NELSON QMATHS 11 GENERAL MATHEMATICS

FULLY WORKED SOLUTIONS

Chapter 1 Incomes and Budgets

Exercise 1.01 Percentages

Question 1

a $\frac{79}{250} = \frac{79}{250} \times \frac{100\%}{1}$

$= \frac{79}{5} \times \frac{2\%}{1}$

$= 31\frac{3}{5}\% = 31.6\%$

b $3.125 \times 100\% = 312.5\%$

c $2\frac{23}{25} = \frac{73}{25} \times \frac{100\%}{1}$

$= 292\%$

d $\frac{19}{40} = \frac{19}{40} \times \frac{100\%}{1}$

$= \frac{19}{2} \times \frac{5\%}{1}$

$= 47\frac{1}{2}\% = 47.5\%$

e $0.797 \times 100\% = 79.7\%$

f $2.7 \times 100\% = 270\%$

g $2\frac{7}{8} = \frac{23}{8} \times \frac{100\%}{1}$

$= 287\frac{1}{2}\%$

h $0.024 \times 100\% = 2.4\%$

i $1\frac{4}{5} = \frac{9}{5} \times \frac{100\%}{1}$

$= 180\%$

j $\frac{3}{80} = \frac{3}{80} \times \frac{100\%}{1}$

$= \frac{3}{4} \times \frac{5\%}{1}$

$= 3\frac{3}{4}\% = 3.75\%$

Question 2

a $\frac{11}{12} \times 100\% = 91.667\%$

b $2\frac{2}{27} = \frac{56}{27}$

$= \frac{56}{27} \times 100\%$

$= 207.4074...\%$

$\approx 207.407\%$

c $\frac{6}{21} \times 100\% = 28.571\%$

d $\frac{5}{9} \times 100\% = 55.556\%$

e $1\frac{13}{18} = \frac{31}{18}$

$= \frac{31}{18} \times 100\%$

$= 172.222\%$

f $1\frac{2}{3} = \frac{5}{3}$

$= \frac{5}{3} \times 100\%$

$= 166.667\%$

g $\frac{14}{19} \times 100\% = 73.684\%$

h $\frac{5}{14} \times 100\% = 35.714\%$

i $1\frac{6}{7} = \frac{13}{7}$

$= \frac{13}{7} \times 100\%$

$= 185.714\%$

j $\frac{6}{11} \times 100\% = 54.545\%$

Question 3

a $\frac{5}{14} \times 100\% = 35.714\%$

b $1\frac{10}{19} = \frac{29}{19}$
$= \frac{29}{19} \times 100\%$
$= 152.632\%$

c $1\frac{1}{5} = \frac{6}{5}$
$= \frac{6}{5} \times 100\%$
$= 120\%$

d $2\frac{1}{2} = \frac{5}{2}$
$= \frac{5}{2} \times 100\%$
$= 250\%$

e $1\frac{9}{28} = \frac{37}{28}$
$= \frac{37}{28} \times 100\%$
$= 132.143\%$

f $1\frac{11}{13} = \frac{24}{13}$
$= \frac{24}{13} \times 100\%$
$= 184.615\%$

g $\frac{9}{17} \times 100\% = 52.941\%$

h $1\frac{8}{11} = \frac{19}{11}$
$= \frac{19}{11} \times 100\%$
$= 172.727\%$

i $\frac{3}{14} \times 100\% = 21.429\%$

j $\frac{13}{16} \times 100\% = 81.25\%$

Question 4

a 14% = 14 ÷ 100 = 0.14

b 28.5% = 28.5 ÷ 100 = 0.285

c 173% = 173 ÷ 100 = 1.73

d 8% = 8 ÷ 100 = 0.08

e 0.56% = 0.56 ÷ 100 = 0.0056

f 1.4% = 1.4 ÷ 100 = 0.014

g 50.5% = 50.5 ÷ 100 = 0.505

h 127.5% = 127.5 ÷ 100 = 1.275

i 23% = 23 ÷ 100 = 0.23

j 5.72% = 5.72 ÷ 100 = 0.0572

Question 5

a $12\% = \frac{12}{100}$

$= \frac{3}{25}$

b $148\% = \frac{148}{100}$

$= \frac{37}{25} = 1\frac{12}{25}$

c $134\% = \frac{134}{100}$

$= \frac{67}{50} = 1\frac{17}{50}$

d $72.5\% = \frac{72.5}{100}$

$= \frac{725}{1000}$

$= \frac{29}{40}$

e $342.5\% = \frac{342.5}{100}$

$= \frac{3425}{1000}$

$= \frac{137}{40} = 3\frac{17}{40}$

f $113.6\% = 113\frac{3}{5}\%$

$= \frac{568}{5} \times \frac{1}{100}$

$= \frac{142}{5} \times \frac{1}{25}$

$= \frac{142}{125} = 1\frac{17}{125}$

g $232.75\% = 232\frac{3}{4}\%$

$= \frac{931}{4} \times \frac{1}{100}$

$= \frac{931}{400} = 2\frac{131}{400}$

h $59.375\% = 59\frac{3}{8}\%$

$= \frac{475}{8} \times \frac{1}{100}$

$= \frac{19}{8} \times \frac{1}{4}$

$= \frac{19}{32}$

i $43.125\% = 43\frac{1}{8}\%$

$= \frac{345}{8} \times \frac{1}{100}$

