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Mary spends all of her income on books and bread. The price of a loaf of bread is $2, and the price of a book is $10. Mary's weekly income is $100. Draw Mary`s budget line. What is the opportunity cost of a book? bread? Would the opportunity cost of bookchange if the prices of book and bread doubled?

Application: Mary's Budget Line (Books and Bread)

- Price of bread = $2 per loaf
- Price of book = $10 per book
- Mary's weekly income = $100

Mary's budget line equation is : **($2 × quantity of bread) + ($10 × quantity of books) = 100**

Intercepts for budget line :

If Mary spends all income on bread : $\frac{\$100}{2}$ = 50 loaves

If Mary spends all income on books : $\frac{\$100}{10}$ = 10 books

Opportunity cost

Opportunity cost of 1 book : How many loaves of bread must be given up for one book ?

$\frac{Price\ of\ book}{Price\ of\ bread} = \frac{\$10}{\$2}$ = 5 loaves of bread

Opportunity cost of 1 loaf bread :

$\frac{2}{10}$ = 0.2 of a book (or 1 book costs 5 loaves)

Effect if prices of both goods doubled:

- New price of bread = $4
- New price of book = $20
- Income stays at $100

New budget : **($4 × bread) + ($20 × books) = $100**

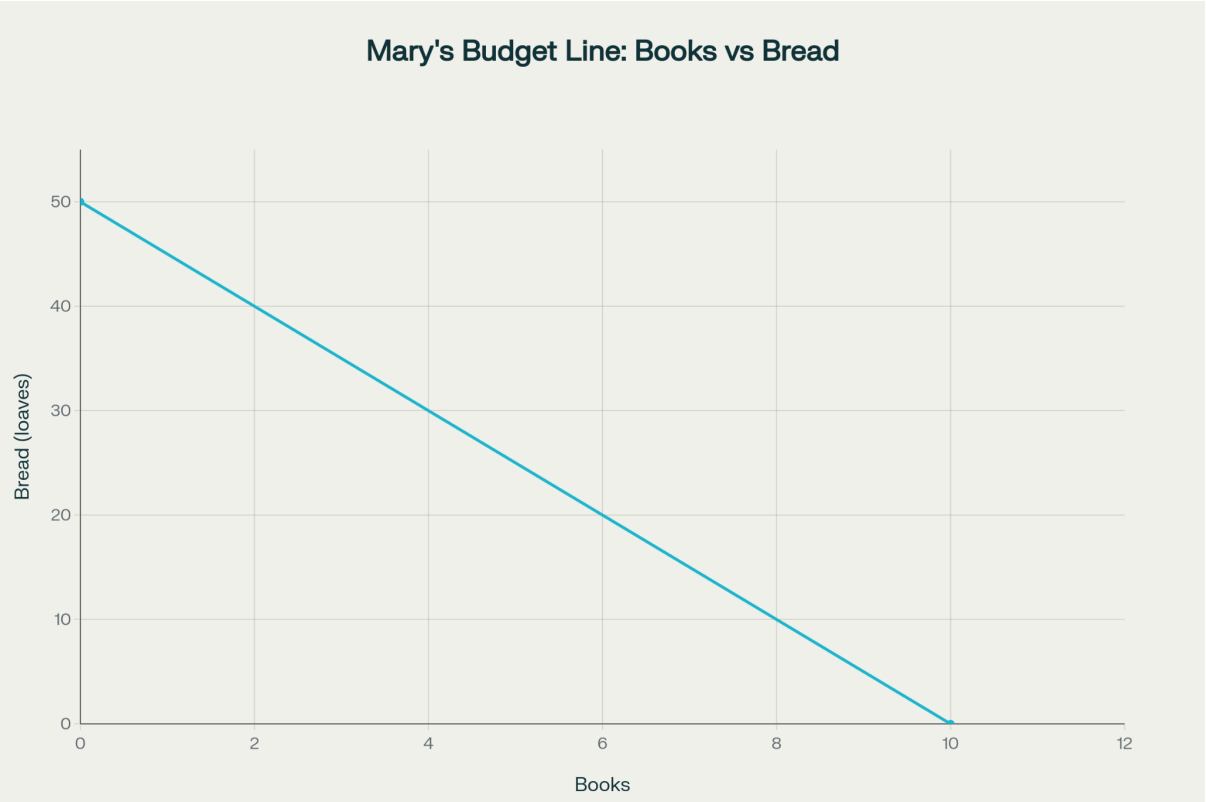
Bread intercept : $\frac{\$100}{\$4}$ = 25 loaves

Books intercept : $\frac{\$100}{\$20}$ = 5 books

Opportunity cost remains the same ratio :

$\frac{\$20}{\$4}$ = 5 loaves per book, so the opportunity cost per book does not change even though prices doubled (price ratio remains constant).

Mary’s Budget Line Graph



Table

Parameter	Original Prices	Doubled Prices
Bread Price	$2 per loaf	$4 per loaf
Book Price	$10 per book	$20 per book
Income	$100	$100
Bread intercept (max loaves)	50 loaves	25 loaves
Book intercept (max books)	10 books	5 books
Opportunity cost (bread/book)	5 loaves per book	5 loaves per book

This shows how the budget line shifts with price changes and why the opportunity cost remains constant when the price ratio between goods remains unchanged.

New question :

Effect of prices if only bread doubled:

- New price of bread = $4
- New price of book = $10
- Income stays at $100

New budget : **($4 × bread) + ($10 × books) = $100**

Bread intercept : $\frac{\$100}{\$4}$ = 25 loaves

Books intercept : $\frac{\$100}{\$10}$ = 10 books

Opportunity cost increased:

$\frac{\$10}{\$4}$ = 2.5 loaves per book, so the opportunity cost per book does change in fact increase because the price of books does not change, only the price of bread doubled. The more the price of bread rises, the more books you're sacrificing for each loaf.