

A tutor's guide: Developing a learner's calculator skills: Part 2 -More advanced operations

## Part 2 – More advanced operations

Workbase: The New Zealand Centre for Workforce Literacy Development provides resources and professional development to support foundation learning for adults.

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## A tutor's guide to developing a learner's calculator skills:

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## (How to use this guide

#### **Purpose**

The purpose of this guide is to develop a learner's skills in using a calculator as one method of developing numeracy skills. It is intended that a learner will work through the guide with a tutor who can answer any questions the learner might have and offer guidance and support.

#### **Structure**

The guide contains a number of Learner Activities (identified in the top right-hand corner with the icon

For each Learner Activity there is a corresponding page that contains Teaching Tips for the tutor. Each of the Teaching Tips should be used to make sure your learner has the relevant language and concepts before they tackle the corresponding Learner Activity.

A tutor's guide to developing a learner's calculator skills: Part 1 – Basic operations covers:

- using a calculator
- estimating and rounding
- basic operations (+, -, x, ÷).

A tutor's guide to developing a learner's calculator skills: Part 2 – More advanced operations covers:

- a review of calculator use
- estimation and rounding •
- percentages •
- GST •
- foreign exchange.

Materials and examples in Part 1 are set within a range of different contexts. Part 2 is set within a retail environment. Both guides provide a model that can be easily adapted to other contexts to suit the needs of your learners.

These guides could also be used with peer tutors. However, you would need to structure the situation carefully in terms of expectations about how the learner and peer tutor would work together. You would also need to monitor the situation carefully.

## **Part 2 – More advanced operations**



Learner Activity).

## **Part 2 – More advanced operations**

#### **Starting out**

Your learner might have already been assessed and have some idea of where they need to develop their skills.

Or your learner might want to go through both guides.

Each guide contains grouped activities relating to various topics that can be worked on separately, but it is best if they are worked on one after the other as later activities build on earlier ones. However, there is no need to work through all the activities if your learner shows they understand and can do the tasks. In these situations move on to other areas where your learner does want to develop skills. It is quite common for people to be able to do some more complex tasks but not be as confident in areas you might think are more basic.

Some activities include references to additional online material that you can use with your learner. In some cases the additional material can be done online and in other cases you can print relevant worksheets and activities.

#### Additional reading and other resources

At the back of each guide there is a list of additional reading and where you might access other useful resources.

## A tutor's guide to developing a learner's calculator skills:



Because this guide is based in the retail sector, a word list of some relevant terms is included as the first Learner Activity. These terms are used throughout this guide.

Some definitions of terms have been included as an example of how you could develop a 'retail dictionary' with your learner.

Go through the list with your learner and make sure they know the meaning of each term. Add any other terms that your learner knows or that you think they need to know.

Here is an example of a UK resource that includes a retail word list: see http://www.bbc.co.uk/skillswise/words/vocabulary/wordsforwork/retail/index.shtml

#### **Retail terms**

Here are some terms that are used in retail. Do you know their meanings?

Create your own 'Retail glossary' by writing down the meanings beside each word. Some are already done for you as examples. If you are not sure what the meanings are, ask your tutor or look them up in a dictionary.

Word	Meaning
balance	
cost	
daily sales target	
decrease	
deposit	
discount	Sometimes a discount is given or wants to clear stock. The di reduced. The discount can be
EFTPOS	
gross	
GST	
hire purchase	
lay-by	
margin	
mark-down	
market	
mark-up	
merchandise	
net	
outlet	
overloads	
profit	Retailers in general sell their ge for. The higher price should co is the gain for the retailer.
retail price	The price of goods in a shop th
stock	
total	
turnover	
wholesale cost	The price for an item from the r

## **Part 2 - More advanced operations**

## Learner activity 1



e.g. when a shop has a sale or a special offer liscount is the amount by which the price is expressed as a percentage or money amount.

loods at a higher price than they bought them over costs and also include a profit. The profit

nat sells to the public.

manufacturer or importer.

## **Teaching tips**

## Using a calculator – a review

How does your learner feel about using a calculator?

Talk about the advantages and disadvantages of using a calculator.

Discuss when you would work out an answer in your head, use pen and paper, or when you would use a calculator.

Some examples of appropriate calculator use are:

- working with large numbers •
- multi-step calculations •
- when your answer must be accurate •
- checking calculations you have done in your head. •

Consider how all calculators look slightly different but most of them have the same basic functions. Scientific calculators are much more complex and should not be used for this guide.

If your learner hasn't completed A tutor's guide to developing a learner's calculator skills: Part 1 – Basic operations you may need to go through the calculator keys on the next few pages. Otherwise go to page 20.

### Looking at calculators

This is what a calculator can look like. However, every calculator is slightly different.

## AC +/-M-MR M+ 8 9 7 5 6 2 3 0

#### Keys



are called operation keys.

and the answer when you finish).

## **Part 2 - More advanced operations**







is the display (for the numbers you have entered

## **Learner activity 2 (continued)**



The Learner Activities in this guide will teach you how to use these operation keys for calculations in contexts relevant to you.

#### More function keys

These keys are called advanced function keys.



is the square root key.

M+



is the percentage key.



changes between positive and negative numbers.



MC are memory keys.



### **Calculator keys**

This Learner Activity might look too easy for your learner, but it is important that they are familiar with the keys as they will be used a lot in the other Learner Activities.

Make sure your learner understands what each key is used for. Talk about 'when' and 'why' they are used.

Then explain that you are going to work with them to understand 'how' they are used.

### **Calculator keys**

Look at this picture of a calculator. Some keys are missing. Mark the following keys in the correct blank spaces:



AC

MR





# Part 2 - More advanced operations **Learner activity 3**



### Maths word list

This word list covers a number of relevant mathematical terms. The list is not comprehensive but includes common terms that are used in this guide.

Definitions of terms have been included as an example of what a glossary can look like. If there are other terms that your learner wants explained, do this on the blank sheet on page 121 of this guide.

Discuss with your learner frequently used mathematical terms. There may be some you know that they don't and vice versa. If you are not sure what a word means, look it up in a maths dictionary. These are available in most bookshops. An online maths dictionary you might find useful is http://www.math.com/school/glossary/glossindex.html

#### Maths word list

This list covers some terms that are used quite frequently in maths.

Do you know their meanings?

Maths term	Meaning
Desimal	Decimals are part of a system of counting that is based on ten. 'Decimal' often
Decilia	means a number that includes a decimal fraction such, as 0.03 or 24.13.
Decimal place	The position of a number represents its value or decimal place. For example, in
	the number 3.915 the 3 = three ones or units, the 9 = $^{9}/_{10}$ , the 1= $^{1}/_{100}$ and the 5 = $^{5}/_{1,000}$
Decimal point	A dot that is used to separate a whole number from a decimal fraction e.g. 2.75.
Desimal fraction	A fraction that is shown after a decimal point. For example, 0.9, 0.38 and 0.751 are
	all decimal fractions.
Digit	Any of the numerals from zero to nine. A digit is also called a figure. Numbers can
	be made up of one or many digits e.g. 238 is a three-digit number.
To estimate	To give a roughly correct but not exact amount.
Equals	The symbol for equals is =. It means 'the same as' or 'makes'.
Figure	Another word for digit.
Operations	Addition, subtraction, multiplication and division are number operations.
	Operations all make changes to a number using a set of rules.
Fraction	Part of something or part of a whole. Fractions can be shown as decimal fractions
	and percentages. The word fraction is often used for a number such as <sup>3</sup> / <sub>4</sub> . The
	bottom number (denominator) shows how many parts make up the whole thing.
	The top number (numerator) shows how many parts you are working with.
Place value	Digits have different values depending on where they appear in a number.
	In the number 394, the 4 has the value of four ones (or units), the 9 has a value of
	nine tens and the 3 has a value of three hundreds.
Round	Rounding a number to the nearest ten means finding the tens number that is
	nearest to it. For example, 58 is rounded up to 60 and 53 is rounded down to 50.
Whole number	Any number that does not include a fraction – 7, 43, 281 and 3,415 are all whole
	numbers.

## **Part 2 - More advanced operations**

## Learner activity 4

88	•
1 2	
	•

These revision exercises cover some of the skills worked on in A tutor's guide to developing a learner's calculator skills: Part 1 – Basic operations.

