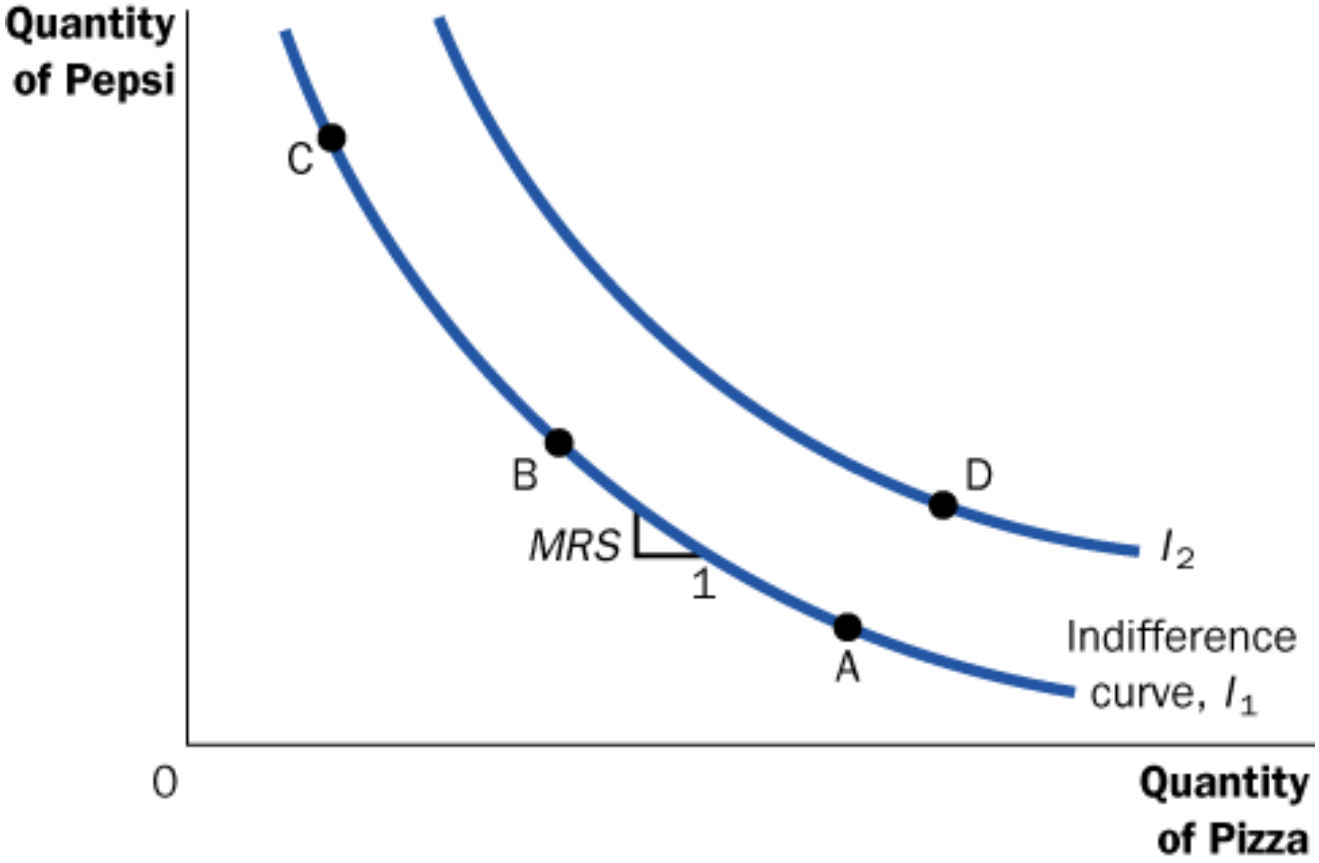
Recap (Consumer's Behavior)

- Before midterm, we discussed about two approaches in understanding consumer's preferences:
  - Cardinal approach – utility
  - Ordinal approach – indifference curve, MRS

- Next sub-topics:
  - Budget line (or budget constraint)
  - Consumer's equilibrium (or consumer's optimization)
  - Change in equilibrium when price changes
  - Demand curve derivation
  - Applications

Part III. Consumer's Equilibrium

- Recall: **Indifference curve** shows consumption bundles that give the consumer the same level of satisfaction.



Extra Notes on Indifference Curve (1)

- MRS is the slope of the indifference curve, and MRS is diminishing (in absolute value) as X increases.
- At any point on indifference curve, the slope is $\frac{\Delta Y}{\Delta X}$.
- As the consumer consumes more X and reduces consumption of Y, her utility changes by:

$$\Delta X > 0 \rightarrow \Delta U_x \approx MU_x \times \Delta X$$

$$\Delta Y < 0 \rightarrow \Delta U_y \approx MU_y \times \Delta Y$$

- But on the an indifference curve, the utility is the same:

$$\Delta U = \rightarrow \Delta U_x + \Delta U_y = 0$$

Extra Notes on Indifference Curve (2)

