

*Working Mathematically*

# **Supplementary**

Activities that teach

**NUMBER & ALGEBRA**

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# FINANCIAL MATHEMATICS

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## Financial planning



On the last day of term 3, this school holds a Fiesta Day. On this day, the older students operate stalls to make money for charities.

Every student brings a certain amount of money to school. They spend it at the stalls where they believe they get the best value.

Financial planning is necessary if you want to make money from a business. The amount of money you make (the **net result**) depends on your **expenses** (the amount you need to spend on the business) and your **sales revenue** (the amount you receive from your customers).

If your sales revenue is more than your **expenditure** (i.e. what you spend), you make a **profit**. If your sales revenue is less than your expenditure, you make a **loss**.

$$\text{Sales revenue} - \text{Expenses} = \text{Net Result}$$

If your expenses are greater than your sales revenue:

- is the net result a positive or a negative number? **negative**
- does this number represent a profit or a loss? **a loss**

Rhianna, Katie and Annie decide to sell chocolate spiders at their stall.  
The recipe is at <http://kidscooking.about.com>.

To make a batch of spiders the ingredients they use are:



chocolate chips



butter



fried chow mein noodles

## NA Financial Mathematics - Activity 1

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The girls make a trial batch of spiders to find how much it will cost them to make each spider.

The cost of the ingredients is given in the table below.

The **net weight** of a product is the weight of the contents of the package (i.e. its weight without the weight of the packaging).

In the last column of the table, calculate the cost of each ingredient needed to make one batch of spiders.

Product	Net weight	Price of one packet	Weight needed for one batch	Cost for this weight
Chocolate chips	375 g	\$4.40	375 g	\$4.40
Butter	250 g	\$3.60	25 g	\$0.36
Noodles	100 g	\$1.12	200 g	\$2.24

Calculate the total cost of the ingredients needed to make one batch of spiders.

$$\$4.40 + \$0.36 + \$2.24 = \$7.00$$

In the trial, one batch of spiders was 25 spiders.

Calculate the cost of the ingredients needed to make one spider.

$$\$7.00 \div 25 = \$0.28$$

The girls decide to sell their spiders for 40c each.

Calculate their sales revenue if they sell 50 spiders.

$$\begin{aligned}\text{Sales revenue} &= \$0.40 \times 50 \\ &= \$20.00\end{aligned}$$

Calculate their expenses if they make 50 spiders.

$$\begin{aligned}\text{Expenses} &= \$0.28 \times 50 \\ &= \$14.00\end{aligned}$$

Calculate their net result.

$$\begin{aligned}\text{Net result} &= \$20.00 - \$14.00 \\ &= \$6.00\end{aligned}$$

Will the girls make a profit or a loss? **a profit**

## NA Financial Mathematics - Activity 1

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Calculate the girls' net result if they make 50 spiders but can only sell 30 spiders at 40c each.

$$\begin{aligned}\text{Sales revenue} &= \$0.40 \times 30 \\ &= \$12.00\end{aligned}$$

$$\text{Expenses} = \$14.00$$

$$\begin{aligned}\text{Net result} &= \$12.00 - \$14.00 \\ &= - \$2.00\end{aligned}$$

If this happens, will the girls make a profit or a loss? **a loss**

Calculate the smallest number of spiders the girls will need to sell so they do not make a loss. This is called the **breakeven point**.

$$\text{Expenses} = \$14.00 \quad \text{Sales price of one spider} = \$0.40$$

$$\begin{aligned}\text{Smallest number needed to be sold} &= \$14.00 \div \$0.40 \\ &= 35 \text{ spiders}\end{aligned}$$

Another way the girls can make more sales revenue is to increase the sale price of the spiders.

Calculate the net result if they make 50 spiders and sell 30 at 50c each.

$$\begin{aligned}\text{Sales revenue} &= \$0.50 \times 30 \\ &= \$15.00\end{aligned}$$

$$\text{Expenses} = \$14.00$$

$$\begin{aligned}\text{Net result} &= \$15.00 - \$14.00 \\ &= \$1.00\end{aligned}$$

If the girls sell their spiders for 50c each (instead of 40c each), calculate the number they will need to sell to **breakeven**.

$$\text{Expenses} = \$14.00 \quad \text{Sales price of one spider} = \$0.50$$

$$\begin{aligned}\text{Smallest number needed to be sold} &= \$14.00 \div \$0.50 \\ &= 28 \text{ spiders}\end{aligned}$$

What is the disadvantage of increasing the sale price of the spiders?