They can be used to check that your learner is familiar with using the calculator to do addition, subtraction, multiplication and division (basic operations) and appropriate estimation and rounding before continuing with this guide.

#### **Revision of calculations**

First write in the boxes the keys you must press to find the answer to each problem. Then work out the answers and write them down. The first one is done for you.





## Part 2 - More advanced operations

## Learner activity 5



## **Learner activity 5 (continued)**

Solve these problems using +, -, x or  $\div$ . Write down your calculations and the answers on the lines provided.

- There are 64 pairs of trousers in the central warehouse of a nationwide store. Another 68 pairs of 2 a. trousers have been delivered to the warehouse. How many pairs are there altogether?
- All the trousers are packed into three boxes of the same size. How many trousers are in each b. box?
- A chain buys 68 pairs of trousers at \$30.00 each to sell in its outlets for \$58.95. What is the C. difference between the buying and the selling prices for each pair?
- What is the total difference for all 68 pairs? d.
- Sue has a new job in a shop and has \$150.00 to buy some new clothes. She buys a T-shirt for 3 a. \$25.99 and a pair of trousers for \$49.95 as well as socks and underwear totalling \$39.90. Work out her spending so far.
- Sue also would like to buy a skirt. There are two skirts she can choose from, a red one at \$31.95 b. and a blue one at \$35.99.

Can she afford a skirt?	Yes/No
If so, which skirt can she afford?	Red/Blue
What is her new spending total?	
What change does she have left?	



## **Part 2 - More advanced operations**

## **Teaching tips**



**CE** clearing functions and the Find the

**CA** clearing keys on your learner's calculator

and check how the clearing functions are marked.

After working through the Learner Activity on the next page, check that your learner understands the difference between the two keys by asking them which key to use in each of the following situations:

- You are adding up the number of items in three different bins. The last number you entered, 23, • should have been 26.
- You worked out your result and wrote it down. Now you want to clear all numbers you have entered • and the display.

#### **Clear keys**

There are two 'clear keys' on the calculator in this guide.

One of them is the 'All clear' key.

AC

This key will clear all numbers entered.

This function can be on the same key as 'ON'.

The other is the 'Clear entry' function.



This key will clear the last number you entered. On the calculator in this guide this function is on the same key as 'ON'.



On some calculators the keys are marked differently. Check your own calculator.

Try these



The display screen will show: 55

Now try the same calculation but using the other clear key.

The display screen will show: 43



## Learner activity 6 (continued)

Discuss the following questions with your tutor.

Why did you get two different answers? \_\_\_\_\_ •

What is the difference between the two clear keys? .

Why is it useful to have two different keys? \_\_\_\_\_ •

When would you use each key? \_\_\_\_\_ •



## **Estimation skills review**

Estimation skills play a vital part when working with a calculator. If your learner has gone through A tutor's guide to developing a learner's calculator skills: Part 1 – Basic operations they will have done a lot of estimation and rounding. If they have not done A tutor's guide to developing a learner's calculator skills: Part 1 – Basic operations it is worth going through the exercises in the additional material on the next page.

Estimations may be done on paper or mentally.

Numbers are rounded up or down so it is more convenient to work with them quickly.

Provide lots of practice at estimation with rounding up and down in real situations e.g. adding up goods bought in a shop or amount of stock. You could also get advertisements from junk mail and newspapers and use these for rounding activities.

Estimation and rounding skills are important when working out accurate results. What rounding method is used and how accurate the rounding has to be depend very much on the situation.

Money and distances are good examples of how estimation can be used.

Mental addition when shopping is easier when all prices are rounded up to the next dollar e.g. 83 cents to \$1.00.

#### Rounding systems used in the New Zealand retail sector

A number of different rounding systems are used in the retail sector in New Zealand.

A large nationwide retail outlet in New Zealand always rounds down, never up, e.g. \$4.99 will be rounded down to \$4.95 if paying by cash.

A lot of stores, especially supermarkets, use the Swedish rounding system. The Swedish system works like this:



#### Additional material

See http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/rounding/ Use the estimation exercises first and then do the rounding exercises. Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

## **Part 2 - More advanced operations**

## **Teaching tips**

#### 7, 8, 9

6, 7	8, 9
l	up
o 65	89 rounds up to 90

## Part 2 - More advanced operations



#### **Estimation skills**

Calculators cannot do the thinking for you. They are simply machines and you need to tell them what to do. Sometimes when you are using a calculator you can press the wrong button and get the wrong answer. So it is always good to have a rough idea or estimate of the answer **before** you start using the calculator.

Once you have done your calculation you can then check if the answer on the display looks okay in relation to your estimate.

Here is an example of how you use estimation when you are adding.

Add 13 + 148. Round 13 down to 10 and round 148 up to 150, then add the estimates. This will give you a rough guide.

	Estimate	Calculator answer
13 + 148	10 + 150 = 160	161

#### Try these

	Estimate	Calculator answer
297 + 382		
84 x 12		
56 – 19		

## Learner activity 7



#### More estimation

Teach your learner the four steps of estimating when using a calculator.

- Work out what the question is asking. 1.
- 2. Estimate an answer either using pen and paper or in your head.
- 3. Do the calculation on the calculator.
- 4 Check that the answer on the calculator is similar to your estimate. If it isn't, go back, redo your estimate and then do the problem again on the calculator, making sure you have keyed the numbers in correctly.

#### **Estimate then calculate**

First decide what the question is asking you to do and which operation  $(+, -, x \text{ or } \div)$  you need. Then work out an estimate. Here is a worked example. Use your calculator and follow the example.

Anna gets paid \$10.30 per hour. She has worked 15.5 hours in the past two weeks. She wants to work out what her gross earnings are.

She estimates that \$10.30 is about \$10.00 and 15.5 hours is about 15. She multiplies 10 by 15. 1. What is 10 x 15? Work it out on paper or in your head.

Write your estimate here

2. Using the calculator she multiplies the number of hours by her hourly rate. On the calculator, key in: 10.30 x 15.5.

The display screen will show: 159.65. That is the exact amount Anna will be paid. How close is that to your estimate?

#### Try these

Work out an estimate for each of the problems below and write it in the space below. Then work out each problem using your calculator and write the answer in the space. Check your estimate and the actual answer.

1. the calculator to work out the exact amount.

Estimate	Calculato

2. costs \$8.95. Estimate if he has enough money for three pizzas, then use the calculator to work out the exact price.

Estimate	Calculato

## **Part 2 - More advanced operations**

## **Learner activity 8**

88	•
0 2	
	•

Sally earns \$8.27 net per hour and she has worked 50 hours. Estimate her earnings first, then use

r answer

Roger would like to buy pizza for himself and his two mates. He has \$29.50 in total. One pizza

r answer

## **Part 2 - More advanced operations**

## **Teaching tips**

#### Memory keys

Most calculators have a small memory section that can be used to do difficult or multi-step calculations.

Discuss when the memory keys could be useful.

The four memory function keys can be different on different calculators.

Sometimes the

**MC** | functions are combined in one key. **MR** and the

#### **Memory keys**

The memory keys help you to do difficult or complex calculations because you can store numbers and then use them later. This saves time having to re-enter numbers. It also cuts down on the possibility of keying errors.

If you use the calculator's memory, the calculator will show this with a small capital M on the left-hand side of the display.



You will find up to four memory keys.



MC

**M+** adds the displayed number to the memory or to what is already in the memory.



**M**- subtracts the displayed number from what is stored in the memory.

MR

MC clears the memory of all information and returns it to zero.

Sometimes the **MR** and **MC** keys are combined.

Show your tutor where the memory keys are on your calculator.

## Learner activity 9



**MR** recalls the number from the memory and shows it on the display.

## Learner activity 9 (continued)

#### Try these

Write down which memory function key you would use in the blank box.

- You would like to clear the memory and make sure it is zero. 1. Which key do you press?
- You would like to add '25' to the memory. 2.
- You would like to subtract '18' from the memory. 3.
- Now you would like to recall the memory value to the display. 4.



## **Teaching tips**

### Using the memory keys

Your learner is now going to work with the memory keys.



MR recalls the memory. The display shows the solution after the last operation.

In some of the examples in the next Learner Activity the answer will show up as a negative number. This shows the difference between actual sales and the target.

### The memory keys

Now you need to use your calculator. Let's look at how the memory keys work.

