Newsletter 82: May 2009

Introduction

Psst! Do you want to make a lot of money? And you don't even have to work! Just give me your cash and I'll magically increase it's value for you.

I moved to Australia to live in April and the exchange rate between the two countries was very important to me – even more than the US exchange rate that the news is so fond of reporting. It's interesting that this is the 82nd newsletter and I was hoping that the Oz/Kiwi exchange rate would get to 82. Now what that actually means is that every 1 New Zealand dollar would be worth 82 cents Australian. The reason that I wanted 82 was that this is about the average rate since we floated our dollar in 1985 and early on in the year the rate was as low as 77. Of course I would dearly have loved parity but that hasn't ever happened though it would certainly have been good to get 1 Ozzie dollar for every Kiwi dollar I wanted to take across the ditch.

Let me show you why this is a problem for me and why I wanted to maximise my nest egg and how you too can make money as a currency dealer.

Let's take some easy numbers. Suppose the exchange rate was 50. Then 1 NZD would be worth 50¢ in Australia. So if I multiply each of these numbers by 2 you can see that 2 NZD would be worth 1 AUD.

On the other hand if the exchange rate was 75, 1 NZD would be worth 75¢ in Australia. So how much would 1 AUD be worth in New Zealand and so how much would I have to pay for 1 AUD? Let's put the two values in dollars. So 1 NZD =0.75 AUD. How do I fiddle this to get 1 AUD = # NZD? What is #?

Let me divide both sides by 0.75. Then 1/0.75 NZD = 1 AUD. What's 1/0.75? 1.33?

Clearly I'd rather have the exchange rate at 75 than at 50. 1.33 NZD is much less than 2 NZD. And can you see that the higher the number in the exchange rate was the better it was going to get for me. Unfortunately at the start of the year things were heading down and were around 77. That would mean that it would cost me 1/0.77 NZD, or about 1.29 NZD.

On the other hand if I could think hard enough maybe I could squeeze the rate to 82 by sheer will power. That would mean that I'd only need to fork our 1.22 NZD for 1 AUD. Given the way things have gone over 20 years, I couldn't expect to get too much more than that.

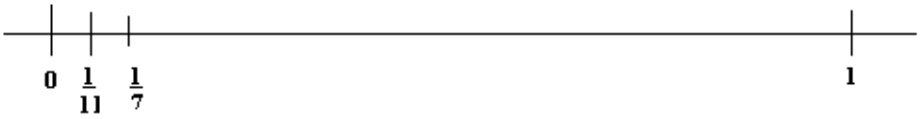
OK then, how can you make money like this? Well it's possible to get the graphs that show the fluctuations in the exchange rate. And the rate goes up and down all the time over varying periods of time. Suppose you bought Australian dollars when the rate is 82 (in April say). So it would cost you 1.22 NZD to get 1 AUD. Now guess that in July the rate would have gone down to 77. Then you send the 1 AUD back to New Zealand. But we know that then 1 AUD is 1.29 AUD. So you've made 7¢. Ok so you tell me that that's just not worth the effort. But 7¢ is about 5.7% of $1.22. So you will have made 5.7% on your money over 3 months. That's 22.8% per annum interest. Where can you get that these days?

And if you don't like waiting for 3 months, I'll tell you another time how to make money every day by just using the exchange rates.

Unpacking the Maths: Comparing Fractions 2

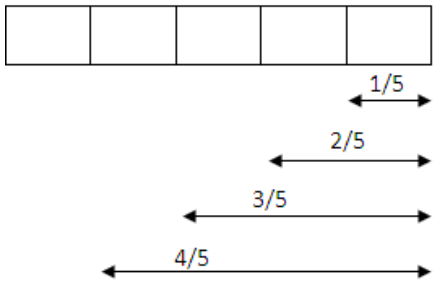
In the last newsletter (Newsletter 81: March 2009) I talked about two roles that fractions play. This is first as a number in their own right with all of their cousins the real numbers and second as a way of acting on other things. This acting stuff is the "2/3 of 6 jellybeans" activity where we want to know what a fraction of some quantity is. In actual fact, this may be the biggest use of fractions as they operate on other things or numbers. But I'm really more interested here in fractions in their own right and how to compare them with other fractions and other numbers. And to do that we have to have one common unit to compare them all to. So if you like I'm thinking here of all the numbers placed on a fixed number line, the one that you carry round in your head will do nicely, and why one fraction is to the right of another on that line.

