Document extract

Title of chapter/article	Classroom ideas: Finance is fun! Maths and money
Author(s)	Mardi Dungey
Copyright owner	The Australian Association of Mathematics Teachers Inc.
Published in	The Australian Mathematics Teacher vol. 70 no. 4
Year of publication	2014
Page range	35–40
ISBN/ISSN	0045-0685

amt contents

"a journal to serve as a medium both for the exchange of ideas and experiences in the teaching of elementary mathematics and for the instruction of teachers in the trends and developments of mathematics education at home and abroad"
(Editorial, AMT, Vol. 1, No. 1, April 1945.)

SUBSCRIPTIONS
The AMT is published four times per year and can be subscribed to by members of the AAMT through their local State/Territory association; non-members can subscribe by contacting AAMT directly. Back issues are also available.

AUTHORS
Contributions from readers are invited and should be sent to the AAMT office. Authors are reminded that the main focus is the teaching of mathematics to the age range 11 to 16 years. Longer articles should generally have a practical orientation, be of interest to practising teachers, and have less than 3000 words. Preference will be given to articles which are clearly written and free of jargon. Manuscripts should be prepared in Microsoft Word and the electronic version sent to the AAMT office. Any diagrams that have been generated electronically should be forwarded in their original format as well as being embedded in the text document. Please include any other relevant diagrams or photographs which can be scanned in at the AAMT Office. (Please specify if you wish these to be returned.) These should be original documents; photocopies are NOT suitable.
Any queries about suitable formats should be directed to Toby Spencer (tspencer@aamt.edu.au) at the AAMT Office.
All published articles (excluding regular columns) are accepted by a process of blind peer review.

REVIEWS
Publishers are invited to send materials (books, software, etc.) for review to:
AMT Review Editor
Care AAMT Inc.
GPO Box 1729
Adelaide SA 5001

ADVERTISING
All advertising enquiries should be directed to the AAMT office. All advertising is subject to approval. Publication of advertising in this journal does not imply endorsement of the product by AAMT Inc.

AAMT OFFICE
GPO Box 1729
Adelaide SA 5001
PHONE (08) 8363 0288
FAX (08) 8362 9288
EMAIL office@aamt.edu.au
INTERNET www.aamt.edu.au

ISSN 0045-0685

classroom ideas

finance is fun!

Maths and money

Mardi Dungey
University of Tasmania
mardi.dungey@utas.edu.au

Teaching the principles of finance can seem daunting, but it is something that students find extremely engaging. The fundamental features of money are both mathematical and social constructs, and hence can be usefully entwined with many areas of the curriculum as enrichment activities. While this proposal talks directly to the current Year 6 *Australian Curriculum: Mathematics* (Units of Measurement) and *Australian Curriculum: History* (Australia as a Nation) it is also forward looking to the curriculum around financial literacy outlined in the Australian Curriculum, Assessment and Reporting Authority (ACARA, 2012) report on *The Shape of the Australian Curriculum: Economics and Business* and the Australian Securities and Investments Commission (ASIC, 2011) *National Financial Literacy Strategy* commissioned by the Government, with the expectation that a substream Money and Financial Literacy will be introduced into Mathematics in the near future (ASIC, 2013). While there are many programs aimed at primary school student financial literacy provided as downloadable resources from major financial institutions my experience is that these are not widely used, at least partly because they tend to rely on sheet based exercises. The advantage of the approach reported here is that it is interactive and involves hands-on learning engaging the entire class and attracts students and teachers to learning based around finance. This can be furthered with programs such as the MoneySmart teaching resources available at www.teaching.moneysmart.gov.au.

Background

Over the past four years, the author has been working with groups of senior primary school students (aged 10–12, Grades 5 and 6) on learning the principles of money—directly addressing this upper primary learning need on "developing personal consumer and financial strategies" (ACARA, 2012, p.14, point 34). The 16 groups were all located in southern and eastern Tasmania and ranged across socio-economic groups and inner city and rural locations. This paper reports on a lesson based on Australian currency which was universally a favourite activity with the students. It also describes how this can be extended to foreign currencies if desired, building mathematics skills in multiplication and division.