Sarah works in a clothes shop and she always checks how much she has sold during the day. She has a sales target of \$450.00 each day.

So far she has sold six tops for \$80.00 each. Has she reached her target? If so, how much is she over her target?

			Displa
Press	MC		
Press	8 (	0	
Press	x	6	
Press	M+		М
Press	4 !	5 0	М
Press	<b>M</b> -	[	М
Press	MR	[	М

Sarah has sold \$30.00 worth of clothing over her target.

## **Part 2 - More advanced operations**

## Learner activity 10



## **Learner activity 10 (continued)**

#### Try these

- Rachel has sold seven items for \$28.00 each. Her target is \$300.00. What's the difference 1. between her sales and her target?
- 2. Jackie's target is \$450.00 and so far she has sold three items at \$109.00 each. How much more does she need to sell to reach her target?
- John's sales target is \$500.00. He sells four items at \$45.00 each and then two items at \$150.00 3. each and another item costing \$80.00. How much is he over or under his target?



#### Fractions, decimals and percentages

This is not intended to be an introduction to fractions and decimals. There are a limited number of contexts such as sales where your learner will use fractions in their job.

Check that your learner understands that fractions, decimals and percentages are three different ways of saying the same thing.

Sometimes fractions are used in combination with percentages, so the aim of this Learner Activity is for your learner to identify fractions used in such combinations.

#### **Additional material**

#### Fractions, decimals and percentages exercises

If your learner does need to do some introductory work about fractions see http://www.bbc.co.uk/skillwise/numbers/fractiondecimalpercentage/ and look at:

- Introduction to fractions
- Simplifying fractions •
- Compare and order fractions
- Finding fraction parts. ٠

Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

### Fractions, decimals and percentages

Fractions, decimals and percentages are just three ways of saying the same thing e.g.



100% percentage '100 out of 100'

Look at these numbers. Here you find fractions and percentages combined. Change the fractions into decimals and write them down.

12 <sup>1</sup> /2% : e.g. GST	12%		
<b>20</b> <sup>3</sup> /4%	20%		
<b>35</b> <sup>1</sup> / <sub>2</sub> %:	35%		

## **Part 2 - More advanced operations**

## Learner activity 11

	•
1 2	
	•



<sup>1</sup>/<sub>2</sub> pizza 0.5 50%

decimal	0.5
fraction	<sup>1</sup> /2
percentage	50%
'50 out of 100'	

## Learner activity 11 (continued)

#### Try these

1. Write down the number of fractions that are shaded. Then show the fraction as a decimal and a percentage.



Use a pen or pencil to shade the fraction on the grid or circle. Then show the fraction as a 2. decimal and a percentage.









b.



## **Teaching tips**

This Learner Activity looks at how your learner can use their calculator to convert common fractions into decimals or percentages (using the percentage key).

You need to make sure that they understand how a fraction is entered.

For example, they need to understand that  $\frac{1}{2}$  is the same as  $1 \div 2$  and this is what they need to key into the calculator.

They also need to understand that to convert a fraction directly into a percentage on a calculator you use the percentage key instead of the = key.

### Fractions, decimals and percentages on a calculator

Fraction

Now change fractions into decimals and percentages on a calculator.

#### 2 $^{1}/_{2}$ 1 ÷ = press 3 2 <sup>2</sup>/3 ÷ = press 3 <sup>3</sup>/4 4 ÷ press = <sup>8</sup>/10 8 1 0 ÷ press 5 0 <sup>5</sup>/10 1 press ÷

## Part 2 - More advanced operations

Learner activity 12





#### **Conversions**

The conversion table on the next page demonstrates the connection between fractions, decimals and percentages.

The table can be easily changed into a learning activity, by deleting specific information and asking your learner to fill in the gaps.

Below is a more comprehensive table for discussing with your learner.

Fraction	Decimal	Percentage
1	1.00	100%
<sup>9</sup> /10	.9	90%
7/8	.875	87.5%
<sup>5</sup> /6	.8333333	83.33%
4/5	.8	80%
3/4	.75	75%
<sup>7</sup> /10	.7	70%
<sup>2</sup> / <sub>3</sub>	.6666666	66.66%
<sup>5</sup> /8	.625	<b>62.5</b> %
<sup>3</sup> / <sub>5</sub>	.6	60%
1/2	.5	50%
<sup>2</sup> / <sub>5</sub>	.4	40%
<sup>3</sup> /8	.375	37.5%
<sup>1</sup> /3	.3333333	33.33%
<sup>3</sup> /10	.3	30%
1/4	.25	25%
1/5	.20	20%
1/6	.1666666	16.66%
<sup>15</sup> /100	.15	15%
1/8	.125	12.5%
1/10	.1	10%
<sup>1</sup> / <sub>20</sub>	.05	5%
1/100	.01	1%

#### **Additional material**

See http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/fractionspercentages/ Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

#### **Conversions**

Here you can see how fractions, decimals and percentages are related and that they are simply different ways of stating the same information.

 Fraction	Decimal	Percentage
1	1.0	100%
<sup>3</sup> /4	0.75	75%
1/2	0.5	50%
1/4	0.25	25%
1/8	0.125	12.5%
1/3	0.33	33.33%
2/3	0.66	66.66%
1/10	0.1	10%
<sup>1</sup> /5 Or <sup>2</sup> /10	0.2	20%
<sup>1</sup> /100	0.01	1%

## Part 2 - More advanced operations

## Learner activity 13

4 5	a
1 2	
	•

# **Part 2 - More advanced operations** Learner activity 14

## **Teaching tips**

#### **Percentages**

What does the word 'per cent' mean? Break it into two separate words.

per	means 'in each'		cent	means '100'
1% 20%	means 1 out of 100 means 20 out of 100	or or	<sup>1</sup> /100 <sup>20</sup> /100	
100%	means 100 out of 100	or	<sup>100</sup> /100	

Discuss the meaning of percentage in daily life. Use specific material e.g. advertisements or newspaper articles. If possible use examples provided by your learner.

Examples where percentages are used in the retail sector include:

- discounts •
- bulk purchasing •
- calculating interest paid on loans or hire purchase •
- calculating the commission on sales or payments. •

Talk to your learner about the fact that there are many different ways to work out percentages in daily life. This part of the guide will concentrate on using the percentage key because it is a fast and accurate way.

#### **Additional material**

See http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/percentages/introduction/ Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

#### **Percentages**

Per cent means 'in each hundred' or 'out of 100'. % is the sign for per cent.

100%	means	100 of 100
100%	means	the whole of something; so

100% = the whole of something Think of a whole pizza (100%) you will eat by yourself.

 $50\% = \frac{50}{100} = \frac{1}{2}$  of something You share your pizza equally with a friend and each of you gets half (50%).

 $25\% = \frac{25}{100} = \frac{1}{4}$  of something This time you share a pizza with three friends. If you share the pizza equally between the four of you, each of you gets a quarter (25%).

 $75\% = \frac{75}{100} = \frac{3}{4}$  of something Each of your three friends gets a quarter or 25% of the pizza. Your friends have eaten 75% of the pizza because 25% multiplied by three is 75%.

Find some examples of percentages in newspaper articles or advertisements. Talk with your tutor about them.

How do you know when you need to work out a percentage?

What do you do? Do you use the

% key on the calculator?

mething complete



#### Finding the percentage of a certain amount

Remind your learner that, when they are working out the percentage of a certain amount, their answer represents a part (percentage) of the whole.

Talk to your learner to see if they already have strategies for working out percentages. An example could be working out the sale price of something advertised as 25% off.

#### Mental strategies for finding percentages

An easy way to work out percentages of an amount mentally is to change a common percentage to the common equivalent fraction.

- To find 50%, divide by 2 •
- To find 25%, divide by 4 or divide in half and then half again •
- To find 75%, divide by 4 and then multiply by 3 •
- To find 20%, divide by 5 or find 10% and double it (easier method) •
- To find 10%, divide by 10 •
- To find 5%, find 10% (divide by 10) and then divide again by 2. •

Remember to encourage your learner to estimate before doing the calculation.

#### **Additional material**

See http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/percentages/percentageparts/ Only use the exercises at appropriate times.

Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

### Finding the percentage of a certain amount

Andrew would like to buy a lawnmower for \$450.00. He decides to use lay-by and pays 35% deposit. How much deposit does he pay? Remember to estimate first.