$= \frac{69}{8} \times \frac{1}{20}$

$= \frac{69}{160}$

j $179.775\% = \frac{179775}{100000}$

$= \frac{7191}{4000} = 1\frac{3191}{4000}$

Question 6

$16.9\% = \frac{16.9}{100} = 0.169$

Fraction	$\frac{1}{10}$	$\frac{1}{7}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$
Percentage	10%	14.286%	16.67%	20%	25%	$33\frac{1}{3}\%$	50%

$16.9\% \approx \frac{1}{6}$

Exercise 1.02 Calculation of percentages

Question 1

$$\frac{16}{25} = \frac{16}{25} \times 100 \qquad \frac{25}{35} = \frac{25}{35} \times 100$$
$$= 64\% \qquad = 71.43\%$$

25 out of 35 is greater than 16 out of 25.

Question 2

$$\frac{32}{45} = \frac{32}{45} \times 100 \qquad \frac{38}{55} = \frac{38}{55} \times 100$$
$$= 71.11\% \qquad = 69.09\%$$

32 out of 45 is better than 38 out of 55.

Question 3

a Increase = \$98 – \$84 = \$14

Percentage increase = $\frac{14}{84} \times 100\% = 16.67\%$

b Increase = 200 – 128 = 72

Percentage increase = $\frac{72}{128} \times 100\% = 56.25\%$

c Increase = 69 – 62 = 7

Percentage increase = $\frac{7}{62} \times 100\% = 11.29\%$

d Increase = 240 – 110 = 130

Percentage increase = $\frac{130}{110} \times 100\% = 118.18\%$

e Increase = 31 – 18 = 13

Percentage increase = $\frac{13}{18} \times 100\% = 72.22\%$

Question 4

a Increase = 14, original = 128 – 14 = 114

Percentage increase = $\frac{14}{114} \times 100\% = 12.28\%$

b Increase = 23, original = 47 – 23 = 24

Percentage increase = $\frac{23}{24} \times 100\% = 95.83\%$

c Increase = 6, original = 53 – 6 = 47

Percentage increase = $\frac{6}{47} \times 100\% = 12.77\%$

d Increase = 27, original = 35 – 27 = 8

Percentage increase = $\frac{27}{8} \times 100\% = 337.5\%$

e Increase = 79, original = 120 – 79 = 41

Percentage increase = $\frac{79}{41} \times 100\% = 192.68\%$

Question 5

a Decrease = 16 – 13 = 3

Percentage decrease = $\frac{3}{16} \times 100\% = 18.75\%$

b Decrease = 28 – 25 = 3

Percentage decrease = $\frac{3}{28} \times 100\% = 10.71\%$

c Decrease = 135 – 115 = 20

Percentage decrease = $\frac{20}{135} \times 100\% = 14.81\%$

d Decrease = 63 – 58 = 5

Percentage decrease = $\frac{5}{63} \times 100\% = 7.94\%$

e Decrease = 230 – 100 = 130

Percentage decrease = $\frac{130}{230} \times 100\% = 56.52\%$

Question 6

a Decrease = 28, original = 142 + 28 = 170

Percentage decrease = $\frac{28}{170} \times 100\% = 16.47\%$

b Decrease = 20, original = 170 + 20 = 190

Percentage decrease = $\frac{20}{190} \times 100\% = 10.53\%$

c Decrease = 20, original = 75 + 20 = 95

Percentage decrease = $\frac{20}{95} \times 100\% = 21.05\%$

d Decrease = 17, original = 63 + 17 = 80

Percentage decrease = $\frac{17}{80} \times 100\% = 21.25\%$

e Decrease = 35, original 415 + 35 = 450

Percentage decrease = $\frac{35}{450} \times 100\% = 7.78\%$

Question 7

Increase = 16, original = x

Percentage for an increase of 16 = $\frac{16}{x} \times 100\% = \frac{1600}{x}\%$

Decrease = 16, original = $x + 16$

Percentage for a decrease of 16 = $\frac{16}{x+16} \times 100\% = \frac{1600}{x+16}\%$

Question 8

Final price = x, decrease = 30, original price = $x - 30$

Percentage discount = $\frac{30}{x-30} \times 100\% = \frac{3000}{x-30}\%$

Check this result by substituting in the equation below.