- So,

$$\Delta U_x = -\Delta U_y$$

$$\mathrm{MU_x}\Delta X \approx -\mathrm{MU_y}\Delta Y$$

➔ $$\frac{\Delta Y}{\Delta X} \approx -\frac{MU_x}{MU_y}$$

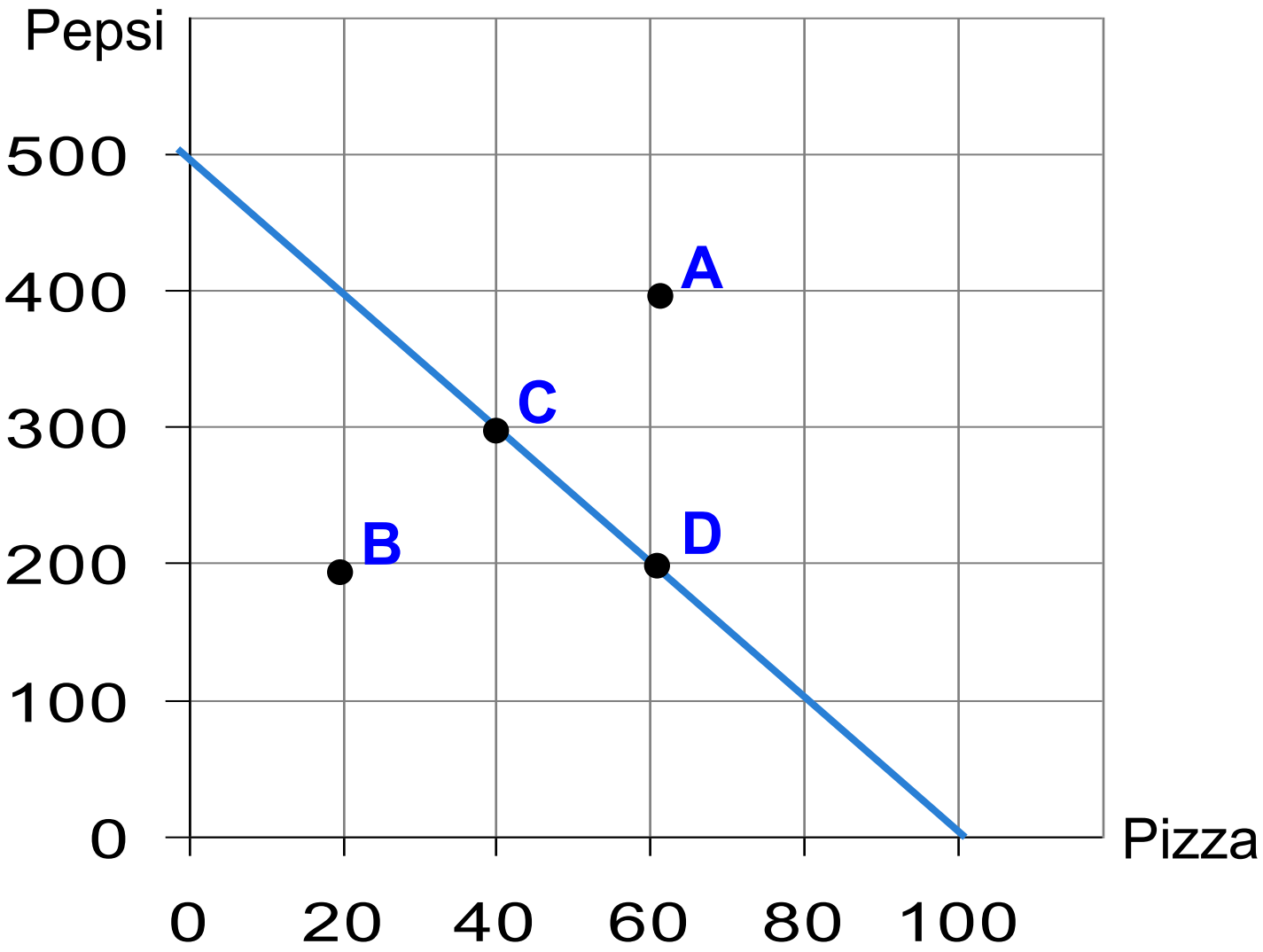
➔ $$\frac{dY}{dX} = -\frac{MU_x}{MU_y}$$: MRS

Budget Constraint

- **Budget constraint (or budget line)**: the limit on the consumption bundles that a consumer can afford.
  - It shows all combinations (bundles) of the two goods that the consumer can afford to buy.
- Consider the case of 2 goods: Pizza (X) and Pepsi (Y). Suppose P_x = \$10, P_y = \$2, and budget (B) = \$1000.
- The budget line can be written as:

$$P_x X + P_y Y = B$$

Graph: Budget Constraint



Slope of the Budget Constraint

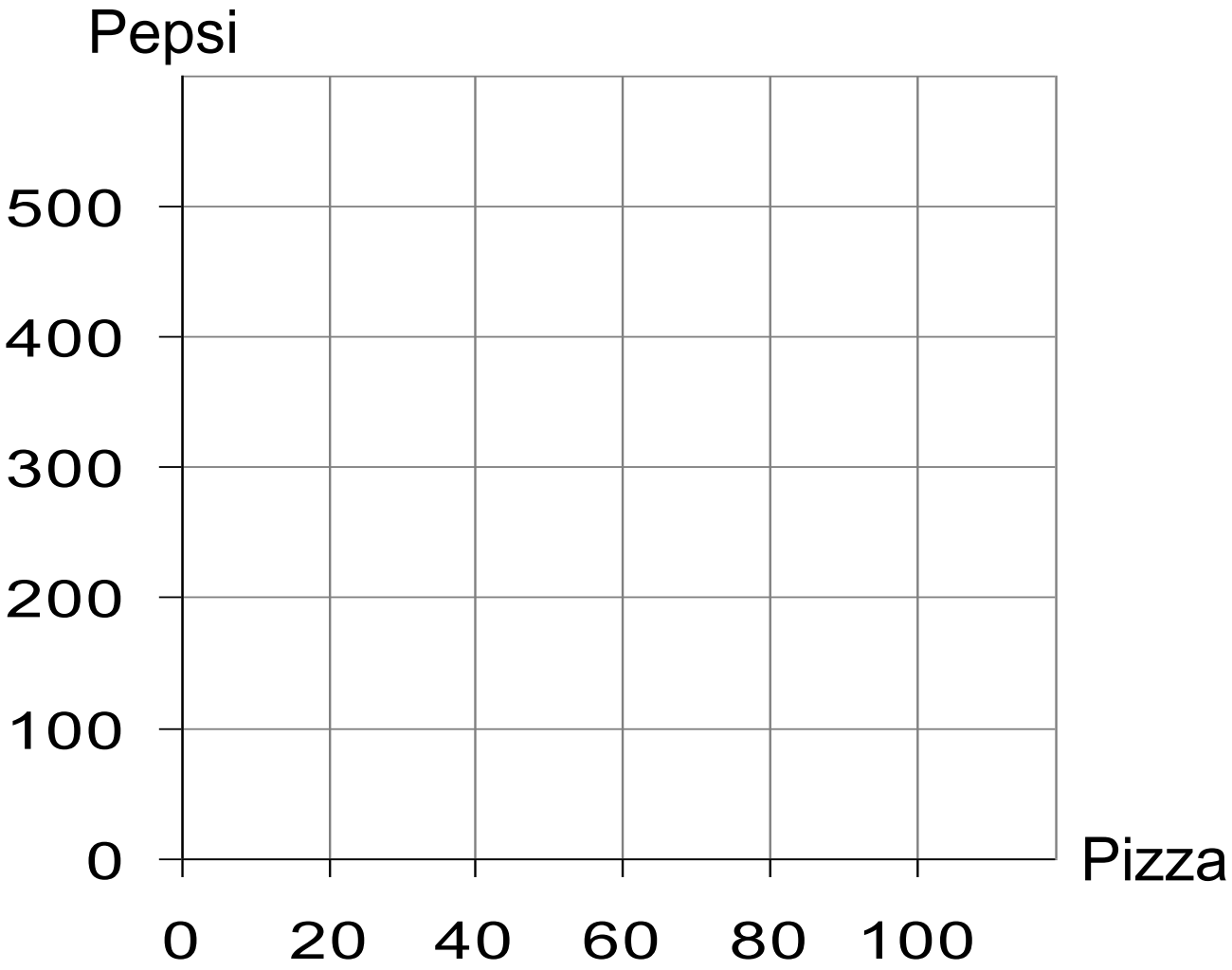
- The slope of the budget constraint equals:
  - the rate at which the consumer can trade Pepsi for pizza
  - the opportunity cost of pizza in terms of Pepsi
  - the relative price of pizza.

