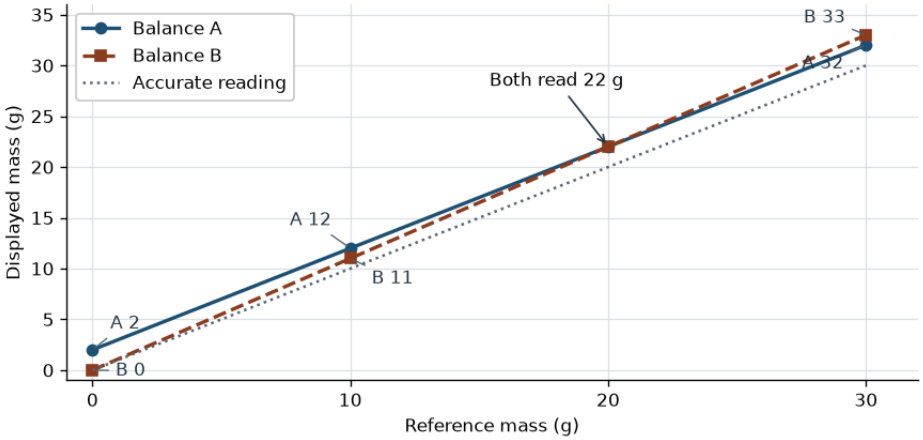
Separating Zero Error From Scale Error

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A class tests two balances by weighing four references. Each point shows a known reference mass and the mass displayed by one balance. Between the marked points the class uses the straight-line models shown. Both balances display 22 g for the same 20 g reference.



Calibration records for the two balances.

1 Which recorded observation distinguishes the two balances at the lightest reference?

(1) A reads 2 g and B reads 0 g.

(2) A reads 0 g and B reads 2 g.

(3) Both read 2 g.

(4) Both read 0 g.

2 Compare how much each display increases when the reference changes from 10 g to 30 g. Show the two differences. [1]

Answer and work

The class can subtract a constant from every displayed mass as a zero adjustment. It cannot change how much the display increases for a given increase in the reference mass.

3 Which balance can the class correct over the plotted range using only a zero adjustment? Explain using two points or differences from the graph. [1]

Answer and work

4 Suppose a student subtracts 2 g from every B reading because that fixes the 20 g point. Calculate the corrected reading at 30 g and state the remaining error. [1]

Answer and work

5 Explain why a calibration check should use more than one reference mass. Use the two records as evidence. [1]

Answer and work