Again in the last newsletter then, I went through the comparison of fractions with 1 in the numerator – fractions like 1/7 and 1/11. I showed that 1/7 must be the bigger of those two simply because if you shared a pizza, or any other favourite object, among 7 people they would all get more than if you shared the ***same*** pizza among 11 people. So 1/7 is bigger than 1/11 and lies to the right of 1/11 on your number line.



At the end of the last newsletter I had then raised the question of 2/3 and 3/7. Which of these is the bigger? Is 2/3 to the right or left of 3/7 on your number line?

Well there's one thing that I need to do before I look at these two fractions. What if the denominator of two fractions is the same? How can we compare them? Maybe this is obvious. Which is bigger, 2/5 or 3/5? Look at the diagram below.



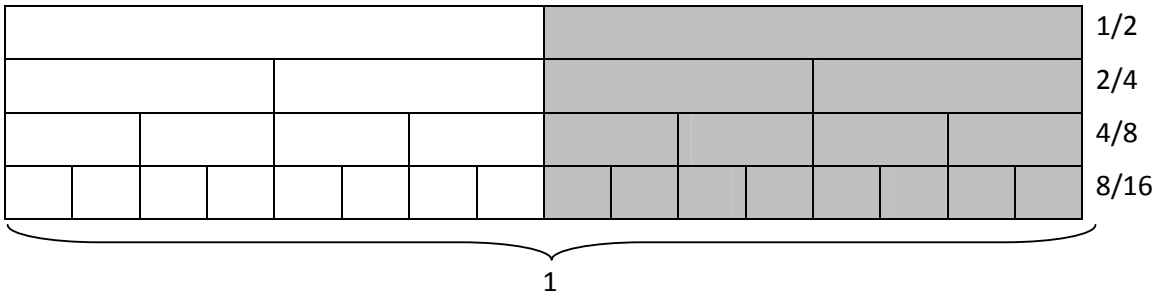
It should be clear that 1/5 is less than 2/5 because two one fifths go together to make 2/5. The same is true for 3/5. This is bigger than 2/5 because you need three one fifths to make up 3/5 and 3 is bigger than 2.

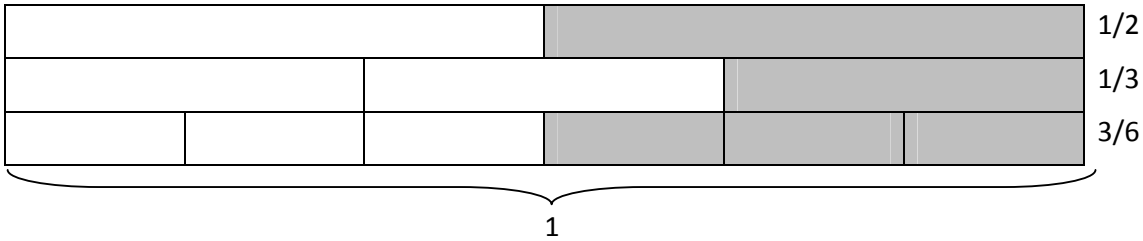
Looking at this another way would you rather have 3/5 or 4/5 of a chocolate cake? Unless you are on a diet, natural greed suggests that you would take 4/5. This is because five people would get a 1/5 each of the cake and 4/5 would be four people's share while 3/5 would be only three people's share.

Comparing fractions that have the same denominator is pretty well a no brainer then. The bigger the numerator in this case, the bigger the fraction, so 1/8 is less than 2/8 is less than 3/8 is less than 4/8 is less than 5/8 is less than 6/8 is less than 7/8.

So now with 2/3 and 3/7 we don't have the same denominator so nothing that we have done so far will help us here. Why not go back then to the trusty old pizza here? Well it's the problem that we've had before with 1/7. Freehand, and that is the way your students would be most likely to do this, it's not easy to draw with any accuracy. So drawing 3/7 with enough accuracy to make a valid comparison with 2/3 can be a problem. So is there a better way?