That is:

$$Slope\ of\ Budget\ line = -\frac{P_x}{P_y}$$

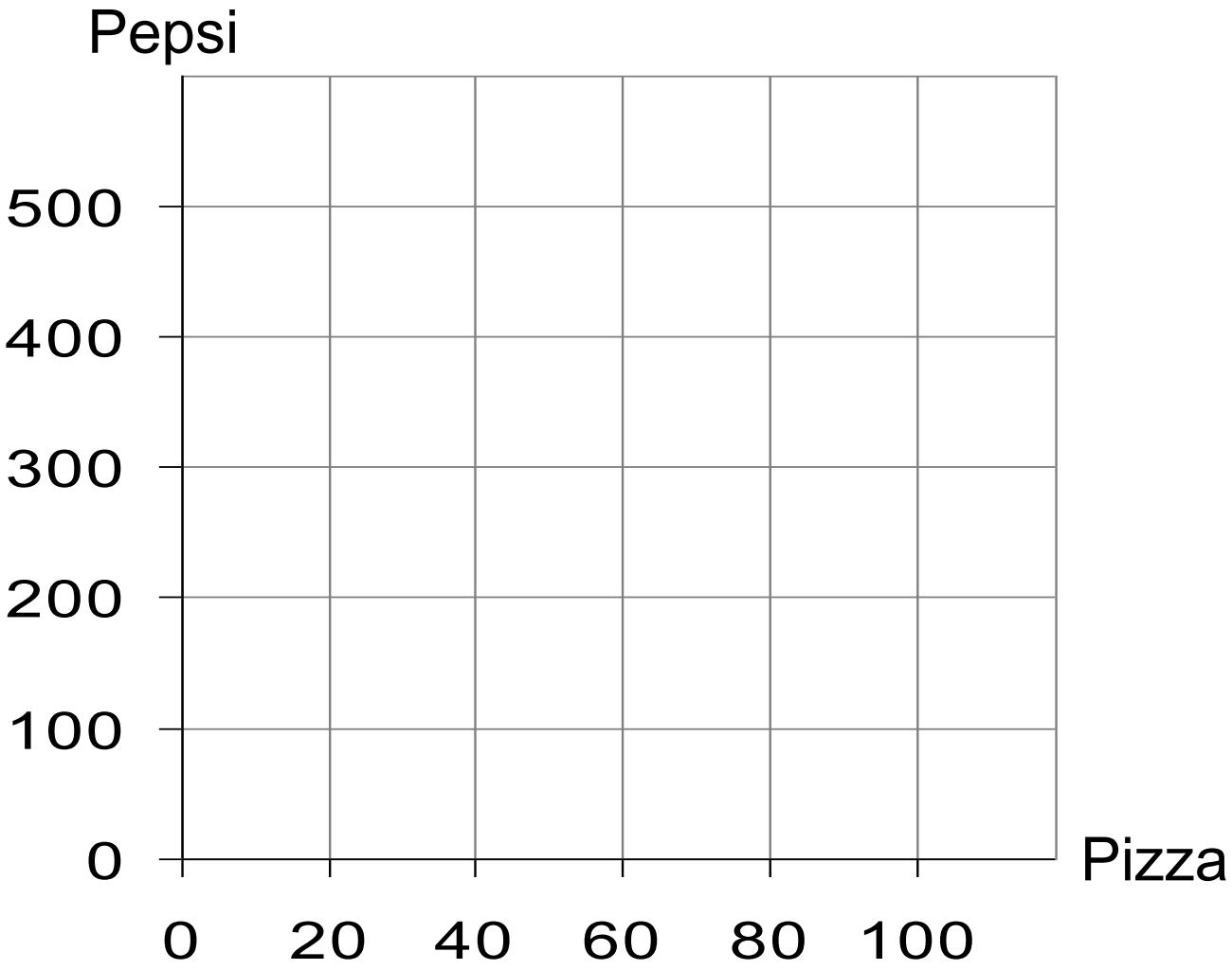
Change in Budget Constraint: Higher Income

- Suppose budget increases to $1200.



