on until I had really made some real world connections. I had always wanted to do a chequebook unit, and it fit in perfectly here, so "Let's go for it," I thought. The only problem I found was that no one had any resources of an already tried and tested programme on chequing. So, it was time to come up with my own.

Fortunately, Dawn Marish, a fourth grade teacher in my school, had set up a year long programme with her children where they would get "paid" for doing their weekly jobs. She has her own real looking cheques with which to pay the students, and they keep balances of their money. Every once in a while, they are allowed to go shopping and buy items in the classroom store with their own cheques, if they have a balance in their account. The children are having a ball with this. This is an excellent way for students to see how time at work and amount of money earned are related. Mrs. Marish was kind enough to share her balance sheets, student cheques, and some handouts which give practice on working with the chequebook.

I then set forth thinking what skills the students had learned in our decimal unit and how they could be applied. They knew how to add, subtract, and multiply decimals. I decided that I would give the children a beginning balance from which they would begin paying bills. Then, they would get paid and have more bills to contend with. Hopefully, the bills did not exceed their revenue. I also had the students receive dividends on certain days. They would take the end balance for that day and multiply it by a percentage (converted into a decimal) and add that amount to their balance. They were even given days to shop. I had them bring in catalogues from which they could "play" order. If there was something of

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interest, they could buy it. This, however, did lower the amount on which they received a dividend. But for those who wanted to spend, instead of save (like so many of us), this was another choice just like those in the real world.

Some examples of expenditures and earnings that a classroom helper, Holly Himmel, and I came up with are listed at the end of the article. We put each item on individual index cards so the students could pick their bills, salaries, and dividends out of a "hat" thus making it a game of chance. This made the activity rather interesting because there were some very high bills and low paycheques. If a student had happened to pick a ritzy lifestyle, and a low paying job, life could be a bit of a squeeze.

The randomness of picking the bills, paycheques, and dividends made the excitement level very high. The students made a definite effort at making sure all mathematical calculations were accurate throughout the unit. They did not want to cheat themselves out of any money. They found this unit great fun and I felt it really tested their skill in working with decimals. I will continue to use this unit and build assessment into it as well. I am also thinking of extending the unit to also include the division of decimals.

I also have the students read *The Money Book* during the mini-unit. This gave an overview of the history of money, how it is made, how chequeing accounts work, how credit cards work, and much more. This gave valuable information on many aspects of money and chequing accounts.

There is nothing like bringing real life learning to students. As teachers our goal is to educate the population so they may grow up to be functioning adults in our society. We need to continue to strive toward students seeing the importance of all we teach them. Hopefully with this unit I have made one small step in achieving that goal.

Rent/Mortgage
Cheques made payable to: Brookfield Bank

Apartment rent	$864.96
Mansion payment	$2500.36
Condo payment	$934.61
Apartment rent	$403.25
House payment	$1066.42
Apartment rent, you share a bedroom	$206.50
House payment	$939.53
Apt. and cottage, you have both, thus two monthly payments	$935.71
Rent, you live with mom and dad	$150.00

Car Payments
Cheques made payable to: Modes of Travel

Van	$713.43
Volkswagen GTI	$394.16
Mazda MX6	$452.93
Jeep Cherokee	$610.05
BMW	$701.42
Mercedes Benz	$1001.64
1979 Ford LTD	$36.05
Porsche	$1591.86
Motorcycle	$209.20
Bicycle, license suspended	$14.63

Monthly Salaries

Radio D. J.	$6050.79
Gas station mechanic	$2725.04
Computer operator	$3604.66
Fire fighter	$3500.05
Best Buy Worker	$2140.49
Dentist	$5900.33
Grocery Store Worker	$1250.14
Entrepreneur	$10598.39
Engineer	$5065.32

Grocery Bills
Cheques made payable to: Storey's Supersaver

You had all the relatives over for dinner	$234.96
It is just you for all meals	$34.98
Feeding a family of 8	$329.34
Just you and spouse	$67.32
Only supply of gum needed	$1.42

