Chapter 13

Percentages profit loss discounts and tax

Learn the ideas below, follow each worked example, then attempt the practice before checking the answers.

13.1 Finding a percentage of an amount

A percentage is a fraction out of 100. Multiply the amount by the percentage divided by 100. For mental calculations, combine easy percentages such as 10%, 5% and 1%. Always identify the amount that represents the original whole.

Worked example 15% of 240 = $\frac{15}{100}$ × 240 = 36. Mentally, 10% is 24 and 5% is 12, giving 36. To express 36 as a percentage of 240, calculate $\frac{36}{240}$ × 100% = 15%.

13.2 Percentage increase and decrease

For an increase of p%, multiply by 1 + p ÷ 100. For a decrease, multiply by 1 − p ÷ 100. Percentage change compares the change with the original value. Equal percentage increases and decreases usually do not cancel because the base changes.

Worked example A price of 800 rises by 12%, giving 800 × 1.12 = 896. A later decrease of 12% gives 896 × 0.88 = 788.48, not 800.

13.3 Profit and loss

Profit = selling price − cost price. Loss = cost price − selling price. In standard school problems, profit or loss percentage uses cost price as the base. Include additional stated costs before comparing with selling price. A percentage of selling price is a different calculation.

Worked example An item costs 500 rupees and sells for 575 rupees. Profit is 75 rupees. Profit percentage = $\frac{75}{500} \times 100\% = 15\%$. If it sells for 450 rupees, the loss is 50 rupees or 10%.

13.4 Discounts and tax

A discount reduces a marked price. A tax increases the applicable price. Apply successive changes in the order specified. In the examples here, tax applies after the discount. Rates in exercises are hypothetical and are not a statement of current tax rules.

Worked example An item marked 1,200 rupees has 20% off, then 5% tax. Discounted price = 1,200 × 0.80 = 960. Tax = 960 × 0.05 = 48. Final price = 1,008 rupees.

13.5 Reverse percentages

To recover an original value, divide the final value by the multiplier. Do not subtract the same percentage from the final amount because it uses a different base. State whether the final value includes an increase or a decrease.

Worked example A price after a 15% discount is 680 rupees. This is 85% of the original, so original price = 680 ÷ 0.85 = 800 rupees. Check: 800 × 0.85 = 680.

13.6 Simple interest

Simple interest uses only the original principal. Interest = principal × annual rate × time, when the rate is a decimal and time is in years. Total amount equals principal plus interest. This differs from compound interest, which also earns interest on earlier interest.

Worked example On 2,000 rupees at 6% simple interest per year for 3 years, interest = 2,000 × 0.06 × 3 = 360 rupees. The total is 2,360 rupees.

Chapter 13 practice

Work in your notebook. Show your method and include units where needed.

1. Find 18% of 350.
2. Increase 640 by 25%.
3. An item costs 750 and sells for 690. Find the loss percentage.
4. A 900 rupee item has 10% off, then 8% tax. Find the final price.
5. A value after a 20% increase is 540. Find the original.

Answers with methods

1. $\frac{18}{100} \times 350 = 63$.

2. $640 \times 1.25 = 800$.

3. Loss = 60. Loss percentage = $\frac{60}{750} \times 100\% = 8\%$.

4. $900 \times 0.90 \times 1.08 = 874.80$ rupees.

5. $540 \div 1.20 = 450$.

Common mistake to avoid

A discount percentage uses the marked price. A profit percentage usually uses cost price. Label the base before inserting values.