**They are likely to sell fewer spiders. This will reduce their sales revenue.**

A **budget** is a list and an estimated cost of everything needed.

So far, the girls have only thought about the cost of the ingredients they will need to make spiders.

List some other expenses the girls might also include in their budget.

Advertising costs (eg. cardboard for posters etc.)

Cost of baking paper (or foil) used to bake the spiders on.

Cost of packaging of the spiders for sale

Cost of energy and water (for transport, baking, washing etc.)

Cost of labour (i.e. wages for people who help).

### Tax

Resources required:  
a calculator.



Tax is money that people pay to their government. Tax is used for things such as schools, hospitals, roads, public transport, welfare and defence.

There are different types of taxes, for example: income tax, property tax, and sales tax.

The amount of tax that someone has to pay is usually calculated as a fraction of what they earn, what they spend, or what they own.

In Australia, people pay a tax called a **GST** (Goods and Services Tax).  
**Goods** (or products) are things you buy (eg. a computer)  
**Services** are things you pay people to do (eg. give you a haircut).  
GST is charged on most goods and services.

The person who sells goods or services is called the **vendor**.  
The person who buys goods or services is called the **purchaser**.

In Australia, the GST is one tenth of the vendor's original price.  
If a vendor wants \$100 for a pair of jeans, calculate the amount that needs to be added to the original price to pay the GST.

$$\begin{aligned} \text{GST} &= \$100 \div 10 \\ &= \$10 \end{aligned}$$

If a vendor wants \$50 for a shirt, calculate the amount that needs to be added to the original price to pay the GST.

$$\begin{aligned} \text{GST} &= \$50 \div 10 \\ &= \$5 \end{aligned}$$

So the amount of GST depends on the original price.

The purchase price usually includes the cost of the GST.  
The abbreviation for "including GST" is "**incl. GST**".

Calculate the purchase price of the jeans incl. GST.

$$\begin{aligned} \text{Purchase price of jeans} &= \$100 + \$10 \\ &= \$110 \end{aligned}$$

Calculate the purchase price of the shirt incl. GST.

$$\begin{aligned} \text{Purchase price of shirt} &= \$50 + \$5 \\ &= \$55 \end{aligned}$$

If the price does not include the GST, it is the price "excluding GST".  
The abbreviation for "excluding GST" is "**excl. GST**".

## NA Financial Mathematics - Activity 2

Below is a picture of an invoice. An **invoice** is a bill that states the price of the goods or services you are paying for.

Look at the headings of the columns on the invoice.

- The **quantity** is the number of the described item that you are buying. "Quantity" is abbreviated as "Qty" in the column heading,
- The **unit price** is the price for one of the described item.
- A **taxable supply** is an item for which you have to pay GST.

Is "**GST Amount**" the GST you need to pay per unit, or is it the GST for the total number of units of the item you are buying? **It is the GST for the total number of units.**

Four values on the invoice are missing. Calculate what these values should be and write them in the spaces are marked with an asterisk (\*).

What is the total amount that Mr and Mrs Fake have to pay? **\$834.90**

What fraction of this amount is GST?  $\frac{1}{11}$

	<b>Tax Invoice</b>	Invoice No. 380 Date: 14 February 2012																																																																													
<b>From:</b>	Phabulously Phony 1A Artificial Arcade Concoction NSW 2139  email: sham@phabphony.net	ABN: 99 825 380 398 Phone: (09) 9449-7810 Mobile: 9419-691-431 Fax: (09) 9449-7811																																																																													
<b>To:</b>	<b>Mr and Mrs R.U.Fake</b> <b>60 Bogus St</b> <b>Bogan Gate</b> <b>NSW 2876</b>	ABN: Delivery Address <b>60 Bogus St</b> <b>Bogan Gate</b> <b>NSW 2876</b>																																																																													
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 5%;">Qty</th> <th style="width: 45%;">Description</th> <th style="width: 10%;">Unit Price (excl. GST)</th> <th style="width: 5%;">Taxable Supply (Y/N)</th> <th style="width: 10%;">Unit Price (incl. GST)</th> <th style="width: 10%;">GST Amount</th> <th style="width: 15%;">Total</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Tacky Toupee (full wig)</td> <td>310.00</td> <td>Yes</td> <td>341.00</td> <td>31.00</td> <td>341.00</td> </tr> <tr> <td>7</td> <td>Hair Extension (Asian)</td> <td>30.00</td> <td>Yes</td> <td>33.00</td> <td>21.00</td> <td>231.00</td> </tr> <tr> <td>1</td> <td>Application of Hair Extension</td> <td>* 90.00</td> <td>Yes</td> <td>99.00</td> <td>9.00</td> <td>99.00</td> </tr> <tr> <td>10</td> <td>Glitter Acrylic Fingernail</td> <td>4.90</td> <td>Yes</td> <td>* 5.39</td> <td>4.90</td> <td>53.90</td> </tr> <tr> <td>5</td> <td>Pack of Lushious Lashes</td> <td>20.00</td> <td>Yes</td> <td>22.00</td> <td>* 10.00</td> <td>* 110.00</td> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Qty	Description	Unit Price (excl. GST)	Taxable Supply (Y/N)	Unit Price (incl. GST)	GST Amount	Total	1	Tacky Toupee (full wig)	310.00	Yes	341.00	31.00	341.00	7	Hair Extension (Asian)	30.00	Yes	33.00	21.00	231.00	1	Application of Hair Extension	* 90.00	Yes	99.00	9.00	99.00	10	Glitter Acrylic Fingernail	4.90	Yes	* 5.39	4.90	53.90	5	Pack of Lushious Lashes	20.00	Yes	22.00	* 10.00	* 110.00																																				
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Percentage discounts