Medical Bills
Cheques made payable to: Burleigh's Better Body

Braces	$498.29
Whip-lash in horse accident	$621.84
New glasses	$199.32
Earache	$49.86
Heating pad and ice pack for muscle pull	$42.96
A big bottle of Tylenol for all those headaches	$7.99
Involved in a car accident (ouch!)	$2349.18
You had a cavity	$89.42
A very healthy person	$0.00

Utilities (just one sample bill)
Make cheques payable to:

Wishy Water Company Water	$200.03
Lots 'O' Energy Electricity	$54.29
Ameritalk Telephone	$68.32
Great Gas Company	$107.39

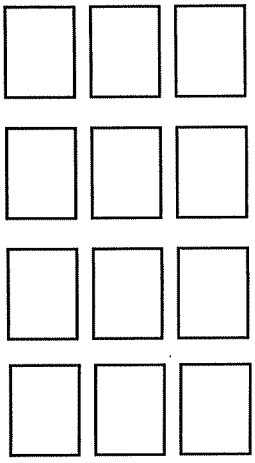
Dividends

0.09 = 9 %	0.05 = 5 %
0.02 = 2 %	0.07 = 7 %
0.04 = 4 %	0.01 = 1 %

More Number Problems

Acknowledgement: These problems were also found in the February 1995 issue of the Illinois Mathematics Teacher. They are intended to challenge teachers and the more advanced grade 7 & 8 students and could also be used in high school math classes.

Use the following clues to place the numbers 0 through 11 in the boxes.



The sum of the numbers in the first row is a prime number < 20.

All of the numbers in the second row are prime numbers, one of which is even.

The sum of the numbers in the third row is 10.

The numbers in the fourth row are consecutive if they are rearranged.

The numbers in the first column are multiples of 2.

Two of the numbers in the second column are odd and two of the numbers are even.

All of the numbers in the third column are odd.

Guess my number?

It is a three-digit whole number.

None of its digits is 0.

The sum of its ones digit and its hundreds digit is less than or equal to 4.

Twice its ones digit is less than or equal to the sum of 5 and its hundreds digit.

It is not an even number.

It is divisible by 11.

It is not divisible by 3.

It is greater than 300.

It is a multiple of 31.

Its tens digit is 4.

Chocolate Pudding

A census taker rang the doorbell whereby a woman answered the door. The census taker, finding that there were three children in the family, inquired what the ages of the children were. The woman replied that the product of their ages was 72. The census taker thanked the woman and left. After a few minutes the census taker returned and told the woman that more information was needed. The woman responded that the sum of their ages was the same as the house number. The census taker thanked the woman again and left. After a few minutes the census taker returned and told the woman that still more information was needed. The woman responded that the oldest child liked to eat chocolate pudding. With that information the census taker wrote down the ages of the children, thanked the woman and left. What were the ages of the three children?

Solutions and Notes to the Teacher

More Number Problems - The possibilities in each row are fixed but there are some possible permutations within each row.

4 6 1 In row 1 the 4 and 6 are interchangeable.

2 11 5 In row 2 the 11 and 5 are interchangeable.

0 3 7 In row 3 the 3 and 7 are interchangeable.

10 8 9 In row 4 the 10 and 8 are interchangeable.

Guess my number is 341.

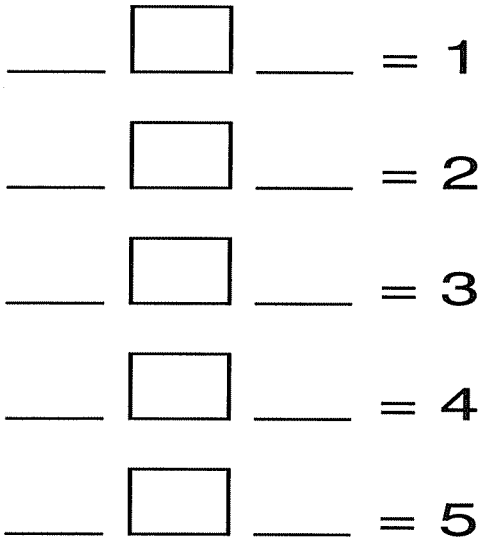
Chocolate Pudding - The factors for 72 involving 3 numbers and their sums are (1,1,72,74), (1,2,36,39), (1,3,24,28), (1,4,18,23), (1,6,12,19), (1,8,9,18), (2,2,18,22), (2,3,12,17), (2,4,9,15), (2,6,6,14), (3,3,8,14), (3,4,6,13). Because there were so many possible factor combinations the census taker needed to know more information so the lady told the census taker that the sum of the digits equaled the house number. All of the factors have different sums except for (2,6,6,14) and (3,3,8,14) so the census taker needed more information. The lady replied that her oldest child liked chocolate pudding. This implied that there was a single oldest child; hence, the other children were twins who must be younger. The ages, then, of the children are 3, 3, and 8.