One possibility is to use a ***benchmark***. Now benchmarks exist for comparison purposes. And the benchmark I want to use in this example is 1/2, though you'll have to choose your own benchmark to suit your fractions. What I'm hoping to show is that 2/3 is bigger than 1/2 and 3/7 is less than 1/2. If I can do that I will have sorted out the 2/3 to 3/7 comparison.
Why then is 2/3 bigger than 1/2? Let me start by asking how else we can write 1/2? Can I suggest that 1/2, 2/4, 3/6, 4/8, 5/10, 8/16 are all ways of writing the same number. Take your favourite unit (see the fraction wall in the diagrams below) and divide it up as I have shown. There should be no problems with seeing that 2/4, 4/8 and 8/16 are all the same and equal to 1/2. And maybe even 3/6 isn't too difficult. What would the fraction wall look like for 5/10?





Can you see the pattern here? To get a fraction equivalent to 1/2 just make sure that the numerator is half of the denominator or equivalently that the denominator is twice the numerator. That means that 100/200, 53/106 and many other fractions are exactly the same as 1/2.

That is, of course, a brilliant discovery but it doesn't help us with 2/3 because 3 is odd – all of the other 1/2 -equivalent fractions had an even denominator. To apply our halving/doubling trick here we need to know that $1\frac{1}{2}$ is half of 3. Yuk! 1/2 = $(1\frac{1}{2})/3$!! How obscene is that! Nothing like that should ever appear in a newsletter or any part of polite society for that matter. But it will serve our purpose because 2 is bigger than $1\frac{1}{2}$ and so 2/3 must be bigger than $(1\frac{1}{2})/3$ (two thirds is bigger than one and a half thirds). So we have shown that 2/3 is bigger than 1/2.

But when you have this little trick on board you can do the same thing for 3/7. What is ½ equal to in sevenths? Using the halving rule we can see that $3\frac{1}{2}$ is half of 7 so 1/2 is the same as $(3\frac{1}{2})/7$. Now we can easily see that 3/7 is less than $(3\frac{1}{2})/7$ and so 3/7 is less than 1/2.

So our benchmark method had nicely shown us that 3/7 is less than 2/3.

I have to say right now that this benchmark method has its limitations. It's probably only useful if the numbers that we are comparing are both easily set against straightforward benchmarks such as 1/2 or 1/3 or 1/4. So I haven't talked about a general rule that will work for all fractions however close they might be or whatever they might be. But the halving and doubling idea that we have used here can be extended to a general rule.

And I'll talk about that in the next newsletter.

Problem Solving

Years 1- 3

Q1. Dad had $10. He shared it equally between his two daughters. The daughters each got a single note. What was the value of that note?

Q.2 Mum had $12 and shared it equally between her three sons. The sons got two coins each. What were these coins?

Q3. Auntie gave her four nephews each an equal share of the $12 that she had in her purse. Each nephew got exactly the same coins. If the nephews had less than 4 coins each, in how many possible ways could the nephews have got their share?

Years 4-6

Q1. Jayne has 3 pink marshmallows and Josh has 7 white marshmallows. They put all of their marshmallows in a pile and then share so they have the same number of marshmallows. Write down all the possible groups of pink and white marshmallows that Jayne could have.

Q2. Jayne has 3 pink and 4 white marshmallows while Josh has 7 white marshmallows. They put all of their marshmallows in a pile and then share so they have the same number of marshmallows. Write down all the possible groups of pink and white marshmallows that Jayne could have.

Q3. Jayne has 3 pink and 4 white marshmallows while Josh has 2 pink and 7 white marshmallows. They put all of their marshmallows in a pile and then share so they have the same number of marshmallows. Josh notices that three-quarters of Jayne's marshmallows are white. How many pink marshmallows does Josh have?

Years 7-9

Q1. Jack and Jill want to know how tall the two plants that they have at home are. In January, Jack measured them with a paper clip and Jill with a small green pencil. The first plant Jack said was 12 paper clips high and Jill said was 8 pencils high. Jack measured the second plant at 18 paper clips. How high did Jill say it was?

Q2. In April, Jack said the first plant was now 15 paper clips high. How high did Jill say it was?

Q3. In May, Jill said the second plant was 20 paper clips high. What was Jack's measurement of the plant?

