Checking a Powder Sample Before and After Mixing

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

A ceramic studio mixes a dark mineral with a light mineral. It divides the dry bin into an upper half and a lower half of equal total mass. A tester can measure the dark mineral's mass fraction in each half. The studio needs at least 40% dark mineral in the whole bin.

Condition	Dark mineral in upper half (%)	Dark mineral in lower half (%)
After settling	30	60
After mixing	44	46

1 Which readings show the greater difference between the upper and lower halves?

(1) After settling

(2) After mixing

(3) Both have the same difference.

(4) The readings do not compare depth.

2 Calculate the whole-bin dark mineral mass fraction for both conditions. Explain why the two halves count equally. [1]

Answer and work

3 The studio adds a second requirement. Each half must contain at least 40% dark mineral. Use both requirements to decide which condition qualifies. [1]

Answer and work

Another bin has a different shape. The upper region holds one quarter of the total mass and contains 30% dark mineral. The lower region holds three quarters and contains 50%.

4 Calculate the whole-bin fraction for the new bin. Show how the region masses enter the calculation. [1]

Answer and work