When a store has a sale on, the discounts are often written as percentages. This means that the amount of money taken off the price of something depends on what on what the original price was. The original price is sometimes called the marked price or the ticketed price.

A percentage is a special type of fraction. It is a fraction that has 100 as its denominator. This denominator is written using the symbol “%”.

50% is the same as  $\frac{50}{100}$  (50 out of every 100).

Bar **A**, Bar **B** and Bar **C** are 10 cm high. Each bar is divided into 100 equal parts.

Measure and colour half of Bar A.  
How many parts out of 100 is this? **50**

$$\frac{1}{2} = \frac{50}{100} = 50\%$$

Measure and colour a quarter of Bar B.  
How many parts out of 100 is this? **25**

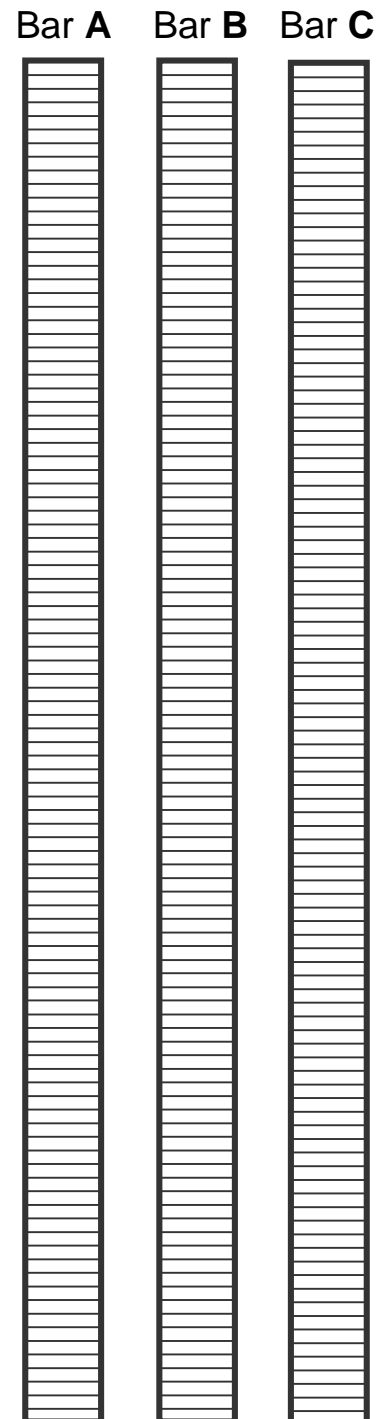
$$\frac{1}{4} = \frac{25}{100} = 25\%$$

Measure and colour a tenth of Bar C.  
How many parts out of 100 is this? **10**

$$\frac{1}{10} = \frac{10}{100} = 10\%$$

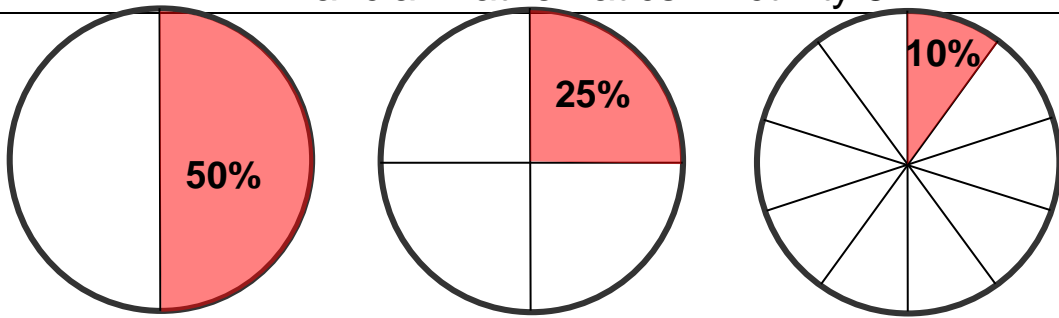
What percentage of a bar is left uncoloured

- when 50% of it is coloured? **50%**
- when 25% of it is coloured? **75%**
- when 10% of it is coloured? **90%**





## NA Financial Mathematics - Activity 3



$50\% = \frac{1}{2}$  so to calculate a 50% discount, divide the original price by **2**.

$25\% = \frac{1}{4}$  so to calculate a 25% discount, divide the original price by **4**.

$10\% = \frac{1}{10}$  so to calculate a 10% discount, divide the original price by **10**.

A **percentage discount** is a percentage of the original price, taken off.

A **discount** is an amount of money taken off the original price.

The **discounted price** is the price after the discount has been taken off.

Complete the table below.

Original Price	Percentage Discount	Discount	Discounted Price
\$12	50%	$\$12 \div 2 = \$6$	$\$12 - \$6 = \$6$
\$12	25%	$\$12 \div 4 = \$3$	$\$12 - \$3 = \$9$
\$12	10%	$\$12 \div 10 = \$1.20$	$\$12 - \$1.20 = \$10.80$
\$8	50%	$\$8 \div 2 = \$4$	$\$8 - \$4 = \$4$
\$8	25%	$\$8 \div 4 = \$2$	$\$8 - \$2 = \$6$
\$8	10%	$\$8 \div 10 = \$0.80$	$\$8 - \$0.80 = \$7.20$

### Extension Questions

- 1) A notice on a toy says “Reduced by 25%. Now \$30”.