The approach is designed as a whole group activity, enjoyable at all skill levels. Financial literacy is necessary for all members of our community, has been found to build social inclusion (ASIC, 2013) and builds maths confidence. It has been helpful to teachers in the trial groups in detecting unexpected areas of competence and lack of understanding in curriculum areas such as decimals, percentages and multiplication and division. In what follows I report on a session designed to last for between 60 to 75 minutes of class time, with ample opportunity for follow-on activities.

Although we may think that students are very familiar with cash, my experience is that many students of this age have never physically held a $20 note. A moment of reflection makes sense of this: our economy is now run on plastic cards, children are not eligible to hold their own plastic card until the age of 12 years and as a consequence many students are unfamiliar with cash.

Introducing money

The activity begins with an interactive group question and answer session and moves to small group based activities which requires some fairly easily acquired materials—namely a bunch of cash! Tools for this activity consist of a selection of current Australian dollar currency. Usually I try to have enough high denomination notes for a reasonable number to share around the class, and a selection representing a range of denominations: $50, $20, $10, $5, and additionally, enough Australian coins for a full set between approximately every four students (that is $2, $1, 50, 20, 10, 5 cents). A good preparatory exercise for this unit is to ask the students to bring old Australian notes and coins which they may have at home. This will hopefully provide a complete set of Australian currency with some 2 and 1 cent coins, may bring in some older $1 and $2 notes, some pre-plastic currency ($1, $2 up to $20 notes) or commemorative $10 notes, and hopefully some pre-decimal coins (pennies, halfpennies, threepence, sixpence, florins, shillings). In absence of local resources please contact the author who will be happy to arrange access.

The sessions begin by distributing the current Australian dollar notes amongst the class and asking them some simple questions.

What makes this money?

The aim is to identify the key features of currency. These are first, that we (the community) all agree that it is money: a defining feature of money is that we all agree to accept it as worth an agreed value to make the buying and selling of goods and services easier—this is formally the function of 'unit of exchange'. Second, that the Government has issued it; this is because we have agreed to limit its supply so that it retains value. Students may identify the signatures on the notes, for example. Third, that money has security features to stop it being easily copied—again to limit its supply. Security features include signatures, complex designs, holographs which can only be seen when the note is held up to the light (for example the star in a circle near the 5 of the $5 note), the transparent panel embedded in the notes. A useful leading question is to ask the class is: "Why don't we use sticks as money?" This is usually met with howls of derision and emphasises the point that money needs to be in restricted supply so that it retains its value —sticks 'grow on trees' providing unlimited supply. The fourth feature which

is less often identified at this level is that money provides a 'unit of account' it means we can agree what we mean when we write down the value of goods, services or even our own bank account balances.

Who is pictured on the money?

This is an opportunity to delve into the history curriculum. For easy reference the historical figures pictured on each note with a brief overview are given in Table 1. Discussion points include who students would choose to represent on notes and why.

The next step is to distribute the Australian coins ($2, $1, 50c, 20c, 10c, 5c and 2 and 1 cent) to the students in small groups.

Why do we use coins instead of notes?

The answer is that coins do not wear out as fast as notes. This can be illustrated with a $5 note which passes from one student to the next in a stimulated transaction. The teacher is paid by the school to teach the class, the teacher then goes to the shop and pays the shopkeeper for the some milk, the shopkeeper goes to the petrol station and buys some petrol, and so on. This illustrates what is called the 'velocity' of money, which is how fast it moves around the economy. Notes just wear out. Coins do not. The $1 and $2 coins used to be paper notes (you may have some paper notes to demonstrate), but they wear out too fast.

Table 1. Images on current Australian banknotes.[1]

Note	Person pictured	Brief biographical notes
$5	Queen Elizabeth II (1926–) or	Queen of Australia (notes issued since 1992)
	Sir Henry Parkes (1815–1896)	The Father of Federation (notes issued since 2001)
	Catherine Spence (1825–1910)	Journalist, author, first female political candidate in Australia (unsuccessful)
$10	Mary Gilmour (1865–1962)	Poet (*I Love a Sunburnt Country*)
	A. B. 'Banjo' Paterson (1864–1941)	Poet (*Waltzing Matilda*, *The Man from Snowy River*)
$20	John Flynn (1880–1951)	Established the Flying Doctor Service
	Mary Reiby (1777–1855)	Transported as a convict, became a successful businesswoman
$50	Edith Cowan (1861–1932)	Suffragette, welfare activist, first woman elected to Australian Parliament
	David Unaipon (1872–1967)	Writer, Inventor (shearing machine, drawings of a helicopter based on a boomerang motion) only Indigeneous Australian represented
$100	Nellie Melba (1861–1931)	Internationally famous opera singer
	John Monash (1865–1931)	General, commander of Australian corp in World War I, fought at Gallipoli.