THE FIVE PROBLEMS

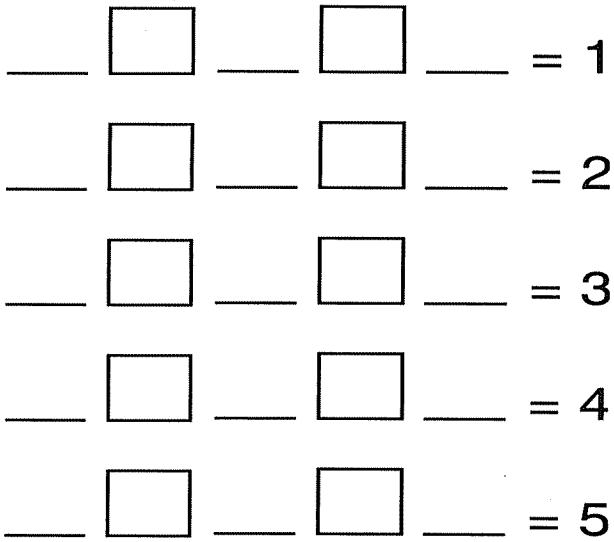
Acknowledgement: This activity, suitable for students in the primary grades, has been reproduced from the Illinois Mathematics Teacher, February 1995 edition.

Cut out the boxes on the next page. Place any of the numbers on the lines and put + or – in the boxes to equal the number in the sentence. You may use each number only once in each problem. Try to find as many different ways as possible. If it is not possible to write a true number sentence, explain why it can't be done.

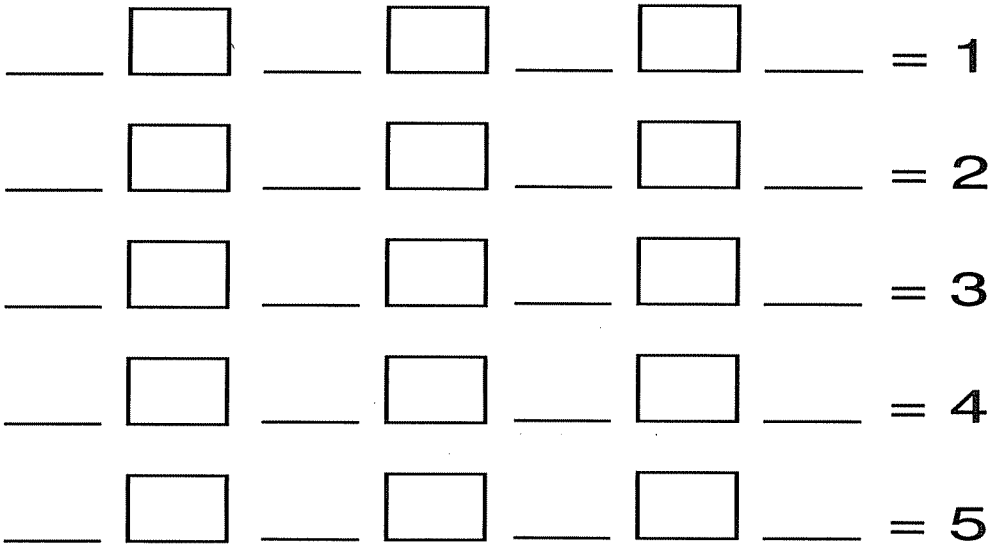
Use any two numbers.



