Step-by-Step Presentation Script

Sines and Cosines of Complementary Angles

Pre-Class Preparation

- Scientific calculators for each pair
- Printed sine and cosine tables
- Rulers and pencils
- Chart paper for group work
- Prepared examples on board
- Right triangle diagrams

Minutes 0-2: Introduction

[SAY] Good morning! Today we're exploring a special relationship between sine and cosine functions.

[DO] Draw a right triangle on the board with angles labeled.

[ASK] In a right triangle, if one angle is 30°, what's the other acute angle? [60°]

[ASK] What's 30° + 60°? [90°]

[SAY] When two angles add up to 90°, we call them complementary angles. Today we'll discover something amazing about their sine and cosine values!

Minutes 2-17: Anchor Activity

[DO] Divide class into pairs. Distribute sine/cosine tables, calculators, and activity sheets.

Task 1: Reading Values (5 minutes)

[SAY] Work with your partner. Use the tables to find the values of these angle pairs.

[WRITE] On board: (a) sin 40° and cos 50° (b) cos 30° and sin 60° (c) sin 70° and cos 20° (d) sin 80° and cos 10°

[DO] Circulate. Ask: What values did you get? Are they the same or different?

Task 2: Pattern Recognition (3 minutes)

[ASK] What do you notice about each pair of values?

[LISTEN] Students should notice: sin 40° = cos 50° (both ≈ 0.643)

Task 3: Class Discussion (5 minutes)

[DO] Call on 2-3 pairs to share observations.

[ASK] What's the sum of 40° and 50°? [90°] What about 30° and 60°? [90°]

[SAY] Excellent! You've discovered that when two angles add to 90°, the sine of one equals the cosine of the other!

Minutes 17-27: Structured Instruction

[WRITE] On board: Complementary Angles

[SAY] Complementary angles are two angles whose sum is 90°.

[WRITE] On board: The Co-Function Identity

- $\sin(90° - \theta) = \cos\theta$
- $\cos(90° - \theta) = \sin\theta$

[SAY] This is why it's called 'co-sine' – it's the sine of the complementary angle!

[WRITE] General Rule: If $x + y = 90°$, then $\sin x = \cos y$ and $\cos x = \sin y$

[SAY] This gives us a powerful solving strategy. If you see $\sin A = \cos B$, you know $A + B = 90°$!

Minutes 27-37: Worked Examples

Example 1: Finding Angles (8 minutes)

[WRITE] Problem: Find α if $\cos 45° = \sin\alpha$

[ASK] If $\cos 45° = \sin\alpha$, what does that tell us about the angles?

[LISTEN] They're complementary!

[WRITE] $45° + \alpha = 90°$, so $\alpha = 45°$

[WRITE] Problem: Find β if $\cos\beta = \sin 5\beta$

[DO] Work through together: $\beta + 5\beta = 90°$, $6\beta = 90°$, $\beta = 15°$

Example 2: Complementary Angles with Ratios (5 minutes)

[WRITE] Problem: A and B are complementary. If $A = \frac{1}{2}B$, find $\sin A$ and $\cos A$

[ASK] What equation can we write? [$A + B = 90°$]

[DO] Substitute $B = 2A$: $A + 2A = 90°$, $3A = 90°$, $A = 30°$

[WRITE] $\sin 30° = 0.5000$, $\cos 30° = 0.8660$

Individual Practice (2 minutes)

[DO] Students work on similar problem independently

Minutes 37-40: Exit Ticket

[DO] Distribute exit ticket with 4 questions

[SAY] Complete individually. Show all steps. Remember the complementary angle relationship!

[DO] Collect exit tickets. Quick review of question 3 if time permits.

Teaching Tips

- Emphasize that complementary means 'adds to 90°'
- Use right triangle diagrams to visualize relationships
- Connect 'co-sine' etymology to help memory
- Stress the solving strategy: sin A = cos B means A + B = 90°
- Allow calculators for verification
- Use real-world examples (ladders, ramps, buildings)

Common Student Errors

- Thinking complementary means 'equal' instead of 'sum to 90°'
- Confusing complementary (90°) with supplementary (180°)
- Forgetting to solve for the variable after setting up equation
- Mixing up which angle gets which function
- Not recognizing when to apply the relationship
- Calculation errors when solving algebraic equations