

13 Estimating 2

Do not use a calculator for the problems on this page. For each problem show how you estimate the answer.

A Consumer Maths

- 1 Show how you estimate the total cost of 2.845 kg of pork sausages at \$14.25 per kg and 0.735 kg of mince at \$23.95 per kg.

- 2 Petrol costs \$2.45 per litre. Mum's car uses 1L for every 9 km while Dad's car uses 1L for every 12 km. Estimate how much cheaper it is to take Dad's car on a holiday on which we expect to travel 1780 km.

- 3 A washing machine can be bought for \$1295 cash or 18 monthly instalments of \$87, plus \$55 administration fee payable at the time of purchase. Estimate how much extra you pay if you choose to pay by instalments.

- 4 Julie replaces 0.012 with zero when she estimates the answers to these four questions :

i) $29.6 + 0.012$	ii) 29.6×0.012
iii) $29.6 \div 0.012$	iv) $29.6 - 0.012$

 - a) For which questions will Julie's estimate be wrong?

 - b) How would you estimate the answers to these four questions?
 - i)
 - ii)
 - iii)
 - iv)

B Going Mental

- 1 Sandra's pedometer shows that she walked about 8085 steps today. Sandra's steps measure 0.68 m. Estimate how far Sandra walked.

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- 2 Tom used 25 litres of petrol to drive a distance of 345 km. Estimate how far Tom's car goes on 1 litre of petrol.

 - 3 A block of cheese costs \$8.83 and weighs 642 g. Estimate the cost of 1 kilogram of cheese.

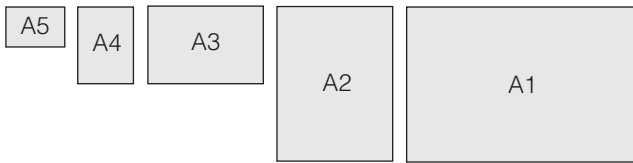
 - 4 High Voltage Electric Company charges a fixed rate of 109.28 cents for each day our household is connected to their supply plus 20.76 cents per unit of electricity used.
 - a) On July 11th our electricity meter read 68 857, on August 8th the reading was 70 285. Exactly how many units did we use in 29 days?

 - b) Estimate how much our electricity bill should be for this period.

27 Fraction Arithmetic 3

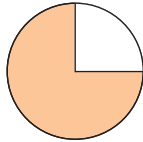
A Cuts

- 1 This diagram shows how sizes of paper are related.
An A4 sized sheet of paper is half of an A3 sized sheet.
If you cut an A4 sized sheet in half you get A5 sized sheets.



- a) What part of an A2 sheet is an A5 sheet?
- b) What part of an A1 sheet is an A5 sheet?

- 2 Tessa came home and found a large pizza on the table. She ate $\frac{1}{4}$ of it. Sam came home after Tessa and ate $\frac{1}{4}$ of what was left. What fraction of a pizza did Sam have?



- 3 There are $2\frac{1}{2}$ acres in one hectare.
- a) How many acres in 3 hectares?

- b) How many acres in $\frac{1}{2}$ hectare?

- c) How many acres in $\frac{1}{4}$ hectare?

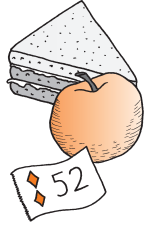
- 4 A farmer has 400 acres of land of which 25 acres are planted in corn. What fraction of the land is planted in corn?
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- 5a) What fraction is larger $\frac{2}{3}$ or $\frac{3}{4}$?

- b) What fraction is exactly halfway between $\frac{2}{3}$ and $\frac{3}{4}$?
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B Lunch

- 1 Richard spends $\frac{3}{4}$ of his lunch money on food and $\frac{1}{6}$ on a raffle ticket.
He has 50¢ left.
How much lunch money did Richard get?



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- 2 Joshua used to have 40 g of Cheddar cheese with his lunch. He changed it to 40 g of Edam cheese. $\frac{1}{5}$ of Edam cheese is fat, $\frac{7}{20}$ of Cheddar cheese is fat. How many grams less fat does Joshua have with his lunch now?
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- 3 How many portions of $\frac{2}{3}$ pie can be cut from $3\frac{1}{2}$ pies?
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- 4a) One box contains $\frac{5}{8}$ of a large pizza, another box contains $\frac{3}{4}$ of a large pizza. Four people want to share the leftovers fairly. How much pizza will each get?
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- b) The pizzas were already cut into slices of one eighth. How many of the slices need to be cut smaller? Explain.
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45 Mixed Problems 3

A Sales

1 In the 'Winter Sale' a women's clothes shop sells all clothes at 22% discount.

a) Brittany chooses a skirt and pays \$40.75.
How much was on the price ticket before the sale?

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b) Vanessa gets \$35.18 discount on a jacket.
How much does she pay?