1 The older paper notes carried images of the Queen ($1); John Macarthur and William Farrer ($2); Sir Joseph Banks and Caroline Chisholm ($5); Francis Greenway and Henry Lawson ($10); Sir Charles Kingsford-Smith and Lawrence Hargreave ($20); Howard Florey (Baron Florey) and Sir Ian Clunies Ross ($50); and Sir Douglas Mawson and John Tebbutt ($100).

Why do we use notes at all?"

Notes are cheaper to manufacture and easier to carry around. Imagine if you had to carry one hundred $2 coins to the shop each week to do the shopping! If you have some old 1c and 2c coins you can point out that the copper used to make them brown is worth a LOT more than the face value of those coins. This happened to the original 50 cent coins issued in 1966 which were made from 80 percent silver, and were almost immediately worth more melted down than their face value of 50 cents. At one stage in the 1980s the silver in these coins was worth over $10!

Which is the oldest coin?

Students are generally completely unaware that the decimal system of coinage started within the lifetime of their family members. They look for the oldest coins by examining the dates on the 'head' side of the coin. The oldest coin in any group will be 1966, the year when decimal currency was introduced. A prompt to wonder what money was like in the 'olden days' usually brings forth somebody who remembers that there used to be pounds and pence. The jingle invented by the Government to promote decimalisation is available on YouTube (search for "dollar bill jingle") and provides both delight and emphasis on the features of a decimal system. Students many notice that the original (silver) 50 cent pieces are round. These were quickly phased out and replaced with the hexagonal coins in 1969.

Pre-decimal money

You may have some older Australian coins available—many people can scout up a few. Distribute these amongst the groups and ask them to identify the following:

- "Who is the 'heads' side?" These range from as early as Queen Victoria.
- "What is the date?" Potential dates range from the early 19th century.
- "What is the value of the coin?" Usually these are pennies, half-pennies, threepence, sixpence, shillings or florins. These come from a pre-decimal system, which usefully leads to a discussion of decimals.
- Do a 'coin rubbing' where students put the coins in date order. This reinforces ordering. Surprisingly few students seem to have previously done a coin rubbing and find it very exciting.

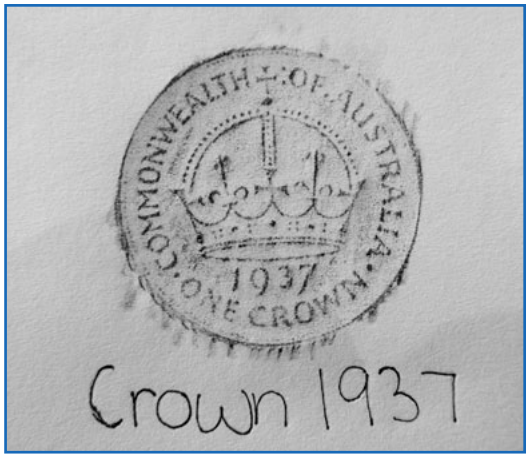

Figure 1. Coin rubbing of a pre-decimal Australian crown.

As a result of this activity, students achieve a greater awareness of money and why it takes its current form. There are numerous extension activities across the curriculum which this lesson can support. Some examples include: students designing their own money incorporating the essential elements of being distinct and easily recognisable and perhaps people or places which are important in their lives; using coins as tokens in the classroom; or having a class savings plan (a rather more sophisticated form of class points which can be converted to a reward in exactly the same manner).

Extension: Introducing foreign money

Figure 2. A selection of foreign notes and coins.

To extend this material we now turn to foreign currencies. Accessing foreign currency notes and coins is often more straightforward than it first appears. Many students have small stashes at home which they are delighted to share—and after exploring Australian currency, asking them to bring in coins and notes often elicits a surprisingly large horde. Resources are again available from the author who will be happy to assist.