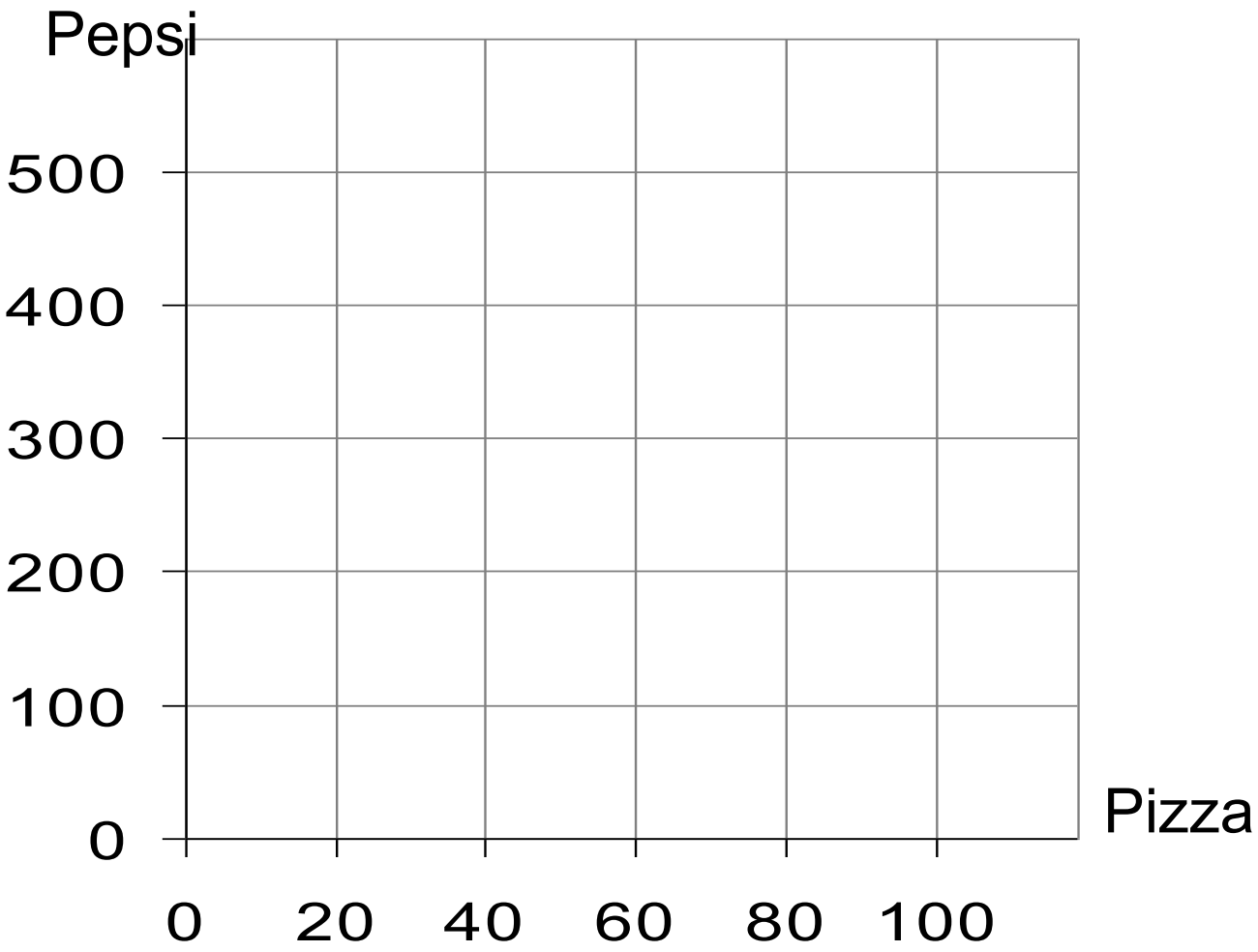
Change in Budget Constraint: Px changes.

- Suppose P_x increases from \$10 to \$12.5.



Change in Budget Constraint: Px & Py change by the same proportion.

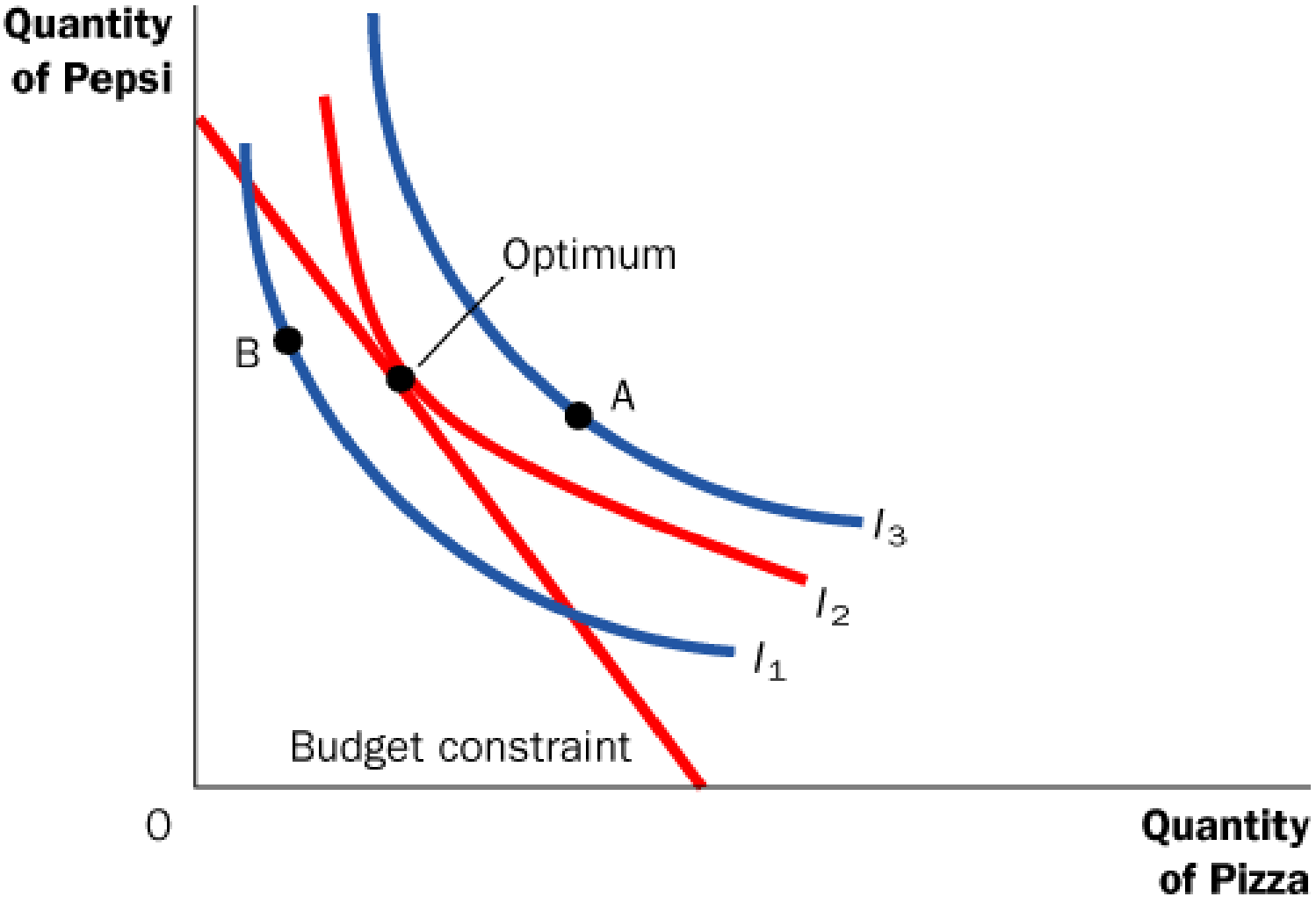
- Suppose $P'_x = \$12.5$ and $P'_y = \$2.5$.