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2 Cooper buys sports shoes, which are down from \$269.95 to \$199.95.

a) Calculate the percentage discount.

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b) The sales price of \$199.95 includes 15% GST.
What could Cooper do to calculate the price without the GST?
(Circle one of the following calculations.)

- A Multiply \$199.95 with 0.85
- B Multiply \$199.95 with 1.15
- C Divide \$199.95 by 0.85
- D Divide \$199.95 by 1.15

3 A car salesman gets 8% commission when he sells a car. The commission is calculated using the GST exclusive amount paid by the customer.
Calculate the commission earned by the car salesman if the customer paid \$34,560 (incl GST) for his car.

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B Population

1 In 2006 the population in Wellington region was 418000. In the years from 2006 to 2013 the population in the region grew to 492 000. What percentage increase is that?

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2 New Zealand's population in 2014 was 4 500 000 (3sf).

a) Complete this sentence : 'The population of New Zealand in 2014 was at least and at most

b) Write the population size in standard form.

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c) The ratio NZ born to overseas born is 9 : 2. How many people in NZ were born overseas? Round sensibly.

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3a) Black Forest High School has 78 more girls than boys. The ratio girls to boys equals 10 : 7. How many students attend this school?

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b) Green Akers College has 436 boys and 54% of the students are girls.
How many students attend Green Akers College?

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A Repeated Percentage Increase/Decrease

If an original amount (S) increases with a constant percentage ($r\%$) per time unit, then the compounded amount (A) after n time units can be calculated with the formula : $A = S(1 + r\%)^n$.
The same formula can be used if there is a constant percentage decrease, in that case r is negative.

Examples :

- 1) In 2014 a family of four spent \$260 per week on groceries. Assuming that the rate of inflation in New Zealand stands at 2.4% per year, calculate the cost of the weekly groceries in the year 2018.
- 2) A businessman bought a laptop for \$1800. The laptop depreciates in value at a rate of 33% per year. Calculate the value of the laptop 3 years after purchase.

Working : Use $A = S(1 + r\%)^n$.

- 1) Here we are given : $S = \$260$, $r\% = 2.4\% = 0.024$, $n = 4$.
Then $A = 260(1.024)^4 = 285.87$.
So the groceries would cost \$286 (3 sf) in the year 2018.
- 2) Here we are given : $S = \$1800$, $r\% = -33\% = -0.33$, $n = 3$.
Then $A = 1800(0.67)^3 = 541.37$.
So after 3 years the laptop will be worth \$541 (3 sf).

1 House prices in city A are expected to rise at a rate of 2.5% per annum for the next 5 years. An investor just bought a house there for \$425,000. For how much can the investor expect to sell the house in 5 years time?

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2 The population of a small New Zealand town is decreasing steadily at a rate of 1.8% per year. If the population is 12,000 now, how many people are expected to live there in 10 years time?

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3 An investor bought \$15,000 worth of shares in a certain company. The value of the shares first decreased for 2 years at a rate of 4.2% per annum, but then they went up steadily at a rate of 6.8% per annum for 4 years. The investor held on to the shares for these 6 years and then decided to sell. How much profit/loss did she make in this investment?

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B Use Your Graphic Calculator

Example : This looks familiar but there is a twist!

- 1) In 2014 a family of four spent \$260 per week on groceries. Assuming that the rate of inflation in New Zealand stands at 2.4% per year, after how many years will the family's weekly groceries cost \$300?
- 2) A businessman bought a laptop. The laptop depreciates in value at a constant annual rate of 33% per year. After five years the laptop was worth just \$100. Calculate the original purchase price of the laptop.

Working : For detailed help, revise page 18, column B.
We will need to use the formula $A = S(1 + r\%)^n$.

Keying sequence for Casio FX 9750 GII graphic calculator :
Select **EQUA** from the Main Menu, then select **F3:Solver**.
Now use the **ALPHA** keys to enter the formula : $A = S(1 + R)^N$

- 1) Enter the values **A=300**, **S=260** and **R=0.024**.
When **N=.....** is highlighted press **SOLV (F6)**.
Answer : **N = 6.033**.
After 6 years the groceries will be \$300.
- 2) Enter the values **A=100**, **R=-0.33** and **N=5**.
Go back up to highlight **S=.....** and press **SOLV (F6)**.
Answer : **S = 740.672**.
The purchase price was \$740 (2 sf).

1 The value of a car depreciates at a constant rate of 18% per annum. What was the car's new price if after 8 years it is worth \$7500?

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2 When Thomas started working for his current boss, his yearly salary was \$23,500. Each year his salary is increased by a fixed rate. Now, 15 years later his salary is \$62,300. Calculate the rate of yearly salary increase.

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3 Mia has put \$500 in a savings account that has a net interest rate of 4% p.a. compounded monthly. Apart from the interest Mia is not saving any more money. After how many months will there be \$600 in the account?

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