Original price + percentage increase × original price = final price

$x - 30 + \frac{3000}{x-30} \times \frac{1}{100} \times (x-30) = x$ *as required*

Exercise 1.03 Calculation with percentages

Question 1

a 32% of \$560 = $\frac{32}{100} \times \$560 = \$179.20$

b 14.5% of 48 L = 0.145 × 48 = 6.96 L

c 16% of 63.45 = 0.16 × 63.45 = 10.152

d 210% of \$88.47 = 2.1 × \$88.47 = \$185.79

e 11% of \$620 = 0.11 × \$620 = \$68.20

f 5.4% of 248 g = 0.054 × 248 g = 13.392 g

g 128% of \$17.50 = 1.28 × \$17.50 = \$22.40

h 19% of 740 kg = 0.19 × 740 kg = 140.6 kg

i 21.5% of \$784 = 0.215 × \$784 = \$168.56

j 3.43% of \$6420 = 0.0343 × \$6420 = \$220.21

k 37% of \$293 = 0.37 × \$293 = \$108.41

l 7.08% of \$2400 = 0.0708 × \$2400 = \$169.92

Question 2

.x = the original amount, an increase of 15% = 115% of original

$x \times 1.15 = \$6256$

$x = \$6256 \div 1.15$

$x = \$5440$

Check: increase = \$5440 × 15% = \$816

\$5440 + \$816 = \$6256

or i = increase

115% × original = \$6256

15% × original = i

$\frac{i}{\$6256} = \frac{15}{115}$

$i = \frac{15}{115} \times \$6256 = \$816$

Question 3

x = the original amount, a decrease of 20% = 80% of original

$$x \times 0.8 = \$516$$
$$x = \$516 \div 0.8$$
$$x = \$645$$

Decrease = \$645 × 20% = \$129

Check: \$645 – \$129 = \$516

Question 4

x = the original amount, an increase of 25% = 125% of original

$$x \times 1.25 = \$490$$
$$x = \$490 \div 1.25$$
$$x = \$392$$

Question 5

x = the original amount, a decrease of 14% = 86% of original

$$x \times 0.86 = \$420$$
$$x = \$420 \div 0.86$$
$$x = \$488.37$$

Question 6

x = the original amount, a decrease of 12% = 88% of original

$$x \times 0.88 = 308$$
$$x = 308 \div 0.88$$
$$x = 350$$

There was originally 350 mL of solvent.

Question 7

x = the original weight, an increase of 24% = 124% of original

$$x \times 1.24 = 13$$
$$x = 13 \div 1.24$$
$$x = 10.48$$

The clothes originally weighed about 10.5 kg.

Question 8

x = the final weight

104.5% × original = x

4.5% × original = 270 g

$$\frac{x}{270} = \frac{104.5}{4.5}$$
$$i = \frac{104.5}{4.5} \times 270 \text{ g} = 6270 \text{ g}$$

The final weight is 6270 g = 6.27 kg.

Exercise 1.04 Wages and salaries

Question 1

Annual wage = $78 830

a Weekly rate = $78 830 ÷ 52 = $1515.96

b Fortnightly rate = $78 830 ÷ 26 = $3031.92

c Monthly rate = $78 830 ÷ 12 = $6569.17

d Hourly rate = $78 830 ÷ (52 × 38) = $39.89

Question 2

Fortnightly amount = $58 826 ÷ 26 = $2262.54

Question 3

Monthly amount = $36 700 ÷ 12 = $3058.33

Question 4

Annual amount = $17.70 × 38 × 52 = $34 975.20

Question 5

Annual amount = $12.20 × 38 × 52 = $24 107.20

Question 6

Annual amount = $19.45 × 38 × 52 = $38 433.20 (assume a 38 h week)

Question 7

Annual amount = $18.32 × 38 × 52 = $36 200.32 (assume a 38 h week)

A salary of $37 500 is better.

Question 8

Annual amount = $748.37 × 52 = $38 915.24

$748.37 /week is better than $38 420 per year.

Question 9

$14.60 /h annual amount = $14.60 × 38 × 52 = $28 849.60 (assume a 38 h week)

$1046.45 /fortnight annual amount = $1046.45 × 26 = $27 207.70

$14.60 /h is better than $1046.45 /fortnight.

Question 10

$21.45 /h annual amount = $21.45 × 38 × 52 = $42 385.20 (assume a 38 h week)

$21.45 /h is better than $42 000 per year.