				Disp
Press	4	5	0	
Press	X			
Press	3	5		
Press	%			

The display screen will show: 157.5.

The deposit will be \$157.50.

#### Try these

Work out the deposit for each item then write it down.

- 1. Breadmaker \$199.00 with a 25% deposit
- 2. Sandwich press \$129.00 with a 30% deposit





#### Showing an amount as a percentage

Practise working out percentages using everyday examples. For example, work out what percentage of your learner's total income is spent on travel or food.

In the worked example, money is used but the operation can also be done with other quantities.

This operation is also used to work out the percentage reduction of something.

#### **Remember the rules for rounding**

The rule for rounding decimals is:

- numbers that end in 1, 2, 3 or 4 are rounded down •
- numbers that end in 5, 6, 7, 8 and 9 are rounded up •
- if the figure at the end is 0 the number stays the same. •

Amounts are usually rounded to two decimal places. Discuss reasons for this with your learner. Use money as the first example.

You also need to discuss with your learner when they would use rounding in their lives.

Remember to estimate if possible. If estimation is too hard you can use a calculator to do an estimate before doing the actual calculation. Always check the calculation by thinking, "Is the answer sensible?".

#### Showing an amount as a percentage

Sometimes we need to show a part of something as a percentage. Look at this example.

Caroline owns a small bakery that specialises in cakes. She needs to know what percentage of her total production costs she spends on packaging. In November, the packaging costs are \$40.00 out of total costs of \$350.00. What percentage is that of her total costs?



The display will show: 11.42857. We round up to two places (the second number on the right of the decimal point), so the amount is 11.43.

The packaging costs are 11.43% of the total production costs.

You can also use this operation to work out what percentage one amount is of another amount.

A DVD player is on sale for \$349.00 instead of its regular price of \$429.00. What is the percentage reduction?



To work out the percentage by which the DVD player has been reduced, deduct the sale price % from 100% (original price).

100 - 81.35 = 18.65%The DVD player price has been reduced by 18.65%.

# **Part 2 - More advanced operations** Learner activity 16

splay	
40.	
40	
40.	
350.	
11.42857	

## Part 2 - More advanced operations

## Learner activity 16 (continued)

### Try these

In each case work out the percentage and write down the result.

- 1. What is \$60.00 as a percentage of \$890.00?
- 2. What is \$223.00 as a percentage of \$687.00?

Where would you use this operation in your daily life?

Think up a problem like the DVD problem on the previous page but make your problem more complex.

Write the problem down then work out the answer.



#### Comparing a percentage rate with an amount

This Learner Activity shows how to compare a percentage rate with an amount of money.

This will show your learner not only how to compare offers in different units but also how to compare the same units.

### Comparing a percentage rate with an amount

Two banks offer a loan for five years. Bank A offers \$8,000.00 at \$950.00 interest per year. Bank B offers the same amount at 11% interest yearly. To compare both loan offers, you need to convert them to a common base.

Bank A: Find the interest payable to Bank A as a percentage.



The display screen will show: 11.875. The interest rate from Bank A is 11.88% (rounded up).

Alternatively you could work out the yearly interest you would pay to Bank B.



The display screen will show: 880. The yearly interest for a loan from Bank B would be \$880.00.

Which bank has the cheaper loan offer?

## **Part 2 - More advanced operations**

## Learner activity 17



#### **Changing amounts by percentages**

Changes to any quantities can be expressed as percentage changes. A change in percentage can be an increase or a decrease. You either add something to or take something away from the original amount.

When you start exploring a change in percentage, check that your learner understands:

the starting amount is and or

100% they *add* something to the 100% (increase) they take something away from that 100% (decrease)

A change in percentage can be worked out in various ways. The next few Learner Activities concentrate on specific methods to work out a percentage increase or decrease.



#### Additional material

See http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/percentages/percentincrease Only use the percentage increase exercises at this time. Use decrease exercises later. Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names.

#### **Changing amounts by percentages**

Sometimes you have to change an original amount by a percentage. This can be a percentage increase - something gets bigger - or a percentage decrease - something gets smaller. For example, in a sale you might have to reduce prices by 25%.

Fill in the gaps:

Percentage increase – something becomes

Percentage decrease – something becomes \_

Look at this example.

A short sleeve vest costs \$95.85. \$95.85 = 100%.

This represents 100% or \$95.85.



25% increase (mark-up) 1. A percentage increase means that the vest will cost more than \$95.85. 100% + 25% = 125%



2. 25% decrease (mark-down) A percentage decrease means that in a sale the vest will cost less than \$95.85. 100% - 25% = 75%



## **Part 2 - More advanced operations**

## Learner activity 18



## **Teaching tips**

#### Percentage increase: Finding the % part and adding

Useful situations for practising percentage *increases* could be:

- a percentage increase in the cost of electricity or other household services or items •
- interest on savings •
- a pay rise •
- cost of credit (increased loan payments when there is a change in interest rates) •
- adding a mark-up to stock. •

A percentage increase can be found by finding the percentage part and adding it to the original amount.

There are two steps to this process. First you have to find the percentage part. Secondly you add the percentage part to the original amount. Go through this with your learner to ensure they understand.

#### Percentage increase: Finding the % part and adding

The first method to work out a percentage increase is to find the percentage part, then add it to the original amount.

A shop sells a range of T-shirts for \$24.95 each. The shop owner decides to increase the price by 4% to cover higher costs. What is the price increase? What is the new selling price of the T-shirts?

Step 1: How much is the price increase?



The 4% increase is .998. Don't round this result yet.

Step 2: What is the new selling price of the T-shirts in the shop?



# Part 2 - More advanced operations Learner activity 19



The new selling price is \$25.948.

Now you can round. You are working with money here so you need to state your answer in money terms.

Round the price to two decimal places (two numbers to the right of the decimal point).

So 25.948 becomes \$25.95.

#### More percentage increases

The 'Fill in keys' Learner Activity on the next page gives your learner a chance to try their new skills and record the steps on paper before keying them into their calculator. It is also good for skill consolidation.

Remember, if your learner finds writing it down too easy they can leave out this part of the task and work out the results straight away using the calculator.

### More percentage increases

#### Try these

Fill in the keys including the display boxes, then work out the increases and the new prices with the calculator.



# Part 2 - More advanced operations Learner activity 20

Display

25.75

#### Percentage increase: Using the 100+% method

Here is a summary of three methods for working out percentage increases. Method 1 has already been covered in the previous Learner Activity.

Method 2, the '100+%' method, is an accurate way of working out a percentage increase. In this method you add the % increase to 100% before you multiply the amount you want to increase. With this method your learner is able to see the **increased** value straight away. This combines the two steps in Method 1.

Method 3 is a more advanced method that you may teach your learner once they are familiar with the underlying principles of percentages (100% is the original amount etc.).

Let your learner choose the method they prefer out of Methods 1 and 2 then encourage them to give Method 3 a go.



### Percentage increase: Using the 100+% method (Method 2)

Let's go back to the shop with the T-shirts for \$24.95 and the 4% price increase.

The shop owner wants to calculate the new price directly rather than adding the increase to the original price.

Here the direct nature of the 100+% method (Method 2) works well. Add 4% to 100%: 100 + 4 = 104%.

What is the new price for the T-shirts?



After you round, the new price is \$25.95.

#### Try these

Work out the new price and write it down. Show your workings and remember to estimate first.

1.	30% increase on \$65.00	
2.	70% increase on \$89.00	
3.	\$195.00 increased by 45%	

## Part 2 - More advanced operations

## Learner activity 21





#### **Goods and Services Tax**

Make sure your learner understands that Goods and Services Tax (GST) is a government tax, the percentage of which can be changed. Originally GST was 10% then it was put up to 12.5%, which is the current rate. GST is added to a product or a service **on top** of the amount calculated to cover costs as well as the amount calculated by the owner of the product or service to make a suitable profit.

GST is included in the marked price of items in shops. However, in some retail situations, GST might not be included e.g. when shopping on the internet or in some restaurants.

Make sure you and your learner discuss these terms:

- GST-exclusive price: this is the price before GST is added. •
- GST-inclusive price: this is the price with GST included. •

Here are two methods to work out GST or the GST-inclusive/exclusive prices:

- GST-inclusive price: use the 100 +% method or 112.5%. •
- GST-exclusive price: divide the GST-inclusive price by 112.5 (original amount is 100% plus GST of • 12.5% = 112.5%) then multiply by 100.