Consumer's Problem: Optimization

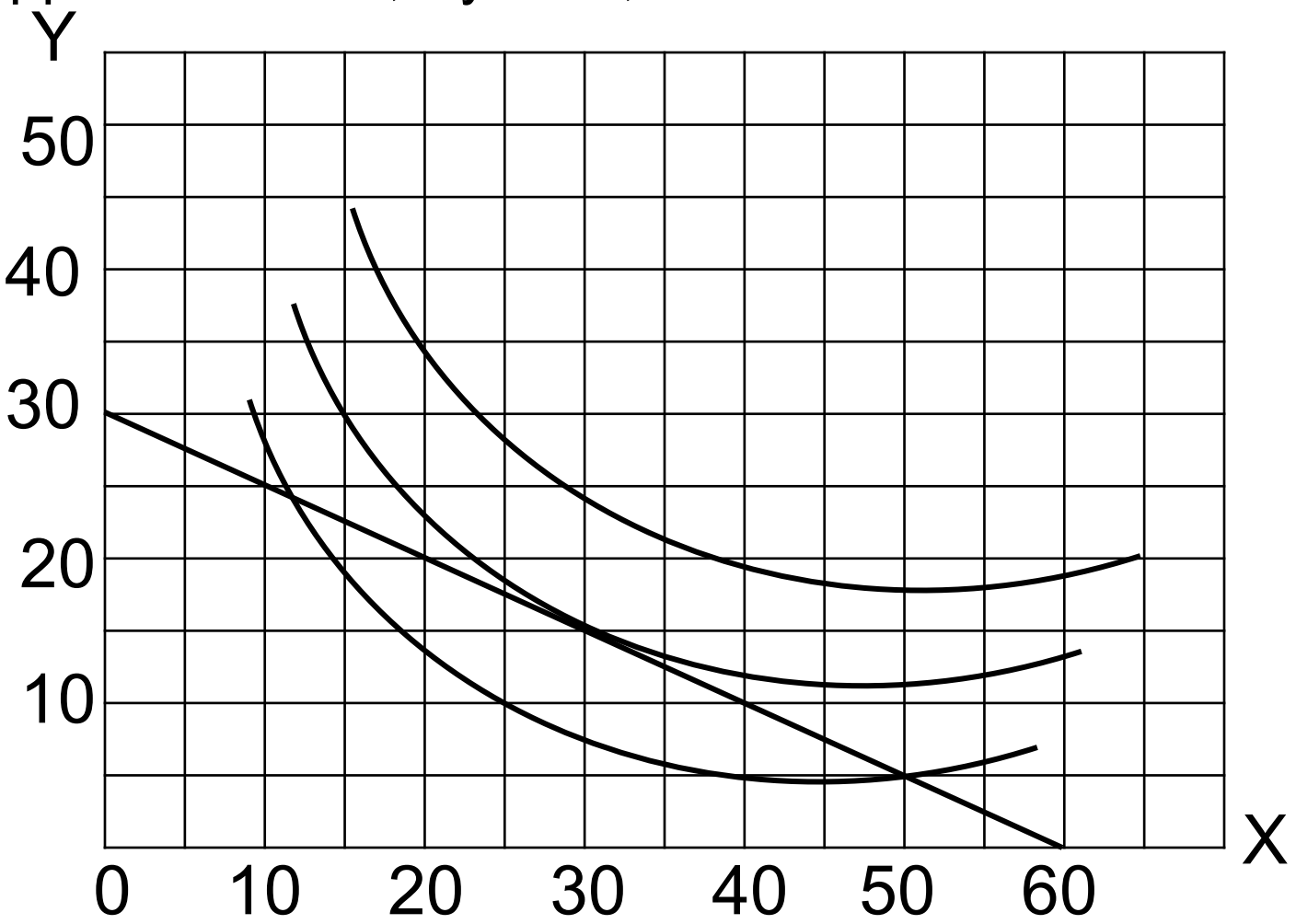
- Consumer's problem is to maximize his/her utility (i.e. satisfaction) under the budget constraint.
- The **optimal bundle** is at the point where the budget constraint touches the highest indifference curve.
  - i.e., the indifference curve and budget constraint have the same slope.
- Since the slope of IC is the MRS and the slope of the budget constraint is the relative price, the optimal bundle is where: $\frac{P_x}{P_y} = \frac{MU_x}{MU_y}$