Exercise 1.05 Overtime and penalty rates

Question 1

Hourly rate = $854.60 ÷ 38 = $22.49 (38 h week)

Overtime pay rate = $22.49 × 1.5 = $33.73 (time-and-a-half)

Overtime pay rate = $22.49 × 2 = $44.98 (double-time)

Holiday pay rate = $22.49 × 2.5 = $56.22 (double-time-and-a-half)

Question 2

Hourly rate = $777.40 ÷ 38 = $20.46 (38 h week)

Overtime pay rate = $20.46 × 1.5 = $30.69 (time-and-a-half)

Overtime pay rate = $20.46 × 2 = $40.92 (double-time)

Holiday pay rate = $20.46 × 2.5 = $51.14 (double-time-and-a-half)

Question 3

Hourly rate = $755.60 ÷ 38 = $19.88 (38 h week)

Pay for weekdays = $19.88 × 6 × 4 = $477.12

Pay for Saturday = $19.88 × 8 × 1.5 = $238.56

Total = $715.68

Question 4

Hourly rate = $782.18 ÷ 38 = $20.58 (38 h week)

Casual hourly rate = $20.58 × 1.25 = $25.73

Overtime rate = $20.58 × 1.6 = $32.93 up to 2 hours (time-and-a-half)

Overtime rate = $20.58 × 2.1 = $43.22 after 2 hours (double-time)

Question 5

Hourly rate = $783.30 ÷ 38 = $20.61 (38 h week)

3-year apprentices

First year 40% pay rate = $20.61 × 0.4 = $8.25

Second year 55% pay rate = $20.61 × 0.55 = $11.34

Third year 75% pay rate = $20.61 × 0.75 = $15.46

Question 6

Hourly rate = $756.40 ÷ 38 = $19.91 (38h week)

Juniors

Under 16 years old 45% pay rate = $19.91 × 0.45 = $8.96

16 years old 50% pay rate = $19.91 × 0.5 = $9.95

17 years old 60% pay rate = $19.91 × 0.6 = $11.94

18 years old 70% pay rate = $19.91 × 0.7 = $13.93

19 years old 80% pay rate = $19.91 × 0.8 = $15.92

20 years old 90% (often only for first 6 months, then adult)

Pay rate = $19.91 × 0.9 = $17.91

Question 7

Hourly rate = $718.60 ÷ 38 = $18.91 (38 h week)

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Hours worked	6	7	8	9	10	0	5

Ordinary pay = $18.91 × (8 + 8 + 8 + 8 + 6) = $718.60

Pay for RDO = $18.91 × 2 × 5 = $189.11

Pay for overtime = $18.91 × 1.5 × 3 = $85.10

Weekly wage = $992.81

Question 8

Hourly rate for an 18 year junior = $743.30 ÷ 38 × 0.7 = $13.62 (38 h week)

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Hours worked	0	6	8	10	11	11	0

Ordinary pay = $13.62 × (6 + 8 + 8 + 8 + 8) = $520.31

Pay for 6 hours overtime @ time-and-a-half = $13.62 × 1.5 × 6 = $123.23

Pay for 2 hours overtime @ double-time = $13.62 × 2 × 2 = $54.77

Weekly wage = $698.31

Question 9

$45.49 extra for 1.5 hours overtime @ time-and-a-half = 2.25 hours at normal rate.

Normal rate = $45.49 ÷ 2.25 = $20.22 / h

Total pay = $20.22 × 38 + $45.49 = $813.77

Question 10

4 hours overtime = 2 hours @ × 1.5 + 2 hours @ × 2 = 7 hours at normal rate.

Hourly rate = $166.53 ÷ 7 = $23.79 / h

Weekly wage = $23.79 × 38 + $166.53 = $1070.55

Question 11

Hourly rate for a casual 17 year junior= $303.24 ÷ 20 = $15.16

Adult rate × 0.6 × 1.25 = $15.16

Adult rate = $20.22

Adult wage for 38 hours = $25.27 × 38 = $768.21

Question 12

Third-year apprentice is paid at 75% of the adult rate.

3 hours overtime on each of 2 days = (2 h @ time-and-a-half + 1 h @ double-time) × 2

= 10 hours at normal rate.

Apprentice hourly rate = $750.88 ÷ (38 + 10) = $15.64

Adult rate × 0.75 = $15.64

Adult rate = $20.86.

Casual adult rate = $20.86 × 1.25 = $26.07

Wage for 30 hours = $26.07 × 30 = $782.17

Exercise 1.06 Commission and piecework

Question 1

a Commission = $2825 × 0.045 = $127.13

b Hourly rate = $127.13 ÷ 8 = $15.89

c No, there would probably be fewer customers on weekdays.

Question 2

a Earnings = $640 × 0.45 = $288

b Hourly rate = $288 ÷ 12 = $24

c Weekly wage = $288 × 5 = $1440

Question 3

a Earnings = $720 × 0.5 – $93 = $267

b Hourly rate = $267 ÷ 12 = $22.25

c Weekly wage = $267 × 5 = $1335

Question 4

a Pay = $6 × 20 = $120

b Car expenses = $0.55 × 140 = $77

c Earnings = $120 – $77 = $43

d Hourly rate = $43 ÷ 6 = $7.17.

e Earnings = $9.30 × 6 + $2 × 20 – $77 = $18.80

He is better off with being paid $6 per delivery.