Example:

The GST-inclusive price for 20 packets of coffee is \$101.25. Work out the GST-exclusive price (before GST is added).



Your learner may already know a way of calculating GST. Acknowledge that there are a number of different methods and that it is important they are comfortable with their way of working it out.

Explain that calculating GST as a percentage is a method they can always use, independent of the percentage to which the Government might change GST in the future. Encourage them to try to work on examples with a range of percentages.

#### **Goods and Services Tax**

GST (Goods and Services Tax) is a government tax of 12.5% added to almost all goods and services.

Set out below is an example using two methods for percentage increases.

The GST-exclusive (without GST) price of a book is \$20.00. What is the GST and what is the GST-inclusive price (with GST added)?

#### Method 1: Finding % part and adding it on



The GST is \$2.50.

\$20.00 + \$2.50 = \$22.50, which is the GST-inclusive price (with GST included).

## **Part 2 - More advanced operations**

## Learner activity 22



## Learner activity 22 (continued)

### Method 2: 100+% method



The GST-inclusive price (with GST included) is \$22.50.

\$22.50 - 20 = \$2.50 GST.

(In Method 1 there is an extra step at the end where you have to add the GST to the GST-exclusive price.)

C



### More GST examples

Here are some exercises you can work through with your learner before they start with the table in the Learner Activity.

GST is not included in the prices below. Ask your learner to calculate GST for each item.

The example in the table in the Learner Activity on the next page shows the keys required.

1.	Jacket	\$72.00
2.	Car	\$3,500.00
3.	Watch	\$60.00

## **More GST examples**

#### Try these

Calculate the GST with Method 1 (finding the % part and adding it on) for each item, then the price for each item with the GST included:

ltem		<b>Price before GST</b> (GST-exclusive price)	GST a				
Example: Jacket		\$72.00	7	2	x	1	2
1.	Camera	\$189.00					
2.	Book	\$33.00					
3.	Digital video camera	\$1,200.00					
4.	Dishwasher	\$1,100.00					

Now calculate the GST-inclusive price with Method 2 (100+%).

ltem		<b>Price before GST</b> (GST-exclusive price)	GST amount at 12.5%	Price with GST included (GST-inclusive price)
Exa Che	mple: ef's knife	\$40.00	4 0 x 1 1 2 • 5 %	\$45.00
5.	Toaster	\$59.00		
6.	Dentist bill	\$439.00		
7.	Overseas airline ticket	\$575.00		
8.	Car	\$14,995.00		

## Part 2 - More advanced operations

## Learner activity 23



unt at 12.5%	Price with GST included (GST-inclusive price)
• 5 % + =	\$81.00

#### Working out a GST-exclusive price

GST is added on top of a price calculated to cover costs and profit margins. How can you work out the amount of GST in the GST-inclusive price?

There are different methods for this calculation. Use the % key on the calculator because it gives your learner the freedom to use it with any GST percentage.

Your learner needs to understand that if you take GST out of a GST-inclusive price (to get the GSTexclusive price) you need to divide by 112.5%, not 100%. You need to discuss this with your learner. (GST of 12.5% has been added to the original price which is 100%.)

You need to go through both of the methods in the next Learner Activity and ask your learner which method they prefer.

In particular you need to explain why they divide by 9 in Method 1. (12.5% is 1/2, 100% is 8/2 so 12.5% +  $100\% = \frac{1}{8} + \frac{8}{8} = \frac{9}{8}$ 

#### Working out a GST-exclusive price

Sometimes you need to work out a GST-exclusive price e.g. if you are comparing prices and the price of one item is GST-exclusive and one is GST-inclusive.

Two stereos are on offer. Stereo 1 costs \$229.00, GST-inclusive. Stereo 2 costs \$210.00, GST-exclusive. Which one is cheaper? Work out the GST-exclusive price for Stereo 1.

There are a number of ways to calculate this. Here are two different methods. In Method 1 you divide by 9 because 100% is  $\frac{8}{2} + \text{the GST}(12.5\%)$  is  $\frac{1}{2}$  so 8 + 1 = 9.

Method 1: This method uses the GST percentage as a fraction, 12.5% is  $1/_{s}$ .



## Part 2 - More advanced operations

## Learner activity 24



203.56

## Learner activity 24 (continued)

Method 2 works with GST as a percentage. It is a method you can always use, whatever Method 2: percentage GST changes to in the future (with Method 1 you would have to adjust the fraction if the rate of GST changes). The only thing that has to be adjusted is the amount of the percentage.

		Display
Press	2 2 9	
Press	÷	
Press	1 1 2 • 5	
Press	%	203.56

The GST-exclusive price for Stereo 1 is \$203.56, therefore it is cheaper than Stereo 2.

#### Try these

The following prices are GST-inclusive. Calculate the GST-exclusive price.

1. \$304.00

2. \$485.00\_

## **Teaching tips**

Percentage	Percentage increase and memory function keys						<b>Method 2</b> (100+%)				<b>od 2A</b> (10)
Memory funct operations. T items that are	nction keys to do more complex out marked up prices of a number of	Press	2	5			Pres	s [			
We have inclu	ıded a worked example for bo	th methods use	d in the	Learner Activities on pages 69, 70	Press	X				Pres	s
and 73. Again encoura	age your learner to do both w	orked examples	so the	y understand both methods.	Press	1	0	3		Pres	s
The summary	below is for your information.				Press	%				Pres	s [
Summary of m Method 1 (3%	<b>nethods for working out a per</b> increase)	centage increas Method 1A (3%	<b>se</b> % incre	ase using memory functions)	Display	25.	.75			Pres	s [
Press	2 5	Press	2	5						Displ	ау
Press	x	Press	x		Explanatio	n					
Press	3	Press	3		Again in M complex ca	ethod 2/ alculatio	A <b>M+</b> ns.	rep	olaces	=	as this is
Press	%	Press	%								
Press	+	Press	+								
Press	=	Press	M+								

#### Explanation

Display

25.75



78

Display

25.75

## Part 2 - More advanced operations

## **Teaching tips**)

### 00+% using memory functions)



a useful function to be aware of in more

### **Percentage increase and memory function keys**

When you have to work out a percentage increase for a number of goods and add them all up, use the memory function keys.

The following exercises show you the keys you need to press. Press the keys as you work through the tasks and record your answers at each step.

1. pair of socks \$3.80, 20% mark-up.

T-shirt C	1	6	•	4	x
Hat	1	7	•	2	x
Socks		3	•	8	x

2.





# Part 2 - More advanced operations Learner activity 25

Find the total cost of these three items: T-shirt \$16.40, 15% mark-up; hat \$17.20, 25% mark-up; a

## Learner activity 25 (continued)

### Try these, remember to estimate first

Find the total cost for the following four items using the memory key: 1.

Total			
Steam iron	\$48.00	35% mark-up	
Hair cut kit	\$28.00	45% mark-up	
Shaver	\$45.00	40% mark-up	
Hairdryer	\$20.00	15% mark-up	

Work out the total price for the following three items, after a mark-up of 48% on the first item, 35% 2. on the second item and 57% on the third item.

Total		
Dishwasher	\$400.00	
Cordless phone	\$49.00	
Vacuum cleaner	\$90.00	



## **Teaching tips**

#### **Percentage decreases** Method 1 Method 2 A percentage decrease can be found by finding the percentage part and subtracting. 2 9 8 Press Practise percentage decreases with everyday problems, e.g. Press Χ discounts • working out sale prices • 5 1 Press reduced loan payments when there is a change in interest rates. • Here is a summary of three methods for working out percentage decreases. Method 1 has already been % Press covered on page 60. Method 2 is the '100-%' method and is an accurate way of working out a percentage decrease. Press In this method you subtract the % decrease from 100 before you multiply the original amount with this percentage decrease. With this method your learner is able to see the **decreased** value straight away. Press

Method 3 is a more advanced method that you may teach your learner once they are familiar with the underlying principles of percentages.

All these methods build on approaches used earlier in this guide.

Encourage your learner to try all three methods. However, in the end your learner should use the method with which they are most comfortable. Your learner will be working with these different methods over the next few Learner Activities.

