

In business mathematics and engineering economics, **percentage markdown and discount problems** model retail pricing changes, depreciation, and tax adjustments.

A **markdown** is a percentage reduction applied directly to the **original price** (also known as the list price, base price, or marked price) to incentivize sales or liquidate inventory. The money remaining after subtracting this markdown is the **sale price** (or discounted price).

The primary equation governing markdown transitions is defined as:

$$\text{Sale Price} = \text{Original Price} - \text{Markdown Amount}$$

Since the markdown amount is calculated as a direct percentage of the original price, the formula can be expanded into:

$$\text{Sale Price} = \text{Original Price} - (\text{Original Price} \cdot \text{Markdown Rate})$$

Factoring out the original price variable yields the standard structural textbook equation:

$$\text{Sale Price} = \text{Original Price} \cdot (1 - \text{Markdown Rate})$$

*Furniture having 18% markdown sale. What was the original price of the table whose sale price is P7000?*

- **Sale Price:** ₱7,000
- **Markdown Rate:** 18% = 0.18

Unknown: Find the Original Price.

### **Step 1: Substitute Values into the Governing Formula**

$$₱7,000 = \text{Original Price} \cdot (1 - 0.18)$$

$$₱7,000 = \text{Original Price} \cdot (0.82)$$

### **Step 2: Isolate the Original Price Variable**

This means the sale price of ₱7,000 represents exactly **82%** of the original price.

$$\text{Original Price} = \frac{₱7,000}{(1-0.18)}$$

$$\text{Original Price} = ₱8,536.6$$

### The One-Line Direct Division Shortcut

Whenever you are given a discounted price and need to scale backwards to find the higher original price, you can find the answer in a single step on your calculator. Simply divide the discounted price by the decimal complement of the markdown rate:

$$\text{Original Price} = \frac{\text{Sale Price}}{1 - \text{Markdown Rate}}$$

### Reverse Engineering from the Choices (Backsolving)

If you forget the formula completely during the exam, you can systematically test each multiple-choice option by subtracting 18% from it to see which one leaves you with exactly ₱7,000.

- **Test Option (b): ₱8,536.6**
  - Compute the markdown amount:  $8,536.6 \times 0.18 = 1,536.588$
  - Subtract the markdown from the option:  $8,536.6 - 1,536.588 = 6,999.912 \approx 7,000$

Since option **b** successfully lands on the target sale price, it is verified as the correct option.