Question 5

a First week earnings = $35 \times \$1.80 = \$63$

b Earnings after first week = $80 \times \$1.80 = \$144$

c Improvement = $(144 - 63) \div 5 = \$16.20$
Earnings = $(\$63 + \$144) \times 3 - \$140 = \$481$

d Pay per week = $\$144 \times 6 - 140 = \$724$

e Hourly rate in 1st week = $\$481 \div 60 = \$8.02$

f Hourly rate after 1st week = $\$724 \div 60 = \$12.07$

Question 6

Hourly rate = $(\$20 \times 5 \times 5) \div 50 = \$10 / h$

Earnings over 6 weeks = $\$10 \times 50 \times 6 = \$3000$

Question 7

Commission on \$555 000 = \$400 000 × 0.0045 + \$155 000 × 0.0015
= \$2032.50

Commission on \$478 000 = \$400 000 × 0.0045 + \$78 000 × 0.0015
= \$1917

Commission on \$688 000 = \$400 000 × 0.0045 + \$288 000 × 0.0015
= \$2232

Total earnings = \$6181.50

Question 8

Hourly rate = $\$432 \div 30 = \$14.40$

Number of shirts = $\$432 \div \$4.80 = 90$

Question 9

x = value of whitegoods

$0.07x > 0.055x + 170$

$0.015x > 170$

$x > 11333.33$

He needs to sell at least \$11 333 in whitegoods for a straight commission to be more profitable.

Question 10

Profit per video = \$12 – \$5 = \$7

Receipts on 75 videos = 75 × \$12 = \$900

Weekly earnings less costs = 75 × \$7 – 2× \$80 = \$365

Hourly rate = \$365 ÷ 16 = \$22.81

Question 11

a Earnings = retainer + commission
= \$100 + \$5940 × 0.12 = \$812.80
Hourly rate = \$812.80 ÷ 45 = \$18.06

b \$940 = \$100 + sales × 0.12
\$840 = sales × 0.12
Sales = \$7000

Question 12

a Payment = \$6.20 × 24 = \$148.80

b Petrol = 240 ÷ 100 × 11.2 × \$1.209 = \$32.50

c Earnings = \$148.80 – \$32.50 = \$116.30
Hourly rate = \$116.30 ÷ 6 = \$19.38
The real cost of running a car involves more than paying for petrol so Peter's hourly rate would be lower than \$19.38/h.

Exercise 1.07 Allowances and pensions

Question 1

Single disability pension = $877.10 / fortnight

Reduces by $0.50 for every dollar earned over $164/fortnight

Pension reduces by ($460 – $164) × 0.5 = $148

Pension = $877.10 – $148 = $729.10/fortnight

Annual income = ($729.10 + 460) × 26 = $30 916.60

Question 2

Single age pension = $877.10 / fortnight

Reduces by $0.50 for every dollar earned over $164/fortnight

Pension reduces by ($500 – $164) × 0.5 = $168

Pension = $877.10 – $168 = $709.10/fortnight

Annual income = ($709.10 + 500) × 26 = $31 436.60

Question 3

Youth allowance for a student of 18 years living at home = $285.20 /fortnight

Income / fortnight = $66 × 8 = $528

Reduces by $0.50 /dollar/fortnight for income over $433 and $0.60 /dollar/fortnight for income over $519.

Youth allowance reduces by (519 – 433) × 0.5 + (528 – 519) × 0.6 = $48.40

Youth allowance = $285.20 – $48.40 = $236.80/fortnight

Question 4

ABSTUDY allowance for an ATSI: $285.20 /fortnight

Income / fortnight = $120 × 4 = $480

Reduces by $0.50 /dollar/fortnight for income over $433 and $0.60 /dollar/fortnight for income over $519.

Youth allowance reduces by (480 – 433) × 0.5 = $23.50

ABSTUDY allowance = $285.20 – $23.50 = $261.70/fortnight

Question 5

Austudy - Independent, 25+ $433.20 /fortnight

Income / fortnight = $490

Reduces by $0.50 /dollar/fortnight for income over $433 and $0.60 /dollar/fortnight for income over $519.

Youth allowance reduces by (490 – 433) × 0.5 = $28.50

Austudy allowance = $433.20 – $28.50 = $404.70/fortnight

Question 6

ATSI over 21, no children or partner: $528.70 /fortnight

Income / fortnight = $720

Youth allowance reduces by (519 – 433) × 0.5 + (720 – 519) × 0.6 = $163.60

ABSTUDY allowance = $528.70 – $163.60 = $365.10/fortnight

Question 7

a Independent or with partner, no children, : $433.20 /fortnight

Danielle Income / fortnight = $420
Youth allowance reduces by $0
Youth allowance = $433.20 /fortnight

Sam Income / fortnight = $480
Youth allowance reduces by (480 – 433) × 0.5 = $23.50
Youth allowance = $433.20 – $23.50 = $409.70/fortnight

b Danielle and Sam will receive the same amounts.

Question 8

At home, 18–24: $285.20 /fortnight

Student earns $800/fortnight

Youth allowance reduces by (519 – 433) × 0.5 + (800 – 519) × 0.6 = $211.60

Youth allowance = $285.20 – $211.60 = $73.60

If the student does not work, the youth allowance is $285.20.