Graph: Consumer's Optimal Choice



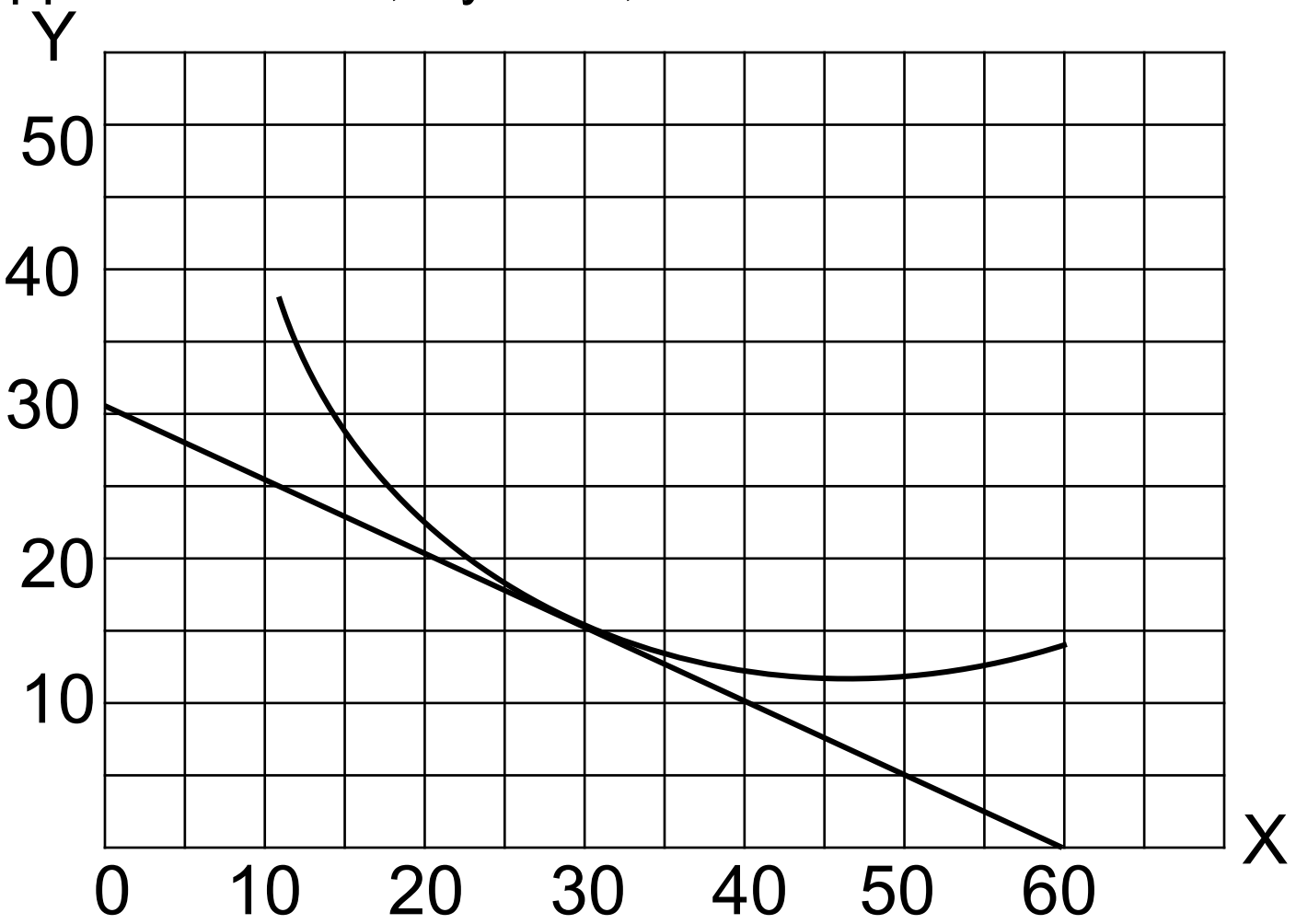
Example: Optimization

- Suppose Px = $2, Py = $4, and B = 120.



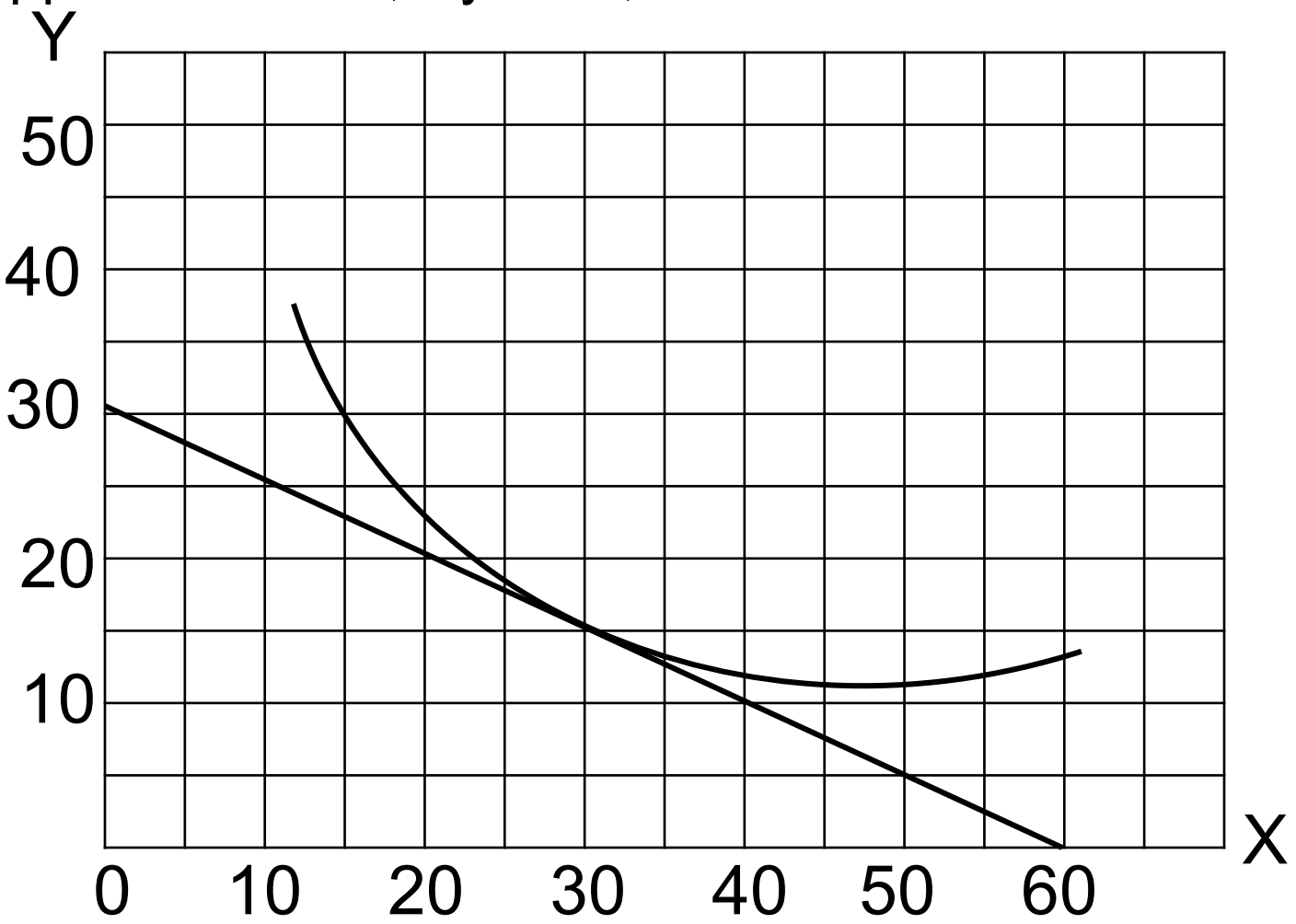
Example: Effect of Income Increase

- Suppose Px = $2, Py = $4, and B = 150.



