NCEA Level 1 · AS 91945: Maths in Aotearoa: Rates, Ratios & Money

Name: Date:

Hi! This standard is all about using number and algebra methods, rates, ratios, percentages and financial maths, to explore real-life problems in Aotearoa and the Pacific. Work through each section in order, always show your method clearly, and check your answer makes sense in the context.

Revision summary

- Percentage of an amount: amount × (percent ÷ 100). To increase by x%: multiply by (1 + x/100); to decrease: multiply by (1 − x/100).
- Reverse percentage: original = final ÷ (multiplier). E.g. price after 15% GST added: original = total ÷ 1.15.
- Rate = quantity ÷ time (or per unit). Keep units consistent, e.g. km/h, $/kg, L/100km.
- Ratio sharing: add ratio parts, divide total by parts to find one part, then multiply. a:b means split into (a+b) equal shares.
- Unit rate for comparison ('best buy'): divide price ÷ quantity to get cost per unit, then compare.
- Simple interest: I = P × r × t (r as a decimal, t in years). Amount = P + I.
- Currency conversion: multiply by the exchange rate; divide to convert back.
- Always state units, round sensibly (money to the nearest cent), and write a clear concluding sentence answering the question.

Key skills

1. Find 15% of $240.

2. Share $600 between two marae committees in the ratio 3 : 2.

3. A car travels 180 km in 2.5 hours. Find its average speed in km/h.

4. A 2 kg bag of kūmara costs $9.60. What is the cost per kilogram?

Achieved

5. A pair of gumboots is priced at $65 before GST. GST of 15% is added at the checkout. What is the total price?

6. At a Pasifika festival, a food stall sells 3 items for $12. At this rate, how much would 8 items cost?

7. Aroha deposits $800 in an account paying 4% simple interest per year. How much interest does she earn in 3 years?

8. A recipe for a hāngī feeds 6 people and uses 1.5 kg of pork. How much pork is needed to feed 20 people?

Merit

9. A shop reduces the price of a surfboard by 20% in a sale, making the sale price $360. What was the original price, and how many dollars were saved?

10. Two brands of coconut milk are compared. Brand A: 400 mL for $3.20. Brand B: 600 mL for $4.50. Which is better value, and by how much per litre?

11. Tane is driving from Auckland to Taupō, a distance of 280 km. His car uses fuel at 7.5 L per 100 km, and petrol costs $2.80 per litre. Calculate the total fuel cost for the trip.

Excellence

12. A tourist changes $500 NZD to Fijian dollars at a rate of 1 NZD = 1.35 FJD, paying a $10 NZD flat fee first. In Fiji she spends 600 FJD, then changes the rest back at 1 NZD = 1.40 FJD. How many NZD does she end up with? Explain why she loses money overall even though nothing was 'spent' on the conversions themselves.

13. Two towns run water tanks. Town A's tank fills at a steady 15 L per minute; Town B's fills at 12 L per minute but already holds 900 L when both start. After how many minutes do the tanks hold the same volume, and prove your answer using an equation.

14. A koha (donation) fund grows by the same percentage each year. After 2 years $2000 has grown to $2205. Find the annual percentage growth rate, and use it to predict the value after 3 years, explaining any assumption.

Answer key (for parents and tutors)

1. Find 15% of $240.
   15% of $240 = 240 × 0.15 = $36.
   Achieved: applies the percentage-of-an-amount method.

2. Share $600 between two marae committees in the ratio 3 : 2.
   Total parts = 3 + 2 = 5. One part = 600 ÷ 5 = $120. First committee = 3 × 120 = $360; second = 2 × 120 = $240.
   Achieved: applies ratio sharing.

3. A car travels 180 km in 2.5 hours. Find its average speed in km/h.
   Speed = distance ÷ time = 180 ÷ 2.5 = 72 km/h.
   Achieved: calculates a rate.

4. A 2 kg bag of kūmara costs $9.60. What is the cost per kilogram?
   Cost per kg = 9.60 ÷ 2 = $4.80/kg.
   Achieved: finds a unit rate.

5. A pair of gumboots is priced at $65 before GST. GST of 15% is added at the checkout. What is the total price?
   GST = 65 × 0.15 = $9.75. Total price = 65 + 9.75 = $74.75.
   Achieved: applies percentage increase to a real context.

