

Chapter 1

CONSUMER ARITHMETIC, RATES AND VARIATION

Examples

- (a) Find Carol's wage if she cleans for a period of 32 hours per week and is paid \$7.82 per hour.

SOLUTION

$$\begin{aligned}\text{Wage} &= \$7.82 \times 32 \\ &= \$250.24\end{aligned}$$

Carol's wage is \$250.24 per week.



- (b) Two jobs as mechanic are advertised. The first pays \$401.45 for a 35-hour week, while the second pays \$433.20 for a 38-hour week. Which job pays the higher hourly rate?

SOLUTION

First job: Hourly rate

$$\begin{aligned} &= \$401.45 \div 35 \\ &= \$11.47 \end{aligned}$$

Second job: Hourly rate

$$\begin{aligned} &= \$433.20 \div 38 \\ &= \$11.40 \end{aligned}$$

First job pays a higher hourly rate.



- (c) Find the yearly salary of a person whose fortnightly income is \$1620.

SOLUTION

$$\begin{aligned}\text{Salary} &= \$1620 \times 26 \\ &= \$42\,120\end{aligned}$$

The salary is \$42 120 per year.

- (d) Sue works for Hannah's Realty and her commission on sales is calculated as follows:



3% on the first \$12 000

2% on the next \$30 000

$1\frac{1}{2}\%$ on the remainder.

Calculate Sue's commission if she sells a block of land for \$71 000.

SOLUTION

$$\$71\,000 = \$12\,000 + \$30\,000 + \$29\,000$$

Commission

$$= 3\% \text{ of } \$12\,000 + 2\% \text{ of } \$30\,000$$

$$+ 1\frac{1}{2}\% \text{ of } \$29\,000$$

$$= 0.03 \times \$12\,000 + 0.02 \times \$30\,000$$

$$+ 0.015 \times \$29\,000$$

$$= \$360 + \$600 + \$435$$

$$= \$1395$$

Sue's commission is \$1395.



- (e) Fiona works in a clothing factory and is paid \$2.70 for each shirt completed. Find her pay if 290 shirts are completed.

$$\begin{aligned}\text{SOLUTION: Pay} &= \$2.70 \times 290 \\ &= \$783\end{aligned}$$

Fiona is paid \$783.

- (f) Daniel works at Costless Supermarket when required. If he is called on to work for six-and-a-half hours at \$11.97 per hour, find his total pay.

SOLUTION

$$\begin{aligned}\text{Total pay} &= \$11.97 \times 6.5 \\ &= \$77.805 \\ &= \$77.81 \text{ (rounded to the} \\ &\quad \text{nearest cent)}\end{aligned}$$

Daniel is paid \$77.81.



1.1.2 Overtime rates

A person may work more than a normal week and be paid at an hourly rate more than the normal rate. This may be $1\frac{1}{2}$ (time-and-a-half) or 2 (double) times his normal rate.

Examples

- (a) Adam's employment contract states that he is paid normal pay for the first eight hours he works. He is paid time-and-a-half for the next two hours and double time for any time after that. Find Adam's pay if he works a thirteen-hour day and his hourly pay rate is \$14.75.

SOLUTION

$$13 \text{ hours} = 8 \text{ hours} + 2 \text{ hours} + 3 \text{ hours}$$

$$\begin{aligned}\text{Pay} &= \$14.75 \times 8 + \$14.75 \times 1.5 \times 2 \\ &\quad + \$14.75 \times 2 \times 3 \\ &= \$118 + \$44.25 + \$88.50 \\ &= \$250.75\end{aligned}$$

Adam is paid \$250.75.



- (b) Laura is paid normal rates when she works during the week, time-and-a-half on Saturdays and double time on Sundays.

Her normal pay rate is \$13.70 per hour.
Find her weekly pay if she works the following hours:

Day	Start	Finish	Hours
Wed-Fri	9:00	5:30	$8\frac{1}{2} \times 3 = 25\frac{1}{2}$
Sat	9:00	4:00	7
Sun	10:00	3:00	5

SOLUTION

Weekly pay

$$\begin{aligned} &= \$13.70 \times 25\frac{1}{2} + \$13.70 \times 1.5 \times 7 \\ &\quad + \$13.70 \times 2 \times 5 \\ &= \$349.35 + \$143.85 + \$137 \\ &= \$630.20 \end{aligned}$$

Laura's weekly pay is \$630.20.



1.1.3 Other payments: bonus, holiday loading, etc.

Examples

- (a) Mitchell's boss, Mr Skrooge, was so impressed by his productivity improvement that he offered him a Christmas bonus equal to 40% of his normal weekly pay. If Mitchell received \$280 extra in his pay that week, find his usual pay.

