

Extension & Challenge — Equalities & Inequalities

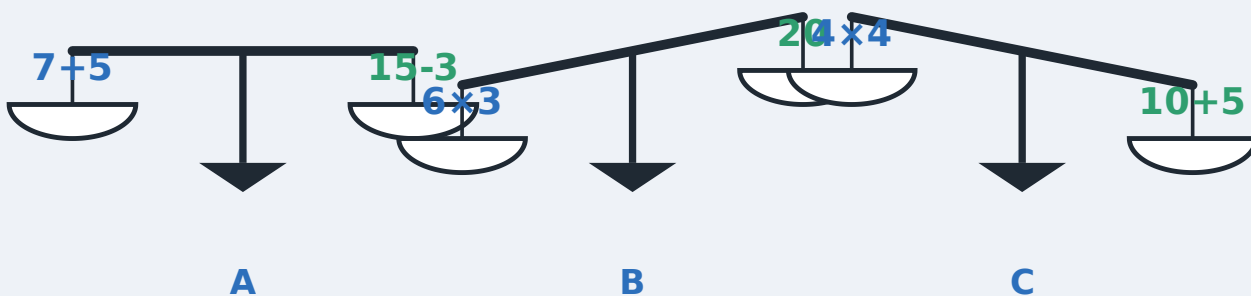
Part A — Balancing the Scales

A balance scale is a picture of an equation. When the pans are level, both sides have the **same value**, so we write $=$. When one side is heavier we use $>$ (greater than) or $<$ (less than) — the open mouth always faces the larger amount.

Worked example. Compare 9×2 and $8 + 8$.

Left side: $9 \times 2 = 18$. Right side: $8 + 8 = 16$. Since 18 is greater, we write $9 \times 2 > 8 + 8$.

Balance or not? Write $=$, $<$ or $>$



Three balances, A, B and C. Work out each side before deciding which way it tips.

1 For each balance above, work out the value of *both* sides, then write $=$, $<$ or $>$ in the box.

A: $7+5$ _____ $15-3$

B: 6×3 _____ 20

C: 4×4 _____ $10+5$

2 A bag of identical marbles plus a 3 g weight exactly balances an 11 g weight. Write an equation and find the mass of the bag of marbles.

3 Two identical apples balance a 200 g weight. How heavy is one apple? Then predict what would balance *three* apples.

4 **Keep it balanced.** A balance is currently equal. You add 4 to the left pan. What must you do to the right pan so it stays balanced? Explain the rule in your own words.

Part B — True, False & Open Sentences

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A number sentence can be **true**, **false**, or **open** (it has a missing number, so we cannot decide until we fill the gap). Mathematicians test sentences and find values that make open ones true.

Always calculate **each side separately** first, then compare. Do not just read left to right.

1 Write **True** or **False** for each sentence. If it is false, change the right-hand side to make it true.

(a) $7 \times 8 = 54$ _____

(b) $100 - 45 < 60$ _____

(c) $3 \times 12 = 36$ _____

(d) $5^2 > 4 \times 6$ _____

2 Find a whole number that makes each open sentence true.

(a) $\square + 7 > 12$ _____

(b) $2 \times \square = 18$ _____

(c) $30 - \square < 25$ _____

3 List *all* the whole numbers that make this inequality true: $5 < n \leq 9$.

4 **Prove it.** If $a = b$, explain why $a + 5$ must equal $b + 5$. Use the idea of a balance to help your explanation.