If the student earns $400/week, the youth allowance reduces to $73.60.

Question 9

The youth allowance is the same as calculated in question 8.

Question 10

Independent, 16–24: $433.20 /fortnight

$433.20 – reduction = $233.20

Reduction in youth allowance = $200

Youth allowance reduces by (519 – 433) × 0.5 + (allowance – 519) × 0.6 = $200

43 + (allowance – 519) × 0.6 = $200

(allowance – 519) × 0.6 = $157

Allowance from parents = $780.67/fortnight

Question 11

Single age or disability over 21: $877.10 /fortnight

The pension has reduced by $867.10/fortnight.

The **income test** reduces payments by $0.50 /dollar/fortnight for income over $164

(income – $164) × 0.5 = $867.10

Income = $1898.20/fortnight.

The annual earnings = $1898.20 × 26 = $49 353.20

Question 12

a Single with children, 25+ : $567.70 /fortnight

$567.70 – reduction = $320.70

Reduction in Austudy = $247

Austudy reduces by (519 – 433) × 0.5 + (income – 519) × 0.6 = $247

43 + (income – 519) × 0.6 = $247

(income – 519) × 0.6 = $204

Income = $859/fortnight = $429.50/week

b Effective tax rate = $\frac{247}{(320.7+859)} \times 100 = 20.94\%$

Question 13

Single age or disability over 21: $877.10 /fortnight

The **income test** reduces payments by $0.50 /dollar/fortnight for income over $164

Income = $850/fortnight

Reduction in pension = ($850 – $164) × 0.5 = $343

Pension = $877.10 – $343 = $534.10/fortnight.

Income /fortnight = $534.10 + $850 = $1384.10

Effective tax rate = $\frac{343}{1384.10} \times 100 = 24.78\%$

Question 14

a Single age or disability over 21: $877.10 /fortnight

$877.10 –.reduction = $210

Pension has been reduced by $667.10.

The **income test** reduces payments by $0.50 /dollar/fortnight for income over $164

(income – $164) × 0.5 = $667.10

Income = $1498.20/fortnight.

b Age or disabled couple over 21 living together: $661.20 /fortnight each

Income = $1498.20/fortnight ÷ 2 = $749.10

The **income test** reduces payments by $0.50 /dollar/fortnight for income over $292 combined for couples.

Reduction in pension = ($749.10 – $292) × 0.5 = $228.56

Pension = $661.20 – $228.56 = $432.65/fortnight.

Susan's pension has reduced by $877.10 – $432.65 = $444.45

Andrew's pension has increased by $432.65 – 210 = $222.65

c Their combined incomes before marriage = $877.10 × 26 + $210 × 26 + $1498.20 × 26
= $67 217.80

Their combined incomes after marriage = $432.65 × 26 × 2 + $1498.20 × 26
= $61 451.00

Exercise 1.08 Personal budgets

Question 1

Expenses

Flights	$449 × 2 = $898
Airport transfers	$165 × 2 = $330
Room tariff	$285 × 7 = $1995
Meals	$65 × 7 × 2 = $910
Spending money	$25 × 7 × 2 = $350

Total = $4483

Question 2

Wieners: $60/100

Bread rolls: $55/100

Tomato sauce: $10.80 for a 4 L bottle

The treasurer thinks that most people will have 20 mL of sauce on their hot dog.

Cost of one hotdog = $60 ÷ 100 + $55 ÷ 100 + $10.80 ÷ 4000 × 20 = $1.204
Cost of 1000 hotdogs = $1204.00
Cost of 950 hotdogs = $1143.80

Profit on 950 hotdogs = ($4.00 × 950 – $1204) = $2596.00

Question 3

Weekly expenses (use 50 weeks/ year in calculations)

Rent on flat	$102.50
Food	$95
Bus	$24
Entertainment	$105
Mobile	$200 ÷ 4 = $50
Clothes	$1900 ÷ 50 = $38

Total = $414.50
Savings = $510 – $414.50 = $95.50/week or $4775/year.

Question 4

Expenses for three people

Accommodation	$80 × 4 × 3 = $960
Lunch	$15 × 5 × 3 = $225
Dinner	$45 × 4 × 3 = $540
Materials	$96

Total = $1821 or $607 each.

Question 5

Expenses for 115 people

Entry	$10.50 × 110 = $1155
2 × 46 seat buses	$482 × 2 = $964
1 × 25 seat bus	$275
Contingencies	$100

Total for 110 students = $2494 or $22.67 each rounded up to $23 each

Question 6

a Camp for 50 girls, 41 boys and 5 teachers

Total expenses

Cabins for teachers (1) + girls (9) + boys (7) = $1700

Catering = $122 × 96 = $11 712

2 × 55 seat buses = $482 × 2 × 2 = $1928

Total = $15 340

b Cost per student = $15 340 ÷ 91 = $168.57 rounded to $170 per student

c Contingencies = $1.43 × 91 = $130.13, which is probably enough for unexpected costs.