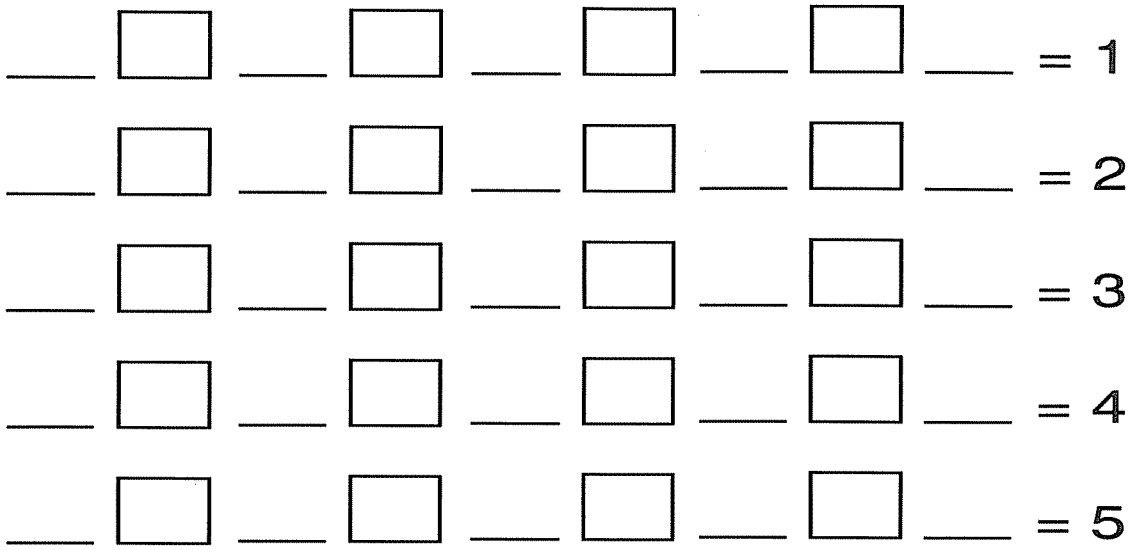
Use any three numbers.

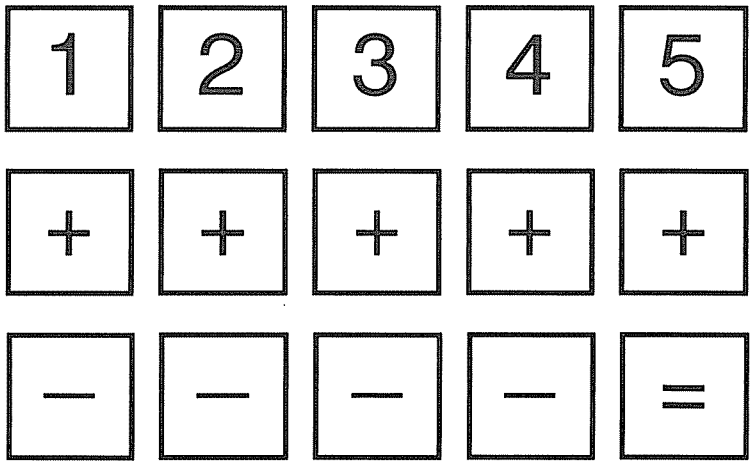


Use any four numbers.



Use all five numbers.





Solutions and Notes to the Teacher

There are several solutions for each problem. The first problem can't be done because there is no zero. For the problem that uses all five numbers, only the ones with an odd number for an answer can be done.

Encourage students to look at what happens when we add or subtract odd and even numbers in order to figure out an explanation.

Math and Literature: Make a Connection!

Acknowledgement: This is the continuation of an article which appeared in the September 1995 issue of the Abacus. It was written by Kerri Wood, a first grade teacher in Knapp, Wisconsin. It was originally published in the Spring 1995 issue of the Wisconsin Teacher of Mathematics.

