Step by step guide_Addition Rule

Pre-Class Preparation

- Prepare group assignments (3-4 students per group).
- Have playing cards ready for demonstrations.
- Prepare Venn diagram templates on large paper.
- Write both formulas on the board or prepare slides.
- Have worked examples ready on cards or slides.
- Prepare decision flowchart: Mutually exclusive vs Non-mutually exclusive.
- Have chart paper for group work.

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

[0-2 minutes] Introduction

[SAY] "Good morning! Today we learn about the ADDITION RULE in probability. This helps us find the probability of 'either/or' events."

[SAY] "For example: What's the probability of passing Math OR English? Drawing a heart OR a club?"

[2-3 minutes] Group Formation

[DO] Divide students into groups of 3-4.

[DO] Distribute chart paper and markers.

[3-5 minutes] Explain the Activity

[SAY] "Here's your problem: A student has 75% chance of passing Math, 60% chance of passing English, and 50% chance of passing BOTH."

[SAY] "Find the probability that the student passes either Mathematics or English."

[SAY] "Work together. You have 10 minutes. Then compare with other groups."

[5-13 minutes] Group Work

[DO] Circulate among groups, observing their approaches.

[LISTEN] to their reasoning.

[ASK] "Did you just add 75% + 60%? What did you get?"

[ASK] "What does 'passing both' mean? Can a student pass both subjects?"

[DO] Note if groups recognize the overlap issue.

[DO] Guide: "If you add 75 + 60, you get 135%. Can probability be more than 100%?"

[13-15 minutes] Group Sharing

[SAY] "Let's share. Group 1, what answer did you get?"

[LISTEN] to different answers (some may say 135%, others 85%).

[SAY] "Group 2, did you use the 'passing both' information? How?"

[LISTEN] to explanations.

[SAY] "Interesting! Some groups added, some subtracted. Let's see the correct approach."

Phase 2: Structured Instruction (10 minutes)

[15-17 minutes] Introduce the Addition Law

[SAY] "The addition law helps us find P(A or B) - the probability of either event happening."

[SAY] "But there are TWO versions depending on the type of events!"

[17-19 minutes] Mutually Exclusive Events

[SAY] "First: Mutually exclusive events. These CANNOT happen at the same time."

[WRITE on board] "Mutually Exclusive: P(A or B) = P(A) + P(B)"

[EXAMPLE] "Drawing a heart or a club. Can a card be both? No! So just ADD."

[19-22 minutes] Non-Mutually Exclusive Events

[SAY] "Second: Non-mutually exclusive events. These CAN happen at the same time."

[WRITE on board] "Non-Mutually Exclusive: P(A or B) = P(A) + P(B) - P(A and B)"

[SAY] "Why subtract? Because when we add P(A) and P(B), we count the overlap TWICE!"

[DO] Draw Venn diagram on board showing two overlapping circles.

[SAY] "This middle part - the overlap - gets counted in P(A) AND in P(B). So we subtract it once."

[22-25 minutes] Decision Guide

[SAY] "How do we decide which formula to use?"

[WRITE on board] "Ask: Can both events happen at the same time?"

[SAY] "If NO → Just add. If YES → Add then subtract the overlap."

[EXAMPLE] "Passing Math and English - can you pass both? YES! So use the second formula."

Phase 3: Practice and Application (15 minutes)

[25-30 minutes] Worked Example 3.2.18 (Cards)

[SAY] "Example 1: A deck has 52 cards. 13 hearts, 13 clubs. P(heart or club) = ?"

[ASK] "Can a card be both a heart AND a club?"

[LISTEN] Students say: No!

[SAY] "Correct! Mutually exclusive. So we just add."

[DO] Calculate together:

[WRITE] "P(Heart) = 13/52, P(Club) = 13/52"

[WRITE] "P(Heart or Club) = 13/52 + 13/52 = 26/52 = 1/2"

[SAY] "Answer: 1/2 or 50%"

[30-37 minutes] Anchor Activity Solution

[SAY] "Now let's solve our anchor problem correctly."

[SAY] "P(Math) = 0.75, P(English) = 0.60, P(both) = 0.50"

[ASK] "Can a student pass both? Are these mutually exclusive?"

[LISTEN] Students say: Not mutually exclusive!

[SAY] "Right! So we use the second formula."

[DO] Calculate together:

[WRITE] "P(Math or English) = P(Math) + P(English) - P(both)"

[WRITE] "= 0.75 + 0.60 - 0.50"

[WRITE] "= 1.35 - 0.50 = 0.85"

[SAY] "Answer: 0.85 or 85%"

[SAY] "See? If we just added 0.75 + 0.60 = 1.35, that's wrong! We counted students who pass both TWICE."

Phase 4: Assessment (5 minutes)

[37-39 minutes] Exit Ticket Review

[SAY] "Question 1 - P(A or B) in a class with 5 grades?"

[ASK] "Can you get both A and B? Are they mutually exclusive?"

[LISTEN] Students say: Yes, mutually exclusive!

[SAY] "So just add: P(A) + P(B) = 1/5 + 1/5 = 2/5"

[SAY] "Question 3 - 15 like math, 10 like chemistry, 5 like both, out of 30 students."

[ASK] "Can you like both? Mutually exclusive?"

[LISTEN] Students say: Not mutually exclusive!

[SAY] "Right! P(Math or Chem) = 15/30 + 10/30 - 5/30 = 20/30 = 2/3"

[39-40 minutes] Closure

[SAY] "Excellent! Today we learned the addition rule for probability."

[SAY] "Key question: Can both happen at the same time?"

[SAY] "If NO → P(A or B) = P(A) + P(B)"

[SAY] "If YES → P(A or B) = P(A) + P(B) - P(A and B)"

[DO] Collect exit tickets.

Teaching Tips

- Always ask: "Can both events happen at the same time?" to decide which formula.
- Use Venn diagrams to visualize overlapping vs non-overlapping events.
- Emphasize that probabilities cannot exceed 1 (or 100%).
- Use playing cards for concrete, hands-on demonstrations.
- Connect to real-world scenarios: passing exams, sports, weather.
- Remind students that "or" in probability means "either one or the other or both".
- Practice identifying event types before calculating probabilities.

Common Student Errors to Watch For

- Always adding probabilities without checking if events can happen together.
- Forgetting to subtract the overlap for non-mutually exclusive events.
- Thinking "or" means "only one, not both" (it includes both).
- Getting probabilities greater than 1 and not recognizing the error.
- Confusing "and" (multiplication rule) with "or" (addition rule).
- Not identifying whether events are mutually exclusive before choosing formula.