Question 7

a Costs for 3000 punnets.

Punnets	$\$0.12 \times 3000 = \$360$
Seeds	$3000 \times 20 \times \$0.012 = \$720$
Seed raising mixture	$3000 \div 300 \times \$25 = \$250$
Trays	$\$0.50 \times 3000 \div 20 = \$75$
Labour	$3000 \div 150 \times \$30 = \$600$

Total = $2005

b Cost per punnet = $0.67 or $13.37 per tray of 20 punnets

Question 8

Expenses each fortnight (use 25 fortnights/year in calculations)

Rent = $870 ÷ 3 = $290

Food = $90 × 2 = $180

Mobile = $180 × 2 = $90

Entertainment = $160

Fares = $64

Clothes = $2100 ÷ 25 = $84

Total expenses = $868

Savings = $1360 – $868 = $492 per fortnight or $12 300 /year

She could pay cash for a new car after 2 years.

Question 9

Weekly expenses (use 50 weeks/year and 4 weeks/month in calculations)

Rent = $350 ÷ 4 = $87.50

Power = $420 ÷ 4 ÷ 4 = $26.25

Takeaway food = $220

Car repayments = $160 ÷ 4 = $40

Car expenses = $75 ÷ 2 = $37.50

Clothes = $1000 ÷ 50 = $20

Mobile = $150 ÷ 4 = $37.50

Total = $468.75/week.

If he does not save any money, he must spend $536 – $468.75 = $67.25/week going out. He could save more by eating fewer takeaways, rationing his mobile and going out less.

Question 10

Fortnightly expenses

Rent = $450 ÷ 2 × 2 = $450

Power = $120 ÷ 2 ÷ 2 = $30

Groceries = $190 ÷ 2 × 2 = $190

Entertainment = $150 × 2 = $300

Motorcycle = $180 ÷ 2 = $90

Running costs = $30

Clothes = $1400 ÷ 25 = $56

Mobile = $100 ÷ 2 = $50

Total = $1196

Savings each fortnight = $1380 – $1196 = $184 or $4600/year

Get a cheaper flat and stop spending so much on takeaways and parties.

Chapter review

Question 1

a $1\frac{1}{4} = \frac{5}{4} \times 100\% = 125\%$

b $0.053 \times 100\% = 5.3\%$

c $4.6 \times 100\% = 460\%$

d $\frac{5}{7} \times 100\% = 71.429\%$

e $2\frac{7}{13} = \frac{33}{13} \times 100\% = 253.846\%$

Question 2

a $13\% \div 100 = 0.13$

b $0.05\% \div 100 = 0.0005$

c $135\% \div 100 = 1.35$

Question 3

a $16\% = \frac{16}{100} = \frac{4}{25}$

b $142.5\% = 1\frac{42.5}{100} = 1\frac{425}{1000} = 1\frac{17}{40}$

c $2.55\% = \frac{255}{10000} = \frac{51}{2000}$

d $168\% = 1\frac{68}{100} = 1\frac{17}{25}$

e $17.5\% = \frac{175}{1000} = \frac{7}{40}$

Question 4

English

$$\frac{17}{25}\times 100\% = 68\%$$

Maths

$$\frac{27}{35}\times 100\% = 77.14\%$$

Her Maths result was better than her English one.

