Key focus

This objective is the mirror of increasing/decreasing by a percentage: instead of being given the original amount and finding the new amount, students are given the NEW amount (after a stated percentage increase or decrease) and must find the ORIGINAL amount, by dividing by the multiplier (1 plus or minus the rate) rather than adding or subtracting a percentage. The most common student error is subtracting (or adding) a percentage of the given NEW amount instead of dividing – this LO explicitly targets and corrects that error. Teach immediately after (and in contrast with) increasing/decreasing by a given percentage, using forming-and-solving-an-equation as the underlying model: original $\times$ multiplier $=$ new, so original $=$ new $\div$ multiplier.

Suggested teaching sequence

1. Revisit the multiplier method for increasing/decreasing by a percentage: new $=$ original $\times(1 \pm \frac{r}{100})$. Rearrange to original $=$ new $\div(1 \pm \frac{r}{100})$.
2. Model the percentage-change bar in reverse: the new amount is now the KNOWN end of the bar, and the 100% (original) end is unknown – the same diagram, read the other way.
3. Contrast directly with a common misconception: to find the original before a 20% increase to \$120, some students compute $120 - 20\%$ of $120 = 96$. Show this is wrong (it takes 20% of the wrong amount) and that the correct original is $120 \div 1.2 = 100$.
4. Practise with benchmark percentages first (10%, 20%, 25%, 50%), then extend to less common whole-number and decimal percentages.
5. Apply the method to money and real-world contexts: discounts, GST, pay rises and cuts, population and measurement change.
6. Introduce successive percentage changes in reverse: divide by both multipliers, in the reverse order to how they were applied, to undo a two-step change.
7. Extend to finding an unknown constant percentage rate from a start and an end value over two equal periods (square-root the ratio of end to start to get the single-period multiplier).
8. Extend to a two-variable context (e.g. area after independent percentage changes to two dimensions) and discuss why the combined multiplier is the product of the two separate multipliers, not their sum or difference.

Core examples to model

- Basic reverse increase: a price rose 20% to \$72: $72 \div 1.2 = 60$.
- Basic reverse decrease: a price fell 20% to \$72: $72 \div 0.8 = 90$.
- GST: a total of \$69 includes 15% GST: $69 \div 1.15 = 60$ pre-GST.
- Successive changes: a price rose 20% then fell 10% to \$216: $216 \div 0.9 = 240$, then $240 \div 1.2 = 200$ original.
- Unknown rate: a value falls from \$25 000 to \$20 250 over 2 equal-rate years: $20\,250 \div 25\,000 = 0.81$, $\sqrt{0.81} = 0.9$, so the annual rate is a 10% decrease.

- Common error corrected: a price rose 20% to \$120. WRONG: $120 - 20\%$ of $120 = 96$. RIGHT: $120 \div 1.2 = 100$ (check: $100 \times 1.2 = 120$).

Watch for

- Subtracting/adding a percentage of the NEW amount instead of dividing by the multiplier – the single most common error on this LO.
- Using the wrong multiplier direction: dividing by 1.2 to reverse a decrease, or by 0.8 to reverse an increase.
- In successive-change problems, dividing by both multipliers in the wrong order, or dividing by their sum/difference instead of applying them one at a time.
- Assuming the annual rate over two equal periods is simply half the total percentage change – it requires a square root of the multiplier ratio, not a division by 2.
- Confusing this LO's "find the original" questions with the sibling LO's "find the new amount" questions – the direction of the arithmetic (multiply vs. divide) depends on which quantity is unknown.
- Rounding a money answer before completing a second calculation step, which can shift the final cents.

Checks for understanding

- Can students find the original amount by dividing the new amount by the correct multiplier?
- Can they read a percentage-change bar diagram where the new amount is known and the original is unknown?
- Can they apply the method to GST, discounts, pay changes, and other real-world contexts?
- Can they explain why dividing (not subtracting a percentage of the new amount) is the correct method?
- Can they reverse two successive percentage changes in the correct order?
- Can they find an unknown constant percentage rate from a start and an end value over two equal periods?