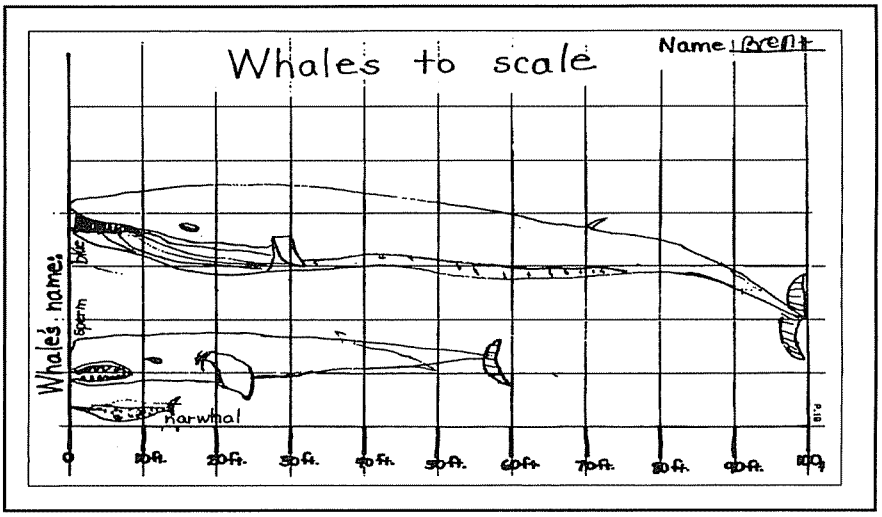
What's Big?

Jim and the Beanstalk by Raymond Briggs is a delightful story. Jim climbs the beanstalk to find a giant who can't see well, has no teeth, and is bald. Jim goes about measuring this giant for glasses, a wig, and dentures only to find he might be eaten after all.

I asked my students to think about how big glasses or dentures or a wig might have to be to fit a giant. They tried to make comparisons to things around our classroom and school. Then I had them think about comparing their size to the size of a giant. One child thought that they would have fun wearing the giant's shoes. This started a whole discussion about foot size. The children decided to make a paper model of what they thought a giant's foot would be like. Then they traced their own feet inside of the giant's footprint to compare. They were absolutely amazed that 74 of their feet fit inside. How many of their footprints could walk around the outside of the giant print?

In *How Big is a Foot?* by Rolf Myller, the king wants to give his queen a wonderful birthday gift; something that she's never before seen. He decides to have a bed made for her. He takes all the proper measurements and sends them to the apprentice to construct it. The bed, however, is too small. Can you guess why?

All of the students were asked to go home and trace the feet of their family members so we could investigate the sizes and how they compared. Greg had an interesting notion. He thought that the size of your foot was dependent on your age. Because this was true in Greg's family, we decided to investigate to see if it was true in our school. Our question was, "Does the oldest person in our school have the biggest feet?" We had to ask if this was true in some situations or in all situations. Be ready for a long investigation.



After reading *Is the Blue Whale the Biggest Thing There Is?* by Robert Wells, my students chose to investigate these two questions:

(1) Would a blue whale fit in our school? and

(2) How does an author make a blue whale in a book when they are so big?

We had a wonderful discussion of measuring tools that might help us answer the first question. We found he wouldn't fit in the building unless we could bend him around a corner. We found a great place on the playground though.

My students were fascinated with the whales. We studied all different kinds of whales and compared their sizes and other features. We decided to find out how authors and artists deal with size when making books and pictures. We learned how actual measurements are used to make scale drawings. The students made scale drawings of many different types of whales. They also practiced drawing themselves to scale in drawings by estimating size. Then I gave the students three pictures of houses of different sizes and perspectives. The students were to draw themselves in front of the door at what they

thought was an appropriate size. They did their own measuring and compared their height to our class door before they began.

Fractions in Action

Gator Pie by Louise Matthews is about two alligators who are just about to share a pie, when more gators begin to come. The pieces get smaller and smaller and then the battle begins over whether or not they are equal. This book is a wonderful illustration of "the more the pieces, the smaller the piece". It also illustrates the debate over equal parts. I had my students pretend they were either Alvin or Alice, the two alligators in the story. They were to draw their character and write about how they would feel about having 1/4 or 1/2 of the pie.

In The Doorbell Rang by Pat Hutchins, Victoria and Sam start with a dozen cookies to share, but the number gets smaller each time the doorbell rang. I like to use this book for exploring fractions as parts of a set. We not only divide up a set of cookies, but work with many different materials throughout the year whenever the opportunity arises. This is also a good book for discussing division.

