# Step by step guide_Mean (Grouped)

## Pre-Class Preparation

- Prepare group assignments (4-5 students per group).
- Have calculators ready for all students.
- Prepare chart paper and colored markers.
- Write anchor activity table on the board or prepare handouts.
- Prepare worked examples on cards or slides.
- Have formula cards ready for reference.

## Phase 1: Problem-Solving and Discovery (15 minutes)

[0-2 minutes] Introduction

[SAY] "Good morning! Remember calculating mean for ungrouped data? Today we learn mean for GROUPED data!"

[ASK] "If data is grouped into intervals like 100–199, do we know the exact values?"

[LISTEN] Students say: No, we only know the range.

[SAY] "Exactly! So we need a special method to estimate the mean. Let's discover it!"

[2-3 minutes] Group Formation

[DO] Divide students into groups of 4-5.

[DO] Distribute calculators, chart paper, and markers.

[3-5 minutes] Explain the Activity

[SAY] "Here's pocket money data for students, grouped into intervals."

[DO] Display or write the pocket money table on the board.

[SAY] "Your tasks: (1) Find the midpoint for each interval, (2) Calculate the mean pocket money. You have 10 minutes."

[ASK] "What do you think midpoint means?"

[LISTEN] Students suggest: middle value, average of boundaries.

[5-13 minutes] Group Work

[DO] Circulate among groups, observing their strategies.

[LISTEN] to how they calculate midpoints.

[ASK] "How did you find the midpoint for 100–199?"

[LISTEN] Students explain: (100 + 199) / 2 = 149.5

[ASK] "Now you have midpoints. How do you use them with frequencies?"

[DO] Guide groups to multiply midpoint by frequency.

[ASK] "What do you do with all the fx values?"

[LISTEN] Students discover: Add them up, then divide by total students.

[13-15 minutes] Group Sharing

[SAY] "Group 1, what midpoints did you get?"

[LISTEN] Students share: 149.5, 249.5, 349.5, 449.5, 549.5

[WRITE] midpoints on the board.

[SAY] "Group 2, what did you do next?"

[LISTEN] Students explain: Multiply each midpoint by its frequency.

[SAY] "Group 3, final step?"

[LISTEN] Students say: Add all fx values, divide by total students (75).

[SAY] "Excellent! You discovered the formula for grouped mean!"

## Phase 2: Structured Instruction (10 minutes)

[15-17 minutes] Grouped Data Definition

[SAY] "Grouped data is organized into class intervals with frequencies."

[SAY] "We use it for large datasets - imagine 1000 salaries!"

[WRITE] "Grouped data = intervals + frequencies"

[17-19 minutes] The Formula

[SAY] "The formula you discovered is:"

[WRITE] "$\bar{x} = \Sigma fx / \Sigma f$"

[SAY] "$\bar{x}$ (x-bar) is the mean"

[SAY] "$\Sigma fx$ is sum of (midpoint × frequency)"

[SAY] "Σf is sum of all frequencies (total data points)"

[19-21 minutes] Midpoint Formula

[WRITE] "Midpoint = (Lower + Upper) / 2"

[EXAMPLE] "For 100–199: (100 + 199) / 2 = 149.5"

[EXAMPLE] "For 20,000–29,999: (20,000 + 29,999) / 2 = 25,000 (rounded)"

[SAY] "Midpoint represents ALL values in that interval."

[21-25 minutes] Step-by-Step Process

[SAY] "Here are the 7 steps:"

[WRITE] "1. Create table: Interval | Midpoint (x) | Frequency (f) | fx"

[WRITE] "2. Calculate midpoints: (Lower + Upper) / 2"

[WRITE] "3. Multiply: midpoint × frequency = fx"

[WRITE] "4. Sum frequencies: Σf"

[WRITE] "5. Sum products: Σfx"

[WRITE] "6. Apply formula: Mean = Σfx / Σf"

[WRITE] "7. Verify: Σf = total observations"

[SAY] "IMPORTANT: This mean is an ESTIMATE, not exact!"

[SAY] "We assume all values in an interval are at the midpoint."

## Phase 3: Practice and Application (15 minutes)
[25-40 minutes] Worked Example 3.1.43 (Employee Salaries)

[SAY] "Example: 50 employees' monthly salaries. Calculate mean salary."

[DO] Display the salary table.

[SAY] "Step 1: Create calculation table. Let's do the first row together."

[WRITE] "Salary: 20,000–29,999"

[ASK] "What's the midpoint?"

[LISTEN] Students calculate: (20,000 + 29,999) / 2 ≈ 25,000

[WRITE] "Midpoint: 25,000"

[SAY] "Frequency is 3 employees."

[ASK] "What's fx?"

[LISTEN] Students calculate: 25,000 × 3 = 75,000

[WRITE] "fx: 75,000"

[SAY] "Now work with your partner on the next 3 rows."

[DO] Allow 3-4 minutes for students to calculate.

[DO] Complete the table together on the board.

[SAY] "Step 4: Sum frequencies."

[DO] Add up frequency column: 3+5+7+10+9+6+5+3+2 = 50

[WRITE] "$\Sigma f = 50$"

[SAY] "Step 5: Sum all fx values."

[DO] Add up fx column: 75,000 + 175,000 + ... + 210,000 = 3,070,000

[WRITE] "$\Sigma fx = 3,070,000$"

[SAY] "Step 6: Apply formula."

[WRITE] "$\bar{x} = \Sigma fx / \Sigma f = 3,070,000 / 50 = 61,400$"

[SAY] "Step 7: Verify. $\Sigma f = 50$ employees ✓"

[SAY] "Therefore, the mean salary is 61,400 KES."

## Phase 4: Assessment (5 minutes)
[40-45 minutes] Exit Ticket Review

[SAY] "Question 1: Tea factory weights. Calculate mean."

[DO] Quick guide: Midpoints are 14.5, 24.5, 34.5, 44.5, 54.5

[DO] $\Sigma f = 40$, $\Sigma fx = 1330$

[DO] Mean = 1330/40 = 33.25 kg

[SAY] "Question 2: Sacco fares. Calculate mean."

[DO] Quick guide: Midpoints are 74.5, 124.5, 174.5, 224.5

[DO] $\Sigma f = 100$, $\Sigma fx = 13,450$

[DO] Mean = 13,450/100 = 134.50 KES

[SAY] "Remember: Grouped mean is an ESTIMATE! Always include units!"

[DO] Collect exit tickets.

## Teaching Tips
- Emphasize that grouped mean is an estimate, not exact.
- Always verify Σf equals total number of observations.
- Use calculators freely - focus on understanding, not arithmetic.
- Show the complete calculation table - visual organization helps.
- Remind students to include units (KES, kg, etc.) in final answer.
- Use real Kenyan contexts: salaries, matatu fares, tea deliveries.
- Connect to previous lesson: ungrouped mean used exact values, grouped uses midpoints.

## Common Student Errors to Watch For
- Forgetting to calculate midpoints - using interval boundaries instead.
- Not multiplying midpoint by frequency - just averaging midpoints.
- Confusing Σf with Σfx - using wrong values in formula.
- Calculation errors with large numbers (salaries).
- Not checking that Σf equals total observations.
- Forgetting to include units in final answer.
- Midpoint calculation errors (especially with ranges like 20,000–29,999).
- Thinking the mean is exact (not understanding it's an estimate).