Calculate the original price of the toy.

The price of the toy has already been reduced by 25%.

So \$30 is 75% (3 quarters) of the original price.

So one quarter of the original price is  $\$30 \div 3 = \$10$

So 4 quarters (i.e. the whole) of the original price =  $4 \times \$10 = \$40$

- 2) Two shirts have different prices but the same discount of 10%.

To calculate the total discounted price, can you add the prices together then take 10% off the total? **Yes**

Percentage profit and loss

Pela buys and sells posters.  
The price she puts on a poster depends on the price she paid for it.

Pela is willing to bargain over the sale price but she won't sell a poster for less than the price she paid for it.



The price Pela pays for a poster is her **cost price**. The price she sells it for is her **sale price**.

For each poster she sells, Pela calculates: cost price- sale price.  
How does Pela know when she has made a loss on the sale of a poster?

When the answer to her calculation is a negative number  
i.e. when she sells a poster for less than what she bought it for.

Pela's **percentage profit** (or **percentage loss**) on a poster is expressed in relation to the cost price.

For example, Pela buys a Justin Bieber poster for \$5 and sells it for \$9.

$$\begin{aligned} \text{Profit} &= \$9 - \$5 = \$4 & \text{Profit as a fraction of the cost price} &= \frac{\$4}{\$5} = \frac{4}{5} \\ \text{Percentage profit} &= \frac{4}{5} \times 100\% \\ &= \frac{400}{5} \% \\ &= 80\% \end{aligned}$$

Calculate Pela's percentage loss if she had sold the poster for \$4.

$$\begin{aligned} \text{Profit} &= \$4 - \$5 = -\$1 \text{ (a loss of \$1)}. & \text{Loss as a fraction of the cost price} &= \frac{1}{5} \\ \text{Percentage loss} &= \frac{1}{5} \times 100\% \\ &= \frac{100}{5} \% \\ &= 20\% \end{aligned}$$

Calculate how much Pela would need to sell a Justin Bieber poster for in order to make a 300% profit.

$$\begin{aligned} \text{The difference between the sale price and cost price} &= 300\% \text{ of } \$5 \\ &= \frac{300}{100} \times \$5 \\ &= 3 \times \$5 \\ &= \$15 \end{aligned}$$

So Pela would need to sell the poster for \$5 + \$15 = \$20

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