Miss Prime helps her students explore fractions in their world in Fraction Action by Loreen Leedy. I like to use this book to illustrate fractions used in many different places. It also demonstrates the use of fractions as parts of a whole and parts of a set.

What's in a Name?

A My Name is Alice by Jane Bayer is a rhythmic ABC book of names. Early is the year, as we were learning the names of our new classmates, we read this book. We decided to look at all the different names in the room, how they were spelled, and how long they were. We made a graph on the wall out of small paper plates numbered two through twelve. Then the students wrote their own first name on a sticky note and placed it under the number that represented the letters in their name. We discussed who had the most and least letters and who had the same number of letters. Because five had the most sticky notes under it, I asked the question, "Did more people have five or not have five letters?" For older students you could have students write their names on slips of paper and then cut the letters apart and deal them out to the students to find the average number of letters. You could also work from both ends of the graph using one-to-one correspondence to get to the median.

This could be followed with looking at the number of letters in the names in a different way. I like to give the students a half sheet of inch grid paper. I have them writing their name over and over again with one letter per box beginning in the upper left-hand corner and not skipping any boxes. When they get to the bottom of the page, I have them go back and colour every box that contains the first letter of their name. It makes an interesting pattern. The investigation of this project is to compare all the signature squares in the class; looking at the number of letters and the types of patterns produced. First my students thought that if you had three letters in your name it would always come out with a straight line pattern, but they they found this was not true because one child had turned his paper the other direction. They ended up wanting to do it a different way to see if they could change their pattern.

How Many Ways?

The book, *12 Ways to Get to 11* by Eve Merriam, looks at different number combinations that equal eleven. This is my favourite book to introduce the idea that there are many ways to represent a number. We frequently do this with the date or another special number. It's very open ended and children can work at their own level. My students have improved at this activity and have noticed the patterns in problems such as 22-12 and 23-13 and 24-14, and so on. They have also started to use a combination of operations and even negative numbers.

In *Two Ways to Count to Ten* by Ruby Dee, whoever can count to ten before the king's spear hits the ground gets to marry the king of the forest's daughter. The most unlikely creature counts by twos after all others have failed. This is another favourite book to introduce the notion of skip counting and looking at counting in different ways. It also opens the discussion of grouping and how that helps with efficiency in counting.

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SNOWDRIFTS

Estimating, Measuring, Graphing, Recording - A Real Life Experience

Acknowledgement: This activity was created by Diane Sprackett of Beacon Hill School. It was originally published in the Quebec Association of Mathematics Teachers Journal (December 1994 edition).

Introduction

Connecting math to the real world is an important element in our math teaching. Watch for the biggest snowstorm of the year and try this.

Grade Level: 1 - 4

Objectives:

- to explore the metre stick as a measuring unit
- to use the concept of estimation
- to work co-operatively in a group
- to summarize results
- to have FUN outdoors following a snowstorm

Materials:

- one metre stick per three children
- graph paper
- slates/chalk or paper/pencil
- math journals or recording paper

Directions:

1. Students are divided into random triads which include a measurer, recorder and reporter.
2. Each triad estimates, then measures the depth of five snowdrifts in the schoolyard. All team members are to agree on the cm reading of the metre stick before the recorder records.
3. Upon returning to the classroom each team (every child has his/her individual graph) records its findings on a bar graph.

   A discussion ensues as to how to graph numbers greater than 100 cm, as well as numbers between tens.
4. In their Math journals, the students record what they did, what they discovered and then they draw comparisons about their findings.

Some suggestions for adaptations, extensions, and integration with other subjects:

- fewer or more snowdrifts
- a different style of graph (e.g. a line graph)
- greater number of facts recorded in the Math journal
- finding other things which are similar in height/depth to their snowdrifts
- measuring snowdrifts around their homes
- discussion of why snowdrifts are higher in some places than other places
- temperature of snow - does it vary according to the depth of the snowdrift?

Literature:

The Big Storm, by Rhea Tregebov.