Ask the students to examine the foreign money, and ask them what they notice that is different from Australian money. Some common features are different textures and weights of notes and coins. This is due to different materials in use—and reinforces that the validity of money requires agreement on what money looks like from the community—older societies have used shells, pigs and many other commodities for money. The restrictions required are that it be in limited supply, difficult to counterfeit and we all agree on it, which is why gold is such a popular choice.

One option is that students can work to identify where the money they have is from, drawing them into geography. This can be challenging, particularly if the coins are older. Not all coins have the modern country name on them, and they are of course not in English! But it can be a fun part of the learning journey working this out. There is a coin and note identification resource available at www.portlandcoins.com/idguide which is quite accessible.

Exchange rates: Multiplication and division with decimals

The second option is to introduce students to the concept of exchange rates. Most students are familiar with Amazon.com, iTunes and Internet shopping sites and have encountered the idea of buying goods using other currencies. A leading question is to hold up some foreign currency and ask, “How much could this buy in Australia?” The first answer is often ‘nothing’ because it is not legal currency in Australia. This is correct, and leads to a discussion of how might we change it to Australian dollars at a bank or a currency exchange service such as found in airports. Imagine a student has a UK 10-pound note; then we might wonder, “How many Australian dollars would I get for these ten British pounds?”.

This question is the same as “How many Mars bars would I get for these 10 Australian dollars?”—there is a price for each currency in terms of the other (this is the exchange rate). To find out how many Australian dollars we can purchase with 10 British pounds, we need a current exchange rate. There are many internet sites that provide current exchange rates. A good example which will come up with any search engine is www.xe.com. In this converter (and most others), you simply put which currency you want to convert (British pounds) in on the left hand side and the currency you want to end up with (Australian dollars) on the right hand side. On the day of writing

$$1 \text{ British pound} = 1.66779 \text{ Australian dollars}$$

As our example is a note worth 10 British pounds then this is worth

$$\begin{aligned} 10 \text{ British pounds} &= 10 \times 1.66779 \text{ Australian dollars} \\ &= 16.67 \text{ Australian dollars} \end{aligned}$$

Note that this is rounded down because the current Australian currency does not extend to fractions of a cent.

To make this more challenging for the students it can be phrased as a division problem. Instead of finding the exchange rate for 1 British pound to Australian dollars, find the exchange rate for 1 Australian dollars to British pounds. That is put 1 Australian dollar in the left hand box for the conversion and convert it to British pounds. The equivalent is that we find

$$1 \text{ Australian dollar} = 0.599510 \text{ British pounds}$$

Thus to find out how many Australian dollars are in 10 British pounds we need to find out how many lots of 0.599510 are in 10 British pounds.

$$\frac{10}{0.599510} = 16.67 \text{ Australian dollars as before.}$$

Ask the students to figure out how much the foreign money they have represents in Australian dollars. In this activity the author generally separates the collecting of the exchange rate data from the calculation step. Students can compare the values of different notes and coins. A big hit in the author's classes was the 300 trillion Zimbabwean note which is worth less than 3 Australian cents.

Conclusion

This activity meets the Australian curriculum needs for financial literacy and tailors nicely to Mathematics units on measurement as well as being extendable into history and geography. The students universally enjoy handling actual money, and gain some real understanding of an important part of their developing young adult skills. One of the rewarding aspects of this exercise is that the students willingly undertake repetitive practice of their mathematical skills with enjoyment. They understand the point of it and are highly motivated.

References

Australian Curriculum Assessment and Reporting Authority [ACARA]. (2012). *The shape of the Australian Curriculum: Economics and business*. Retreived 31 August 2013 from http://www.acara.edu.au/curriculum_1/learning_areas/humanities_and_social_sciences/economics_and_business.html

Australian Securities and Investments Commission [ASIC]. (2011). *National financial literacy strategy: Australian Securities and Industries Commission Report #229*. Retreived 31 August 2013 from http://www.asic.gov.au/asic/ASIC.NSF/byHeadline/Reports#2011

Australian Securities and Investments Commission [ASIC]. (2013). *Review of the National Financial Literacy Strategy: Australian Securities and Industries Commission Report #339*. Retreived 31 August 2013 from http://www.asic.gov.au/asic/ASIC.NSF/byHeadline/Reports#2013