Problem-Solving Challenges — Calculating with Number

Part A — Multi-Step Word Problems

Real problems rarely tell you which operation to use. Read carefully, decide what each step needs, and keep your working tidy so you can check it.

> **A four-step plan:** (1) What is the question asking? (2) What information do I have? (3) Which operations, and in what order? (4) Is my answer sensible — about the right size?

> **Worked example.** A jacket costs $60 with 20% off. 10% of 60 is 6, so 20% is $12. You pay $60 − 12 = $48.

1 A book costs $24. The shop takes 25% off in a sale. How much do you save, and how much do you pay?

2 There are 240 students at a school. ¾ of them walk or cycle to school. How many is that? How many do *not*?

3 A recipe for 4 people needs 600 g of flour. How much flour is needed for 10 people? Show your reasoning.

4 Three friends share the cost of a $45 gift equally and also buy a card for $6 shared equally. How much does each friend pay in total?

5 **Multi-step.** A cinema sells 320 tickets. 40% are child tickets at $8 and the rest are adult tickets at $14. How much money is taken altogether?

6 **Prove it.** Leah says "finding 50% then 10% of a number is the same as finding 60%." Is she right? Test it on $80 and explain.

Part B — Order of Operations & Mental Strategies

When an expression has several operations, we follow an agreed order: **brackets first**, then **× and ÷** (left to right), then **+ and −** (left to right). Smart mental strategies — doubling, halving, and compensation — can make hard calculations quick.

> **Worked example.** $4 + 6 \times 3$. Multiplication first: $6 \times 3 = 18$, then $4 + 18 = 22$. (Not 30!)
>
> **Compensation:** $199 + 56$ is easier as $200 + 56 = 256$, then take back the extra 1: 255.

1 Evaluate, using the correct order of operations.

(a) $5 + 3 \times 4 =$ _____

(b) $(5 + 3) \times 4 =$ _____

(c) $20 - 6 \div 2 + 1 =$ _____

2 Insert brackets to make each sentence true.

(a) $6 + 2 \times 5 = 40$

(b) $12 - 4 - 3 = 11$

3 Use a smart mental strategy (doubling, halving or compensation) and explain it.

(a) $25 \times 16 =$ _____

(b) $198 + 47 =$ _____

4 **Estimate first, then calculate.** For 312×19, write a sensible estimate, then the exact answer. How close were you?

5 **Find the error.** A student wrote $8 + 4 \times 2 = 24$. Explain the mistake and give the correct answer.

6 **Open challenge.** Using exactly four 4s and any operations and brackets, write an expression equal to 24. Can you find a second way?