6. At a Pasifika festival, a food stall sells 3 items for $12. At this rate, how much would 8 items cost?
   Cost per item = 12 ÷ 3 = $4. For 8 items = 8 × 4 = $32.
   Achieved: uses a unit rate to scale a proportional problem.

7. Aroha deposits $800 in an account paying 4% simple interest per year. How much interest does she earn in 3 years?
   I = P × r × t = 800 × 0.04 × 3 = $96.
   Achieved: applies the simple interest formula.

8. A recipe for a hāngī feeds 6 people and uses 1.5 kg of pork. How much pork is needed to feed 20 people?
   Pork per person = 1.5 ÷ 6 = 0.25 kg. For 20 people = 20 × 0.25 = 5 kg.
   Achieved: uses proportional reasoning to scale a recipe.

9. A shop reduces the price of a surfboard by 20% in a sale, making the sale price $360. What was the original price, and how many dollars were saved?
   Sale price is 80% of the original, so original = 360 ÷ 0.80 = $450. Saving = 450 − 360 = $90.
   Merit: links reverse-percentage reasoning to find the original amount and the saving.

10. Two brands of coconut milk are compared. Brand A: 400 mL for $3.20. Brand B: 600 mL for $4.50. Which is better value, and by how much per litre?
    Brand A: 3.20 ÷ 0.4 = $8.00/L. Brand B: 4.50 ÷ 0.6 = $7.50/L. Brand B is better value by $8.00 − $7.50 = $0.50 per litre.
    Merit: connects unit-rate calculations to compare and justify a decision.

11. Tane is driving from Auckland to Taupō, a distance of 280 km. His car uses fuel at 7.5 L per 100 km, and petrol costs $2.80 per litre. Calculate the total fuel cost for the trip.
    Fuel used = 280 ÷ 100 × 7.5 = 2.8 × 7.5 = 21 L. Cost = 21 × 2.80 = $58.80.
    Merit: works through a multi-step problem linking rate, quantity and cost.

12. A tourist changes $500 NZD to Fijian dollars at a rate of 1 NZD = 1.35 FJD, paying a $10 NZD flat fee first. In Fiji she spends 600 FJD, then changes the rest back at 1 NZD = 1.40 FJD. How many NZD does she end up with? Explain why she loses money overall even though nothing was 'spent' on the conversions themselves.
    After the fee: 500 − 10 = $490 NZD converted. FJD received = 490 × 1.35 = 661.50 FJD. After spending 600 FJD, she has 61.50 FJD left. Converting back: 61.50 ÷ 1.40 = $43.93 NZD (to the nearest cent). She started with $500 and now holds $43.93 plus the value of 600 FJD spent. The 600 FJD spent was worth 600 ÷ 1.35 = $444.44 at the buy rate but only 600 ÷ 1.40 = $428.57 at the sell rate. The loss comes from the 'spread', the bank buys FJD from her at a worse rate (1.40) than it sold them (1.35), plus the $10 fee, so value is lost on the exchange itself, not on

purchases.

Excellence: solves an unfamiliar multi-stage problem and justifies why the exchange spread causes a loss.

13. Two towns run water tanks. Town A's tank fills at a steady 15 L per minute; Town B's fills at 12 L per minute but already holds 900 L when both start. After how many minutes do the tanks hold the same volume, and prove your answer using an equation.
Let t = minutes. Volume A = 15t. Volume B = 900 + 12t. Set equal: 15t = 900 + 12t → 3t = 900 → t = 300 minutes. Check: A = 15 × 300 = 4500 L; B = 900 + 12 × 300 = 900 + 3600 = 4500 L. ✓ The tanks hold the same volume (4500 L) after 300 minutes.
Excellence: forms and solves an equation from a rate context and verifies the generalisation.

14. A koha (donation) fund grows by the same percentage each year. After 2 years $2000 has grown to $2205. Find the annual percentage growth rate, and use it to predict the value after 3 years, explaining any assumption.
Let the multiplier be m. Then $2000 \times m^2 = 2205$, so $m^2 = 2205 \div 2000 = 1.1025$, $m = \sqrt{1.1025} = 1.05$. The rate is 5% per year. After 3 years: $2000 \times 1.05^3 = 2000 \times 1.157625 = \$2315.25$. Assumption: the growth rate stays constant at 5% each year (compounding), which may not hold if interest rates change.
Excellence: reverses a compound-growth relationship, generalises to a further year, and states an assumption.