Additional material

Percentage decrease exercises. See http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/percentages/percentincrease Use decrease exercises at this time. Make sure your learner understands this is a UK website and could use £ and pence (rather than \$ and cents) and UK place names. Method 3

Display



704.65

85

## Part 2 - More advanced operations

## **Teaching tips**



### Percentage decrease: Find the % part and subtract

During a summer sale a clothes shop offers a 20% discount on all trousers. A pair of trousers was \$80.00.

Step 1: How much is the discount?



The discount is \$16.00.

Step 2: What is the new price?

In Step 1 you worked out the amount of the discount was \$16.00. Now let's work out the new price.



The new price is \$64.00.



## Part 2 - More advanced operations

Learner activity 26



## Learner activity 26 (continued)

#### Try these

Fill in the keys. First work out the discounts, then the new prices.

Coat \$120.00, 40% discount 1.



2. Jeans \$80.00, 35% discount



	Display
the discount is	





### Percentage decrease: '100-%'

You can also use the 100-% method.

Subtract the discount percentage part from 100%, before working out the answer using the percentage function on the calculator.

Make sure your learner is confident with the previous approach before they move on to the second approach.

If they can't do the subtraction of the percentages in their head, encourage them to use their calculator to work out the percentage decrease in the first place.

#### Percentage decrease: '100-%'

Now work out the 20% discount for the work trousers with the 100-% method.

This means take away 20% from 100%.

100 - 20 = 80%

The original price for the trousers was \$80.00.

What is the new price for the trousers?



The new price is \$64.00.

Work out the new price for these.

- 1. Wool pullover \$150.00 reduced by 15%
- 2. Denim jeans \$88.00 discounted by 5%







## Learner activity 27 (continued)

### Try these

Calculate the reduction from the normal price with Method 1, then calculate the new sale price.

ltem	<b>Normal price</b> (Marked price)	Percentage item is reduced by (Decrease)	Reduction	Sale price
Example: Jeans	\$150.00	20%	150 x 20% \$30.00	150 - 30 = \$120.00
1. Mini hi-fi system	\$579.00	30%		
2. Microwave	\$399.00	15%		
3. Stove	\$990.00	25%		
4. Dishwasher	\$1,250.00	40%		

Let's calculate the sale price directly, using Method 2.

ltem	<b>Normal price</b> (Marked price)	Percentage item is reduced by (Decrease)	Sale price
Example: Chair	\$29.00	15%	100 - 15 = 85% 29 x 85% = \$24.65
5. Hand mixer	\$89.00	10%	
6. Vegetable knife	\$15.00	5%	
7. Wall clock	\$116.00	55%	
8. TV	\$1,300.00	45%	



#### Percentage decrease and memory functions

Just like increases, the decreased prices of several items can be easily worked out using the memory function keys.

Go through this concept with your learner. Try it out first with your learner using an example from their work context or out of your local newspaper, or you could make up your own.

Make sure they understand why you are using 15% with the first method and 85% with the second.

### Percentage decrease and memory functions

Working out the total cost of a number of goods that have each had a percentage decrease is easy when you use the memory keys.

Press the keys on your calculator as you work through the task.

#### Try these examples

A shirt priced \$35.00 is on sale at 15% off. A T-shirt priced \$18.00 is on sale at 10% off. How much would you pay in total for the two items?



#### You can also use the 100-% method.







MR

MC



D	isp	lay



## Learner activity 28 (continued)

### Try these examples

How much would you pay for the following items? Remember to estimate first.

Pair of shoes \$45.00 15% discount 1. Running shoes\$50.00 18% discount Cardigan \$29.00 20% discount 2. \$13.00 15% discount Scarf

Sweatshirt \$39.00 10% discount \_

96



#### Find the original amount after a percentage increase

This part of the guide explains how to calculate the original amount of an item after it has been increased by a certain percentage.

There are different ways of calculating the original amount. In this guide the focus is on using the memory and the % keys.

Discuss with your learner the example below before they start work on the Learner Activity on the next page. This example is designed to make them aware that another calculation is needed to find the original cost of an item.

#### Example

An item of clothing at cost price is \$12.00.

The shop owner wants to sell the item with a 10% mark-up. The selling price of the item is \$12.00 plus a 10% increase. Ask your learner to work out the increased selling price for the item.

Over a period of time the shop owner notices that the item of clothing is not selling. The shop owner decides to put the item on sale by reducing the selling price of the item by 10%.

Ask your learner to calculate the sale price of the item after the 10% deduction, then answer these questions.

What is the sale price of the item?

Is it higher or lower than the original cost price of \$12.00?

Why?

Discuss the results with your learner.

Your learner needs to understand that if you add a percentage to a value and then subtract the same percentage from the new value you do not end up back at your original value. This is because although the percentage value is the same, the amount you are adding it to or deducting it from changes.

#### Find the original amount after a percentage increase

We will now work out how to calculate the original amount of an item, after increasing that amount by a certain percentage. Sometimes you need to use this calculation when you have to work out the wholesale price of an item, knowing only the sale price and the percentage mark-up. Look at the following example.

Consider a 25% price increas	se on an \$80.00 pair of	shoes
\$80.00 + 25% increase:	25% is \$20.00	\$80.0
Knowing the increased price	and the % increase ye	ou mig
\$100.00 – 25% decrease:	25% is \$	\$100.
However, the answer is not o	orrect because 25% fr	rom \$1

So how can we work back to the original cost of \$80.00? Try this:



\$80.00 is the original price of the pair of shoes. This is the correct answer.

To find the original price divide the new amount by 100 plus the percentage increase (100 + 25 in the example above) then press the % key on the calculator.

## **Part 2 - More advanced operations**

Learner activity 29



(wholesale).

00 + \$20.00 = \$100.00

ht try to work out the wholesale price like this.

.00 - \_\_\_\_ = \$\_\_\_\_

00.00 is not the same amount as 25% of \$80.00.

## Learner activity 29 (continued)

Try these

Work out the original price.

- \$78.00 after a 20% increase \_\_\_\_\_ 1.
- \$185.00 after a 30% increase \_\_\_\_\_ 2.



#### Finding the original amount after a percentage decrease

This part of the guide explains how to calculate the original amount of an item after the original amount has been decreased by a certain percentage.

As we have just seen, if you increase an amount by a certain percentage then decrease the new amount by the same percentage, you don't end up back where you started.

Similarly, if you take away a percentage from a certain amount then add the same percentage to the new value, you do not end up with your original value.

For example:

A chair was reduced by 10% from \$60.00.

\$60.00 - 10% = \$54.00

If 10% is added to the \$54.00, it does not end up as the original amount.

\$54.00 + 10% = \$59.40

This is because although the percentage value remains the same, the amount you are adding to or deducting from it changes.

To find the original amount, the new amount has to be divided by 100 minus the percentage decrease %.

100% - 10% = 90%i.e.

 $54.00 \div 90\% = 60.00$ 

#### Find the original amount after a percentage decrease

Now we will work out how to calculate the original amount of an item, after decreasing that amount by a certain percentage. Sometimes you need to use this calculation when you only have a sale price and the percentage decrease but not the original selling price.

A shirt is on sale for \$46.80 after having been reduced by 25% in a sale. What was the price of the shirt before the 25% was deducted?



\$62.40 is the price of the shirt before it was reduced in the sale.

To find the original price after a percentage decrease, divide the reduced amount by 100 minus the percentage decrease (100 - 25 in the above example) then press the % key on the calculator.

#### Try these

- \$73.99 after 35% decrease 1.
- 2. \$145.00 after 20% decrease

# Part 2 - More advanced operations Learner activity 30

### Find the original amount after a percentage change

Using the exercises in the first table on the next page, your learner can practise calculating the original prices of products before a percentage increase.

The exercises in the second table can be used to calculate the original prices of products before a percentage decrease.

### Find the original amount after a percentage change

Calculate the price of each product before the mark-up was added.

Price including mark-up	Percentage increase (mark-up)	Workings	Price before mark-up
Example: \$26.00	30%	2 6 ÷ 1 3 0 %	\$20.00
1. \$93.75	25%		
2. \$54.75	50%		
3. \$0.88	10%		
4. \$1,680.00	40%		

The following items are reduced in a sale. Calculate the original price of each product.