Example: Effect of Income Reduction

- Suppose Px = $2, Py = $4, and B = 90.

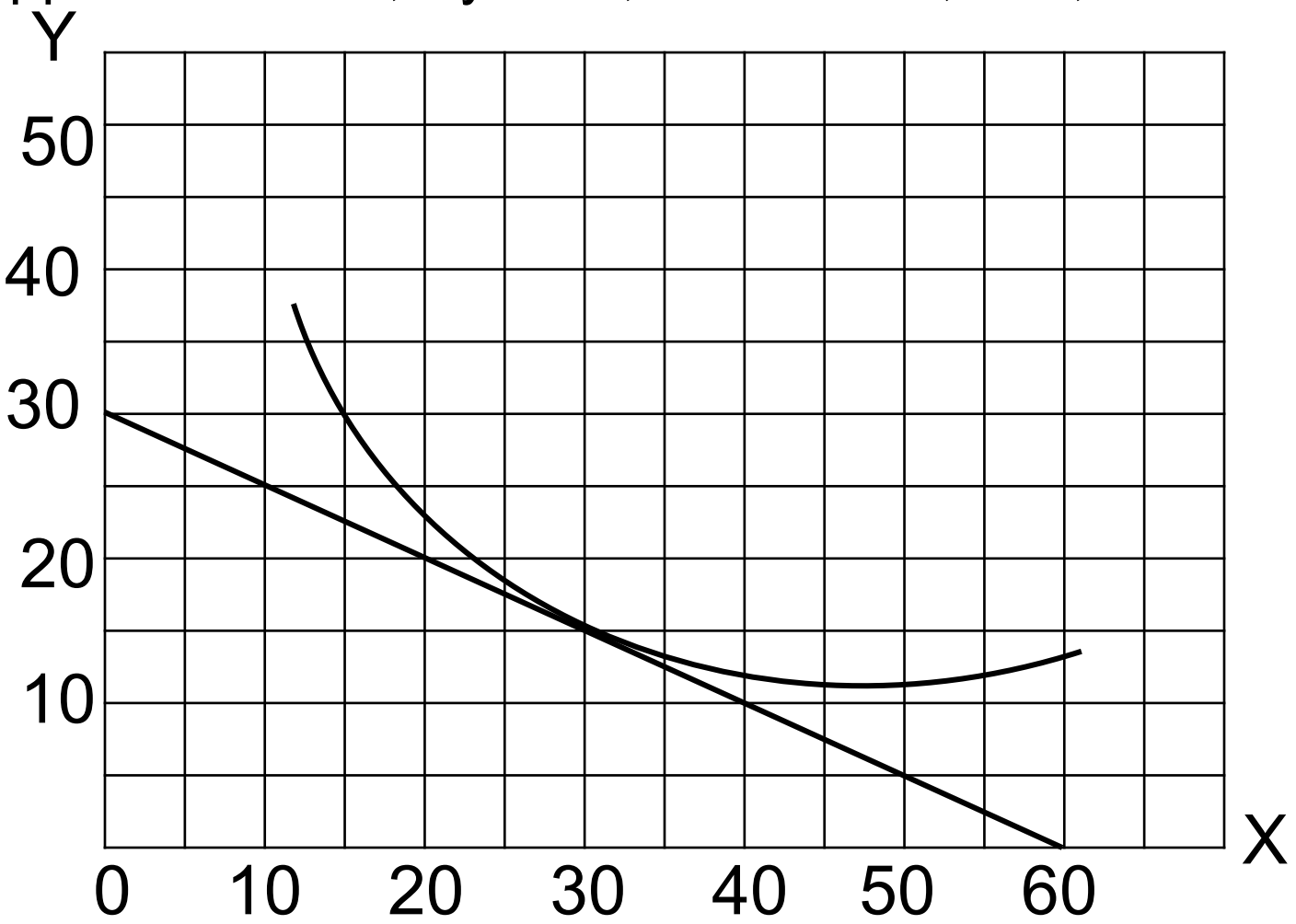


Income Consumption Curve (ICC)

- A change in income, *ceteris paribus*, will shift the consumer's budget constraint.
- For each level of income, there will be a utility maximizing points where IC is tangent to the relevant budget line.
- **Income Consumption Curve (ICC)** is the line that connects all the utility-maximizing points for different levels of income, given prices Px and Py constant.
- I.e. , ICC shows how the consumer's purchases react to a change in money income with relative prices being held constant.

Graph: ICC

- Suppose Px = $2, Py = $4, and B = 90, 120, 150.