Question 5

Increase = 30.24 – 24.78 = 5.46

Percent increase = $\frac{5.46}{24.78}\times 100\% = 22.03\%$

Question 6

Decrease = 13 700 – 6300 = 7400

Percent decrease = $\frac{7400}{13700}\times 100\% = 54.01\%$

Question 7

$407.60 × 19.5% = $79.48

Question 8

Original × 82% = 467.4

Original = 467.4 ÷ 0.82

Original = 570 ppm

Question 9

$72 438 / year = $72 438 ÷ (52 × 38) /h = $36.66/h

Question 10

$29.58/h = $29.58 ×38 × 52 /year = $58 450.08/year

Question 11

$784.32 per week = $784.32 ÷ 38/h = $20.64/h

Question 12

Hourly rate = $1618.80 ÷ (2 × 38) = $21.30

First week

Pay at standard rate = 7.6 × 5 × $21.30 = $809.40

Pay at time-and-a-half = 6.5 × 1.5 × $21.30 = $207.68

Pay at double-time = 2 × 2 × $21.30 = $85.20

Second week

Pay at standard rate = 7.6 × 5 × $21.30 = $809.40

Pay at time-and-a-half = 1 × 1.5 × $21.30 = $31.95

Wage for fortnight = $1943.63

Question 13

Callum’s hourly rate = $974.50 ÷ 38 = $25.64

Normal rate = $25.64 × 1.25 = $32.06

Paul’s wage = 7 hours × 5 × $32.06 = $1122.10

Question 14

Adult rate = $845.60 ÷ 38 = $22.25

Bronwen hourly rate = $22.25 × 0.7 = $15.58

Bronwen’s weekly wage = $15.58 × 30 = $467.40

Question 15

Earnings = retainer + commission

Earnings = $250 + 40 × $145 × 0.15 = $1120

Question 16

Lee's wage = $3.90 × 43 = $167.70

Hourly rate = $167.70 ÷ 6 = $27.95

Question 17

Pension reduced by ($300 – $164) × 0.5 = $68

Pension = $877.10 – 68 = $809.10/fortnight

Annual income = ($809.10 + $300) × 26 = $28 836.60

Question 18

Kylie's fortnightly income = $280 × 2 = $560

Allowance reduced by (519 – 433) × 0.5 + (560 – 519) × 0.6 = $67.60

Allowance = $567.70 – $67.60 = $500.10/fortnight

Question 19

Total cost for 4 people

Fuel cost = 1500 km ÷ 100 km × 15 L × $1.32 /L = $297

Tickets = $150 × 4 = $600

Cabin = $225

Food = $110 × 4 = $440

Total = $1562

Individual cost = $1562 ÷ 4 = $390.50

Question 20

Weekly expenses (use 50 weeks /year and 4 weeks/month in calculations)

Rent = \$380 ÷ 2 = \$190
Food = \$320
Transport = \$70
TV payments = \$112 ÷ 4 = \$28
Clothes = \$380 ÷ 4 = \$95
Aerobics = \$18
Mobile = \$120 ÷ 4 = \$30

Total = \$751/week

Savings = \$880 – \$751 = \$129/week

Annual savings = \$129 × 50 = \$6450

Question 21

$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$	$\frac{1}{14}$
9.091%	8.33%	7.69%	7.14%

$8.54\% \approx \frac{1}{12}$

Question 22

x% increase cancels out a 20% decrease

x% increase is equivalent to multiplying by $\frac{100+x}{100}$

20% decrease is equivalent to multiplying by $(100-20)\% = 0.80$

$$0.8 \times \frac{100+x}{100} = 1$$
$$100 + x = \frac{100}{0.8}$$
$$x + 100 = 125$$
$$x = 25$$

25% increase cancels out 20% decrease.

Question 23

471.5 g/L in 2.5 L

Final Sugar = 471.5 g/L × 2.5 L = 1178.75 g

Original concentration = 471.5 g/L ÷ 1.15% = 410 g/L

Original sugar = 410 g/L × 2.5 = 1025 g

153.75 g of sugar has been added.

Question 24

$21.42 /h = $21.42 × 38 × 52 = $42 325.92/year

$1620.92 /fortnight = $1620.92 × 26 = $42 143.92

$43 300 a year is better.

Question 25

$554.50 for a 20-hour week = $554.50 ÷ 20 = $27.73/h

Normal rate = $27.73 ÷ 1.25 = $22.18/h

Normal weekly wage = $22.18 × 38 = $842.84/week

Question 26

$136.01 for 2 hours @ time-and-a half and 2 hours @ double-time = 7 hours

Normal rate = $136.01 ÷ 7 = $19.43/h

Total pay = (38 + 7) × $19.43 = $874.35

Question 27

$250 + sales × 13% = sales × 19%

$250 = sales (0.19 – 0.13)

0.06 × Sales = $250

Sales = $4166.67

Sales of at least $4166.67

Question 28

Bins per day in the first week

1 bin – 1st day, 4 bins – 5th day

Rate of increase = $5 \div 4 = 1.25$ bins

Sum of bins in 1st week = $(1 + 4) \times 5 \div 2 = 12.5$ bins

Wage in week 1 = $12.5 \times \$35 = \$437.50$

Wage in each of the next 5 weeks = $\$35 \times 4 \times 5 = \$700$

Total wage = $\$437.50 + \$700 \times 5 = \$3937.50$

Hourly rate in final 5 weeks = $\$700 \div 50 = \$14$/h

Question 29

a ABSTUDY reduced by $\$433.20 – \$178.70 = \$254.50$

$\$254.50 = (519 – 433) \times 0.5 + (\text{income} – 519) \times 0.6$

$\$254.50 = 43 + (\text{income} – 519) \times 0.6$

$\$211.50 = (\text{income} – 519) \times 0.6$

Income = \$871.50/fortnight = \$435.75/week

b Annual income = $(\$871.50 + \$178.70) \times 25 = \$27\,305.20$

Question 30

Weekly expenses (use 50 weeks/year and 4 weeks/month in calculations)

Clothes = $\$4800 \div 50 = \$96$

Entertainment = \$300

Food = $\$320 \div 4 = \$80$

Mobile = $\$380 \div 4 = \$95$

Travel = $\$4.60 \times 5 = \$23$

Total = \$594

This leaves $\$624 – \$594 = \$30$, which is not enough to cover the rent of $\$350 \div 2 = \$175$/week. She should not move out without changing her spending habits, however she could easily spend less on entertainment, clothes and her mobile.