Current sale price	Percentage discount	Workings	Original retail price
Example: <b>\$26.00</b>	30%	2 6 ÷ 7 0 %	\$37.14
5. \$93.75	25%		
6. \$54.75	50%		
7. \$0.88	10%		
8. \$1,680.00	40%		

## Part 2 - More advanced operations

## Learner activity 31

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#### Foreign currency exchange – overview

In some retail situations employees have to do foreign exchange calculations. Some people think that these are difficult calculations.

Foreign currency is converted into New Zealand dollars or vice versa using straightforward multiplication and division. Support your learner as they decide which rate to use, the sell rate or the buy rate, as this determines which calculation to use.

Go through the overview in the Learner Activity on the next page with your learner.

In later Learner Activities your learner will do some actual conversions.

#### Foreign currency exchange – overview

New Zealand dollars can be converted into other currencies, such as US dollars (US\$) or pounds sterling (£). Other currencies can be converted into New Zealand dollars. This is useful when people travel overseas or have money sent from abroad. Usually currency exchange transactions are done in a bank or Bureau de Change or foreign currency exchange. Here we use an example from a bank.

Two amounts are always given in relation to foreign currency exchange prices.

Rate	Explanation
Sell rate	This is used when money is converted fr The bank 'sells' foreign currency to you.
Buy rate	This is used when money is converted to The bank 'buys' foreign currency from yo

The bank 'sells' foreign currency to you. The bank 'buys' foreign currency from you.

The buy and sell rates are set by the world market and depend on how strong the New Zealand dollar is at any one time against overseas currencies. Banks advertise their rates in tables such as this.

Country	Currency	Bank buys	Bank sells
Australia	AUD	0.9148	0.8760
Britain	GBP	0.3771	0.3553
Hong Kong	HKD	4.7455	4.4362
USA	USD	0.5992	0.5690

This means the bank will 'sell' you \$0.8760 Australian for each NZ\$1.00 you want to change into Australian money.

To exchange Australian dollars for New Zealand dollars the bank will 'buy' them back from you by dividing the amount of Australian dollars you have by the 'buy' rate of 0.9148.

## Part 2 - More advanced operations

Learner activity 32

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om New Zealand dollars to foreign currency.

New Zealand dollars from foreign currency. ou.

## **Learner activity 32 (continued)**

#### **Conversion 1**

To convert New Zealand dollars into foreign currency, multiply the New Zealand dollar amount by the current sell rate of the currency you want.

#### **Example**

In preparation for a trip to Australia you have saved NZ\$250.00. You want to use this to buy some Australian dollars and you want to find out how many Australian dollars you will get.

Use the foreign exchange sell rate to convert the New Zealand dollars into Australian dollars. Multiply the New Zealand dollar amount by the current sell rate (0.8760).

250 x 0.8760 = 219 NZ\$250.00 equals A\$219.00

#### **Conversion 2**

To convert foreign currency into New Zealand dollars, divide the foreign currency amount by the buy rate of that currency.

#### **Example**

Your friend sends you US\$10.00. You take it to the bank to exchange for New Zealand dollars. To find out how many dollars you could get, divide the foreign currency by the buy rate of US dollars (0.5992)

 $10 \div 0.5992 = 16.6889$ US\$10.00 equals NZ\$16.69



### Foreign exchange conversion 1

When converting New Zealand dollars to foreign currency you use the bank sell rates. Multiply the amount of the New Zealand dollars by the sell rate for the currency you want.

Make sure your learner estimates first. They should always have an idea of whether they will get less foreign currency or more for their New Zealand dollars. Usually we get less foreign currency.

Also make sure that your learner is careful when putting in the sell rate in terms of the decimal point.

### Foreign exchange conversion 1

To find out how much foreign currency you can buy with New Zealand dollars, use the bank sell rate.

Multiply the New Zealand dollar amount by the bank sell rate.

#### **Example**

A customer would like to know how much a product for NZ\$175.00 costs in Australian dollars.



The product costs A\$153.30.

#### Try these

Work out the value of the New Zealand dollars in the foreign currency.

- 1. NZ\$65.00 as English pounds sell rate = 0.3513
- 2. NZ\$130.00 as Japanese yen sell rate = 66.25

## Part 2 - More advanced operations

## Learner activity 33



Display

153.3



#### Foreign exchange conversion 2

When converting foreign currency into New Zealand dollars you use the bank buy rates. Divide the amount of foreign currency by the buy rate.

Make sure your learner estimates first. They should always have an idea of whether they will get more or fewer New Zealand dollars for the foreign currency they are selling. Usually we get more New Zealand dollars than the amount of foreign currency.

Also make sure your learner takes care when entering the buy rate.

### Foreign exchange conversion 2

To find out how much New Zealand currency you could get when selling foreign currency, use the bank buy rate.

Divide the foreign currency by the bank buy rate.

#### **Example**

A customer would like to exchange Australian dollars for New Zealand dollars. She has A\$250.00.

The current bank buy rate is 0.9148.



A\$250.00 is worth NZ\$273.28.

#### Try these

Work out the value of the foreign currencies in New Zealand dollars.

- 100 English pounds buy rate = 0.3761 1.
- 2. 3,000 Japanese yen buy rate = 71.01

## Part 2 - More advanced operations

Learner activity 34



Display

273.28377

#### Mixed exercises, using percentage and memory functions

These review exercises cover the range of calculator functions worked on so far.

Let your learner choose whatever method they are most comfortable with. If they are not able to do these exercises easily, make up some more practice exercises until they are able to use the calculator for these functions.

### Mixed exercises, using percentage and memory functions

Fill in the keys. Then work out the results and write them down. You should still use the C (clear) key at the beginning of each calculation, but a box has not always been provided for that key depending on the method you use.

Find the total cost: 1.

Shoes \$80.00 with 10% off
Socks \$6.00 with 5% off
Sweatshirt \$39.99 with 10% off
Shirt \$20.50 with 10% off

2. Find the total sale price of these items:

Biscuits \$0.90 with a 10% mark-up	
Sugar \$0.98 with a 12% mark-up	
Coffee \$2.95 with a 25% mark-up	





3.

#### Learner activity 35 (continued) Learner activity 35 (continued) Now try these Flour \$0.82 with a 15% mark-up Vicky earns \$340.00 per week. She receives a pay rise of 4%. Work out what she will earn each 4. week and her new four weekly income. Total 5. A car stereo with a wholesale cost of \$297.00 is marked up by 44%. Add GST to the marked-up price. Find the total costs of these items in a sale: TV \$650.00 with a 20% discount A TV is on sale with a 15% discount. The normal price was \$1,199.00. Work out the sale price. 6. Radio \$45.00 with a 35% discount 7. An electrical appliance retail store is having a 'small appliance bargain' sale. Work out the new price for each item. Mixer \$80.00 with a 10% discount A blender was \$79.95, discounted by 33% a. b. A toaster was \$59.95, discounted by 20% A sandwich press was \$89.95, discounted by 15% C. Electric jug \$34.50 with a 25% discount 8. Samuel has \$2,000.00 in a savings account earning 2% interest. Work out the interest for one year. Stereo \$799.00 with a 5% discount Total 9. A nationwide store is advertising a discount of at least 20% on all clothing. You notice a pair of trousers marked down from \$69.95 to \$54.95. Is the store correct in its claim? A DVD player is marked up 45% to \$380.00 GST-exclusive retail price. Work out the mark-up, the 10. wholesale price, the GST and the GST-inclusive selling price. A plastics retail store reduces its prices to clear its storage shelves. Work out the new prices. 11. Laundry baskets were \$10.95, now marked down by 10% a. A 32-litre hobby box was \$8.95, now marked down by 7% b.

On the following page is an extension activity. It is an example of a cost report using percentages. This compares changes in operational costs in a bakery over a two-year period. It is aimed at developing percentage analysis skills.

### **Extension activity 1 – Percentage report**

and in 2005 on different items.

#### **Cost report**

Costs	2004	2005
Staff costs	20%	20%
Operating costs e.g. electricity, water	10%	12%
Packaging of products	10%	12%
Raw materials e.g. flour, sugar, eggs, cream	40%	38%
Machinery costs	20%	18%
Total costs	100%	100%

The report shows in percentages how much of the total cost each year was spent on different parts of the process e.g. on staff costs, packaging and machinery costs.

It does not show the actual amount of money spent. When adding the percentage parts for each year the result is always 100%.

This kind of report is very useful for keeping track of costs and can be produced using a computer with an accounting program.

