

Developing proportional reasoning through tax and super tasks

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Year 7 - Is paying tax good or bad?

Curriculum connections

Number and Algebra: Real numbers

- Find percentages of quantities and express one quantity as a percentage of another, with and without digital technologies. (VCMNA248).
- Recognise and solve problems involving simple ratios. (VCMNA249).

Mathematical focus

Percentage change problems describe the change between an initial value (I) and a final value (F). So, $F > I$ for 'positive' changes such as adding GST to a price, earning interest with a bank account, or the new height of a plant after growth.

$F < I$ for 'negative' changes such as a discounted sales price or the loan value after a repayment which covers the interest due and some of the initial capital. Students can solve percentage change problems given two out of three of the three quantities. For example: (1) Calculate F given I and % change, (2) Calculate I given F and % change, and (3) calculate % change given I and F .

Example using 10% GST:

$$\text{Recommended Retail Price} = \text{unit price} + \text{GST}$$

$$F \text{ (using percentages)} = 100\% \text{ of } I + 10\% \text{ of } I = 110\% \text{ of } I$$

$$F \text{ (in decimals)} = 1.1 \times I$$

Key language: Introduce or revise such terms as *goods and services tax (GST)*, *GST inclusive price*, *price excludes GST*, *total price*, and *amount payable*.

Learning task

The GST is a tax of 10% applied to the sale of most goods and services, and contributes almost a quarter of state revenues. Calculations are used to add and subtract GST. For example, to figure out how much GST is included in a GST inclusive price, divide the amount payable by 11. To work

out the value of goods or services before GST, divide the amount payable by 1.1. Consider the following questions:

1. Su would like a bottle of perfume that costs \$89.95 (including GST). How much GST is collected as part of this sale?
2. Su's friend is travelling overseas and has offered to purchase the same bottle of perfume for Su duty or tax free. How much might Su expect to pay?
3. Think about this situation from both the government's and Su's perspectives. Should Su feel a responsibility to pay GST? Explain your thinking.

Enabling prompts:

- What would be the final recommended retail price (RRP) if the price excluding GST is \$80.
- How much GST is collected if the GST inclusive price is \$90?
- GST is known as a flat tax because everyone pays the same rate (10%) no matter how much they earn. Do you think this is fair? Are there some items which should not have GST added? Explain your thinking.

Extending prompts:

- Derive a formula to explain the linkage between the initial price (excluding GST), GST of 10%, and the final price (inclusive of GST). What would be the formula if GST is 17%?
- Other countries collect GST, which is sometimes called a value added charge (VAT). Find out what rates other countries use. Modify your formula above to apply to any rate of, say, $r\%$.
- Derive a formula to show the link between the full RRP and the discounted sales price of an item with a sales discount of 25%.
- What would be the general formula for an initial price (I), final price (F), and percentage change (r) where r can be positive or negative? How would you explain this to another student?

Important pedagogical considerations

- Invite students to share what they know and understand about tax. They may be working and therefore paying tax.
- 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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