SOLUTION

$$\text{Bonus : } 40\% \text{ of pay} = \$280$$

$$1\% \text{ of pay} = \$7$$

$$100\% \text{ of pay} = \$700$$

Mitchell's usual pay is \$700 per week.



Sarah's employment award includes an annual $17\frac{1}{2}\%$ holiday loading on four week's normal wages. Her weekly wage is presently \$960. Her employer has offered a weekly pay rise of \$15 to replace this holiday loading. Would Sarah be better off with the pay rise and by how much?



SOLUTION

Sarah's holiday loading

$$= 17\frac{1}{2}\% \times \$960 \times 4 \text{ weeks}$$

$$= 0.175 \times 960 \times 4$$

$$= \$672$$

$$\text{Sarah's pay rise} = \$15 \times 52 \leftarrow \begin{array}{l} 52 \text{ weeks} \\ \text{per year} \end{array}$$

$$= \$780$$

Sarah is better off by $\$780 - \672 , that is, Sarah is better off by \$108.



(c)

Craig works outdoors and is paid an additional allowance for rain or extreme hot weather (when the thermometer rises to over 35°). For rainy days he is paid an extra \$15 per day, while for hot days he receives an additional \$19 per day. How much will Craig be paid in allowances if in one week there are two hot days and one wet day?

SOLUTION

$$\begin{aligned}\text{Allowances} &= \$19 \times 2 + \$15 \\ &= \$38 + \$15 = \$43\end{aligned}$$

Craig receives an extra \$43.



1.2 Deductions from pay

Most employees have deductions taken from their pay. These include taxation, superannuation payments, loan repayments and health fund payments.

1.2.1 Taxation

Income tax is paid by employees and is usually of the form called PAYE (pay as you earn). The amount is calculated by the employer and is paid to the government before the employee gets paid. An annual tax return is completed by the employee and any deductions claimed may lead to a refund.



Example

Using the table below, calculate the tax to be paid on taxable income of \$41 760.

Taxable income \$			Tax	
\$1	—	\$5 400	Nil	
\$5 401	—	\$20 700	Nil plus 20 cents for each \$1 over \$5 400	
\$20 701	—	\$36 000	\$3 060	plus 38 cents for each \$1 over \$20 700
* \$36 001	—	\$50 000	\$8 874	plus 46 cents for each \$1 over \$36 000
\$50 001	and over		\$15 314	plus 47 cents for each \$1 over \$50 000

These are
called tax
brackets.

SOLUTION

Taxable income of \$41 760, that is, in the bracket marked with *.

$$\begin{aligned}\text{Tax} &= \$8874 + (\$41\,760 - \$36\,001) \times 0.46 \leftarrow \boxed{46 \text{ cents}} \\ &= \$8874 + \$5759 \times 0.46 \\ &= \$8874 + \$2649.14 \\ &= \$11\,523.14.\end{aligned}$$



1.2.2 Other deductions

Examples

- (a) Jason's gross pay for a fortnight was \$1232. His deductions were as follows: taxation \$372.61; superannuation \$32.46; miscellaneous \$176.50. Find Jason's net pay.

SOLUTION:

Net = gross – deductions

$$\begin{aligned}\text{Net pay} &= \$1232 - (\$372.61 \\ &\quad + \$32.46 + \$176.50) \\ &= \$1232 - \$581.57 \\ &= \$650.43.\end{aligned}$$

Jason's net pay was \$650.43.

- (b) Cliff pays \$42 per month to his health fund to provide private health insurance. He also pays the Medicare levy which is calculated using the table at right

Taxable income	Medicare levy
Less than \$11 746	Nil
\$11 746 – \$12 528	20 c for every dollar above \$11 746
More than \$12 528	1.25% of taxable income

If Cliff's yearly salary is \$39 760, find his annual health insurance cost by adding his private health insurance to his Medicare levy.

SOLUTION: Cost of private insurance
 $= \$42 \times 12 = \504

Cost of Medicare levy $= \$39\,760 \times 1.25\%$
 $= \$39\,760 \times 0.0125 = \497

Total insurance cost $= \$504 + \497
 $= \$1001$

Cliff's cost for health insurance is \$1001 per annum.



1.3 Spending money

1.3.1 Budgeting

A budget is a plan for the use of expected income.