Compare the costs in 2004 and 2005.

- Which costs have increased? 1.
- 2. Which costs have decreased?
- 3. Which costs stayed the same?
- 4. What can Caroline learn from the comparison of the costs of 2004 and 2005?

Answer these:

- 5. Why is this report in percentages and not in dollars?
- Why does the total cost have to add up to 100%? 6.

## Part 2 - More advanced operations

Learner activity 36



#### Here is a cost report from Caroline's Bakery. It compares the percentage of money that was spent in 2004

#### Writing more problems

Some of the Teaching Tips suggest writing more problems if your learner needs more practice.

One approach is just to adjust the numbers in the original problem. For example, if the original problem is '270 items are in one bin and 57 are in another bin and you put them all onto a trolley. How many items on the trolley?', just adjust the number of items to make a new problem.

Alternatively, follow these steps:

- Analyse the problem in terms of operation i.e. is it addition, subtraction, multiplication, division 1. etc?
- Analyse the problem in terms of the size of the digits i.e. does it use single numbers or larger 2. numbers?
- 3. Analyse the problem in terms of whether it is using money or not.
- Analyse whether it is a single-step or multi-step problem. 4.
- Using the results of your analysis, write a new problem that is similar to the original problem. 5.
- Or create a more complex problem to give your learner more practice. 6.
- 7. Talk to your learner about the problems they find the most difficult. Check different problems out with someone else - another tutor, an employer in the retail sector or the Retail Industry Training Organisation.

#### More maths terms

Maths term	Meaning

### Additional reading and other useful resources

#### Reading

#### 'Number and Number Sense'

This US article from the Adult Numeracy Practitioners' Network analyses the skills and knowledge adults need for everyday life and emphasises the importance of estimation and mental maths.

#### http://www.literacynet.org/ann/framework06.html

#### 'Making Peace in the Math Wars'

This article by Kathy Safford, published in the National Center for the Study of Adult Learning and Literacy's magazine Focus on Basics gives a personal account of a maths teacher's negotiation of the 'maths wars' by blending traditional and reform teaching approaches.

#### http://www.ncsall.net/?id=77&pid=318

#### 'Let's End the Debate Over Calculators'

This article from the Centre for Mathematics and Science Education presents a useful synopsis of the arguments about using or not using calculators in maths classrooms. In the end the author argues that adults need to both understand the fundamentals of maths and use calculators.

http://www.unc.edu/depts/cmse/MSEdNC/calculators.html

#### 'Calculators in the Classroom'

This 1998 article written about calculator use in US elementary schools looks at the stance of the National Council of Teachers of Mathematics, which maintains that each child should learn to solve problems using a calculator as well as mental and written calculations.

http://www.sedl.org/scimath/quicktakes/qt9803.html

#### 'Using Calculators in Elementary School'

This opinion piece published in the US journal *Teaching Children Mathematics* supports the appropriate use of calculators.

http://my.nctm.org/eresources/view\_media.asp?article\_id=7149

#### '7 Basics for Teaching Arithmetic Today'

This article from the Scholastic website states that calculators are basic tools that have their place in children's classrooms.

http:/teacher.scholastic.com/professional/teachstrat/arith.htm

#### Resources

You can borrow additional resources free from the Workbase library. Contact info@workbase.org.nz

General numeracy resources are available on the New Zealand Literacy Portal, see http://www.nzliteracyportal.org.nz/Numeracy/

## Answer key

Page	)								73	1.	\$23.625 / \$212.63	2.	\$4.125 / \$37.13
21	1 a. 26 2 a. 13 3 a. \$1	5.9 12 15.84	b. b. b.	16.74 44 yes / red / \$147.3	с. с. 79 / \$2.2	58.45 \$28.95 21	d. d.	35.5 \$1,968.60		3. 5. 7.	\$150.007\$1,350.00 \$66.38 \$648.88	4. 6. 8.	\$137.50 / \$1,237.50 \$493.88 \$5,062.50
31	Calculat	tor answers:	1	679	2	1 008	3	37	76	1.	\$270.22	2.	\$431.11
22	Calculat	tor answers:	1	\$/13 50	2	\$126.85	0.		81	1.	\$44.92		
55			1.	φ <del>1</del> 13.30	۷.	¢120.03			82	1.	\$191.40	2.	\$827.35
36	1.	MC	2.	M+	3.	<b>M</b> -	4.	MR	88	1.	\$72.00	2.	\$52.00
40	1. \$1	04.00	2.	\$123.00	3.	\$60.00 over			91	1.	\$127.50	2.	\$83.60
43	12.5%			20.75%		35.5%			92	1. 5.	\$405.30 \$80.10	2. 6.	\$339.15 \$14.25
44	1. a. 2. a.	$\frac{3}{10} = 0.3 = 3$ $\frac{5}{10} = 0.5 = 5$	0% 0%	b. $\frac{4}{10} = 0.4 =$ b. $\frac{7}{10} = 0.7 =$	40% 70%	c. ${}^{6}_{10} = 0.6 = 6$ c. ${}^{9}_{10} = 0.9 = 9$	0% 0%		95	\$45.9	95		
	З. а.	I <sup>+</sup> / <sub>10</sub> = I.4 =	140%	b. $2^{3/}_{10} = 2.5$	= 250%				96	1.	\$79.25	2.	\$69.35
47	75%	0.8 = 80%		0.5 = 50%					100	1.	\$65.00	2.	\$142.31
53	1. \$4	9.75	2.	\$38.70					103	1.	\$113.83	2.	\$181.25
56	1. 6.7	74%	2.	32.46%					105	1	\$75.00	2	\$36 50
59	Bank B								105	5.	\$125.00	6.	\$109.50
61	Bigger	Smaller							111	1.	<b>£</b> 22.83	2.	Y8,612.50
65	1. \$0	).45 / \$3.45	2.	\$24.75 / \$79.75	3.	\$26.88 / \$122.88			113	1.	\$265.89	2.	\$42.25
67	1. \$8	34.50	2.	\$151.30	3.	\$282.75			115	1.	\$132.14	2.	\$6.72

## Part 2 - More advanced operations

## Answer key (continued)

3.	\$742.50	4.	\$750.00
7.	\$52.20	8.	\$715.00

3.	\$0.80	4.	\$1,200.00
7.	\$0.98	8.	\$2,800.00

3. \$1,406.18

c. \$76.46

## **Answer key (continued)**

- \$353.60 / \$1,414.40 **117** 4.
  - 5. \$427.68 / \$481.14
  - \$1,019.15 6. 7. a. \$53.57
  - 8. \$40.00
  - Yes, the reduction is 21.44% 9.
  - 10. mark-up \$152 / \$117.93 wholesale price \$262.07 GST \$47.50 \$427.50 selling price b. \$8.32 11. a. \$9.86

b. \$47.96

- **119** 1. Operating costs, packaging
  - 2. Raw materials, machinery costs
  - Staff costs 3.
  - Caroline can see how much she has spent in each year on specific items. She can compare 4. which costs have increased and which costs have reduced. In her case, the operating costs and the packing have increased, but she has spent less on raw materials and machinery costs. She also knows that staff costs have stayed the same. She will look at the operating costs and the packaging costs and will think about ways to manage those costs better.
  - Percentages help when making comparisons. Using the actual numbers would not 5. necessarily give a true comparison of costs.
  - 6. It has to add up to 100% to show that all expenses/costs have been included.



Calculators are everyday tools used in New Zealand workplaces. It is important that employees or those seeking employment have well developed calculator skills.

A tutor's guide: Developing a learner's calculator skills: Part 2 - More advanced operations is written for tutors working with adult learners to extend their skills in using calculators.

A tutor's guide: Developing a learner's calculator skills: Part 2 - More advanced operations

- provides tutors with a practical resource for teaching more advanced calculator skills
- shows tutors how to introduce learners to the memory functions of the calculator
- contains strategies for use with learners so that they can solve more complex problems involving percentage increases and decreases, GST and foreign exchange calculations
- includes Learner Activities and corresponding Teaching Tips set in a retail environment that can be easily adapted to other contexts to suit the needs of learners
- contains extension material and suggestions for its use as well as additional teaching material and resources.

A tutor's guide: Developing a learner's calculator skills: Part 2 – More advanced operations is the companion to A tutor's guide: Developing a learner's calculator skills: Part 1 - Basic operations.