

Age problems represent standard linear systems that model dynamic values changing across distinct intervals of time.

The most vital concept to understand when analyzing an age problem is the **Invariant Time-Shift Principle**. This principle states that as time passes or rewinds, **every individual ages or grows younger by the exact same number of years**. If you subtract 4 years from one person's age to look at the past, you must subtract exactly 4 years from the other person's age as well.

The clearest textbook method for solving any age problem without mixing up temporal relationships is to construct an analytical data matrix.

Dely is now twice as old as Tom. Four years ago, Dely was three times as old as Tom then. How old is Dely?

Step 1: Define Variables in the Present State

Let Tom's present age be represented as x .

The problem states: "*Dely is now twice as old as Tom.*" Therefore, Dely's present age is $2x$.

Step 2: Establish the Past State Expressions

Move back in time to the condition "*Four years ago...*" Subtract 4 from both of their present age expressions:

- **Tom's Age 4 Years Ago:** $x - 4$
- **Dely's Age 4 Years Ago:** $2x - 4$

Step 3: Construct the Model Equation

The second sentence states: "*Four years ago, Dely was three times as old as Tom then.*" Write this exact comparison as an algebraic equation using our past expressions:

$$\text{Dely's Past Age} = 3 \cdot (\text{Tom's Past Age})$$

$$2x - 4 = 3(x - 4)$$

Step 4: Solve for x

$$x = 8 \text{ years old}$$

Step 5: Answer the Explicit Target Request

Always check exactly what the problem is asking for before selecting your choice.

- Tom's present age = $x = 8$ years old
- Dely's present age = $2x = 2(8) = 16$ years old