Example

Anne's monthly budget is outlined below:

Monthly income		Fixed expenses		Variable expenses	
Job	\$1740	Rent	\$660	Petrol	\$100
Son's board	\$220	Electricity	\$70	Food	\$480
Investments	\$65	Water	\$56	Entertainment	\$140
Total	\$2025	Rates	\$52	Telephone	\$75
		Other	\$40	Other	\$40
		Total	\$878	Total	\$835

What is Anne's expected monthly balance?

$$\begin{aligned}\text{Balance} &= \text{income} - \text{expenses} \\ &= \$2025 - (\$878 + \$835) \\ &= \$2025 - \$1713 \\ &= \$312\end{aligned}$$

Anne's expected monthly balance is \$312



Examples

- (a) Determine the best buy:

300 mL of orange juice for 72 c
 600 mL of orange juice for \$1.35
 2 L of orange juice for \$3.82
 5 L of orange juice for \$6.90.

SOLUTION: There are a few ways to attack this question — one is to find the cost per unit (here 1 mL).

300 mL, 72 c,

$$\therefore 72 \div 300 = 0.24 \text{ c/mL.}$$

600 mL, \$1.35,

$$\therefore 135 \div 600 = 0.225 \text{ c/mL.}$$

2 L, \$3.82,

$$\therefore 382 \div 2000 = 0.191 \text{ c/mL.}$$

5 L, \$6.90,

$$\therefore 690 \div 5000 = 0.138 \text{ c/mL.}$$

Note: Could have found the cost per 100 mL.

The cheapest per mL is the 5 L container.

Best buy is 5 L for \$6.90.

- (b) Michael lives in Consumerland, a country about to introduce a goods and services tax (GST) on most articles that are purchased. The GST will be set at 12%. Some products already have a sales tax as given in the examples. Find the price without sales tax and then the new price with the GST added.

- (i) A car tyre is priced at \$108 (including a 20% sales tax).

SOLUTION

$$120\% \text{ of price before tax} = \$108$$

$$1\% \text{ of price before tax} = \frac{\$108}{120} = \$0.90$$

$$100\% \text{ of price before tax} = \$0.90 \times 100 = \$90$$

Now add on 12% GST:

$$112\% \text{ of price before tax} = \$0.90 \times 112 = \$100.80.$$

Price without sales tax is \$90 and with GST is \$100.80.



- (ii) A freezer is priced at \$829
(including a $7\frac{1}{2}\%$ sales tax).

SOLUTION

$$107\frac{1}{2}\% \text{ of price before tax} = \$829$$

$$\begin{aligned} 1\% \text{ of price before tax} &= \frac{\$829}{107.5} \\ &= \$7.71 \end{aligned}$$

(to the nearest cent)

$$\begin{aligned} 100\% \text{ of price before tax} &= \$7.71 \times 100 \\ &= \$771.16 \end{aligned}$$

(to the nearest cent)

Now add on 12% GST

$$\begin{aligned} 112\% \text{ of price before tax} &= \$7.71 \times 112 \\ &= \$863.70 \end{aligned}$$

(to the nearest cent)

Price without sales tax is \$771.16
and with GST is \$863.70.



- (c) Jenny decided to purchase a stereo on time payment using the following terms.

Stereo : \$1249

Deposit : 15%

Interest on

balance : 17% per annum

36 monthly repayments (or instalments)

Find the size of each monthly instalment.

SOLUTION

Deposit



Paid before Jenny takes the stereo out of the shop

$$= 15\% \text{ of } \$1249$$

$$= 0.15 \times \$1249 = \$187.35$$

Balance owing

$$= \$1249 - \$187.35 = \$1061.65$$

Interest



This is known as 'simple interest'

$$= \$1061.65 \times 17\% \text{ over 3 years}$$



$$= \$1061.65 \times 0.17 \times 3$$

$$= \$541.44 \text{ (to the nearest cent)}$$

Total repayments

$$= \$1061.65 + \$541.44$$

$$= \$1603.09 \text{ (to the nearest cent)}$$

Monthly repayments

$$= \$1603.09 \div 36$$

$$= \$44.53 \text{ (to the nearest cent)}$$

Jenny needs to repay \$44.53 per month.

Note: Jenny will be paying \$541.44 extra by buying the stereo on time payment. [This is the amount of the interest she has to pay.]

- (d) Amy bought a video recorder with a marked price of \$720. She paid a deposit of 15% in cash, and borrowed the remainder to be paid back in 12 monthly instalments of \$62.22. Find the interest rate that Amy was charged for the money she borrowed.

SOLUTION: Deposit = 15% of \$720
 $= 0.15 \times 720$
 $= \$108$

Amount borrowed = \$720 - \$108
 $= \$612$

Total instalments = \$62.22 \times 12
 $= \$746.64$

Total amount paid = \$108 + \$746.64
 $= \$854.64$

Total interest paid = \$854.64 - \$720
 $= \$134.64$

