Developing proportional reasoning through tax and super tasks

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Year 10 - How much is enough superannuation?

Curriculum connections

Number and Algebra: Money and financial mathematics

- Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (VCMNA328).

Number and Algebra: Patterns and algebra

- Substitute values into formulas to determine an unknown and re-arrange formulas to solve for a particular term (VCMNA333).

Mathematical focus

The underlying rationale for superannuation is "saving" money each year and earning a return on investment on that money over time. In the first year after money is contributed to superannuation, the return generated mimics 'simple' interest:

$$Simple\ Interest = Principal\ \times Interest\ Rate\ \times\ Time$$

However, in each subsequent year, a return is also generated on the returns on previous contributions, so it mimics annual 'compound' interest:

$$Compound\ Interest = Principal \times (1 + Interest\ Rate)^{Time} - Principal$$

When interest is compounded *n* times per year, the formula becomes:

$$Compound\ Interest = Principal \times \left(1 + \frac{Interest\ Rate}{n}\right)^{n \times Time} - Principal$$

In all these cases, the new principal is the original principal value plus interest earned. However, in the case of superannuation, new contributions are made each year based on income earned, so investment returns are generated on the original contribution, the new contributions, and the returns on previous contributions. Students can use a spreadsheet to model and compare simple and compound interest on an initial investment amount versus the returns earned from regular superannuation contributions over time.

While working, superannuation accumulates. When people retire, their superannuation becomes available as an untaxed source of regular income (self-funded pension payment). Due to inflation, living costs increase over time, which means…

Key language: Introduce or revise such terms as *average weekly income*, *gross income*, *net income*, *superannuation*, *Superannuation Guarantee Contribution (SGC)*, *voluntary contribution*, *'topping up' super*, *percent*, and *inflation*.

Learning task

The average Australian weekly income in 2020 for full-time workers is $1634 (gross, i.e., before tax). The Superannuation Guarantee Contribution (SGC) means employers must contribute 9.5% of employees' gross income to their nominated superannuation account. Consider the following questions:

1. Assuming an average income and average superannuation return of 8% annually over 50 years of work, how much superannuation will Ying retire with?

2. It seems as though Ying will have plenty of money, but will she have enough to meet her living costs? Explain your thinking.

3. What would be the impact on Ying's retirement balance if she 'topped up' her super with annual voluntary contributions of $1000 every year she worked?

Enabling prompts:

How much money would Ying have if we assume 50 years employment, average income and zero returns on superannuation investment?

Extending prompts:

- Model the superannuation contributions and returns using a spreadsheet. What information was provided? What assumptions did you make? How much money did Ying have after 50 years to fund her retirement?

- Why might median income be a better basis than average income for thinking about a typical person's superannuation after 50 years of working?

- Create a formula that calculates the impact of a negative investment return. How might the timing of such an event impact retirement plans?

- Model how the cost of living changes (food, housing, healthcare) over a person's life, based on key life stages (before kids, raising and educating kids, divorce, retirement)?

Important pedagogical considerations

- Invite students to share what they know and understand about tax and super. They may be working and therefore paying tax and receiving super contributions.
- Make sure students record their mathematical working and their explanations.

- Ask students to convince you that their solutions are mathematically sound.
- Remind students to check the appropriateness of their solution against the problem, as well as any potential impact on individuals, families, communities and society.

Student handout

If you would like to use a student handout for this task, please print out the next page.

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