Classroom section

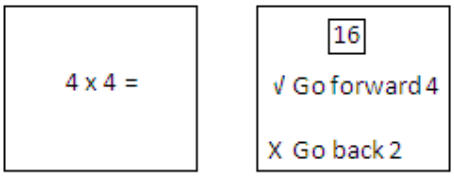
Classroom Idea

Children love to play games and would enjoy designing their own maths board game. It would be a fun way to practise their maths and the games could be available for the children to play in maths sessions and during wet winter lunchtimes.

Make a template on a piece of A3 paper by marking in the grid squares like a Snakes and Ladder board and give it to pairs of children. The children can then to design a game with maths questions for players to answer.

A game like Snakes and Ladders could have questions in some of the squares with a ladder to go up if the answer if correct and a snake to go down if the answer is incorrect. Not every square needs to have both a ladder and a snake. The children will need to make a question and answer sheet for players to check their answers against. Like Snakes and Ladders players will use counters and dice to move through the board. The winner is the first player to get to the end of the board.

Alternatively, children may use question cards where a ? on a game board square indicates a question card is to be asked. The reverse side of the question card will have the answer and the consequence for correct and incorrect answers. For example:



Again, counters and dice will be used to move through the board, with the winner being the first player to reach the final square. Completed boards can be glued to A3 card or laminated to make them more durable. Children can play each others' games.

Variations

There are numerous variations to the board game design. For example, players could collect tokens for correct answers with the player with the most tokens winning the game, a timer could be used to encourage speedy answers or races between players, or a spinner could be used instead of dice.

Maths Content

You may like the children to focus on an area of their learning, for example, basic facts, fractions, naming shapes etc. The answers need to be able to be solved mentally and quite quickly to keep the momentum of the game flowing. Keep the focus of the activity on the maths. Although the topic would integrate well with a technology unit or a English unit on instructional writing.

Website Links

From the homepage of the website there is a link to the new "Assessment" section. This section is designed to help teachers select the most appropriate assessment tool to meet their assessment needs. There is background information about assessment, a description of mathematical assessment tools, and a flowchart to help you select the most appropriate assessment tool as you consider the purpose, how you will use the information and what information is needed.

Website survey

We are continuing to collect feedback about the changes made to the design of the website. There is a link to the survey available from the bottom of the home page of the website. If you would like a response to your feedback please either include your email address in your survey responses or email Andrew at andrew@nzmaths.co.nz.

Resources for the Resource Database

We are now looking for submissions of resources to be added to the Resource Database. If you have a numeracy activity that you have designed and would like to share then you can do this by downloading a template from the link at the bottom of the home page of the website. This template includes all of the headings that need to be completed for resources to be included in the database. Authors' names can be included in their resource at their request.

National Standards

The Government and the Ministry of Education are currently developing National Standards for literacy and numeracy. The National Standards aim to lift achievement in literacy and numeracy (reading, writing, and mathematics) by being clear about what students should achieve and by when. This will help students; their teachers and parents, families and whānau better understand what they are aiming for and what they need to do next.

The consultation period for the National Standards is from the 25th May to the 3rd of July

For more information visit:
http://www.minedu.govt.nz/theMinistry/Consultation/NationalStandards.aspx.

Families

The game of dominoes can be adapted to help children learn number facts, for example, pairs to 10, pairs to 20, halves and doubles, fraction and decimal equivalents.

The trick to making a domino game is to make sure that the set of dominoes can make a continuous line with the ends of the adjoining dominoes making a match (in the example they make a pair to 10 e.g. 4 and 6). The last number in a row is the pair to the first number in the next row (e.g. 8 and 2). Make the domino cards on a piece of cardboard (cereal boxes work well). Draw the cards and then cut along the solid lines and secure with a rubber band.

Example for pairs to 10.

1	4	6	5	5	3	7	8
2	9	1	2	8	6	4	7
3	8	2	1	9	4	6	3
7	4	6	7	3	6	4	8
2	2	8	4	6	8	2	9

Domino Game for Two players

Deal 5 domino cards to each player. Place one domino face up between the two players and the remaining cards face down. Players take turns to match of their domino cards to the card in the middle. For example:

2	1	9	4

The 1 and 9 are a pair to 10. The next player can now match to either the 2 or the 4. If a player is unable to add a domino to the line they pick up from the face down pile.

The winner is the first player to use all their domino cards.