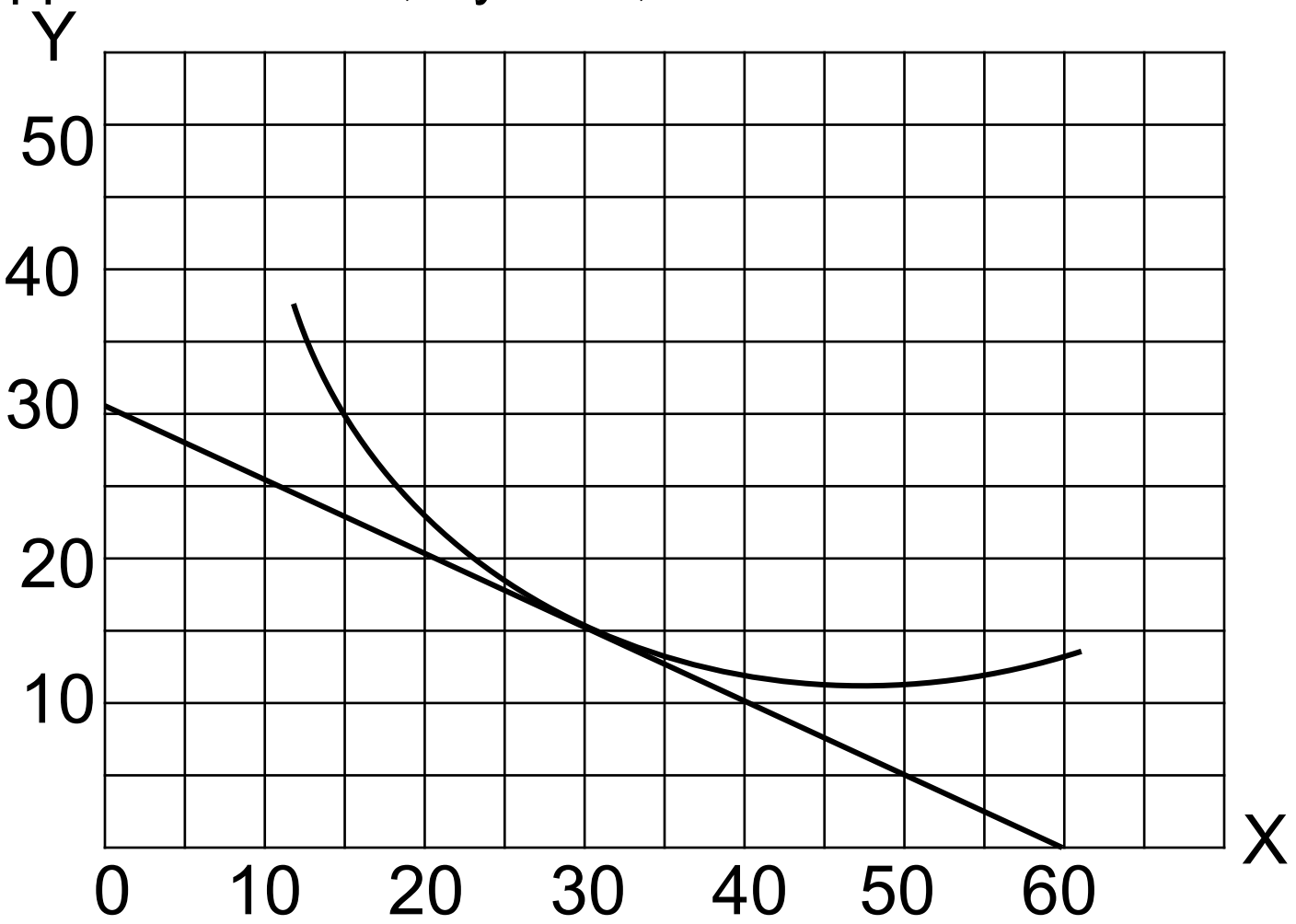


Exercise: Inferior good

- Suppose X is a normal good but Y is an inferior good.
- Use a diagram to show the effects of an increase in income on the consumer's optimal bundle of X and Y.

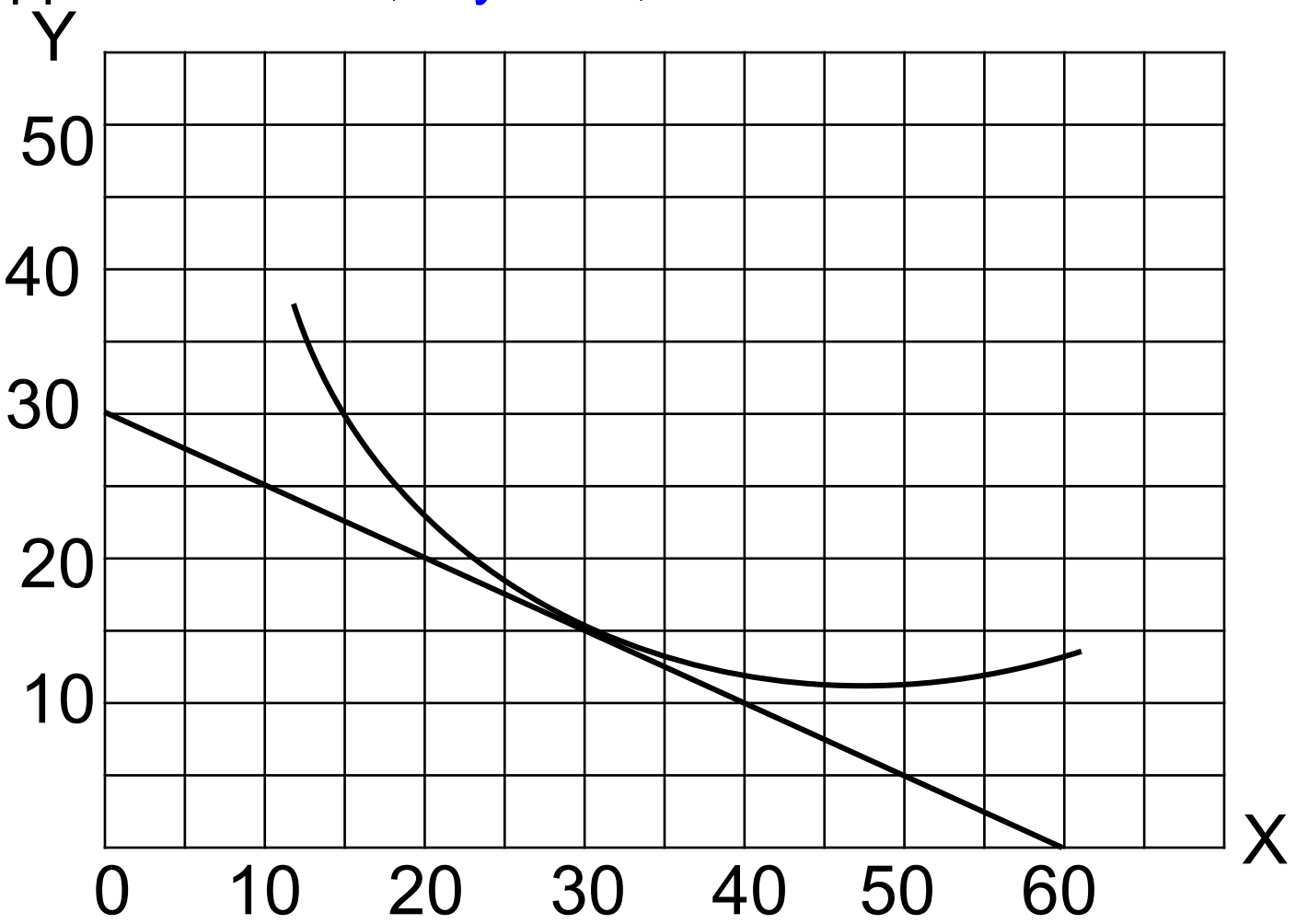
Example: Effect of Price Change (1)

- Suppose P'x = $3, Py = $4, and B = 120.



Example: Effect of Price Change (2)

- Suppose Px = $2, P'y = $6, and B = 120.

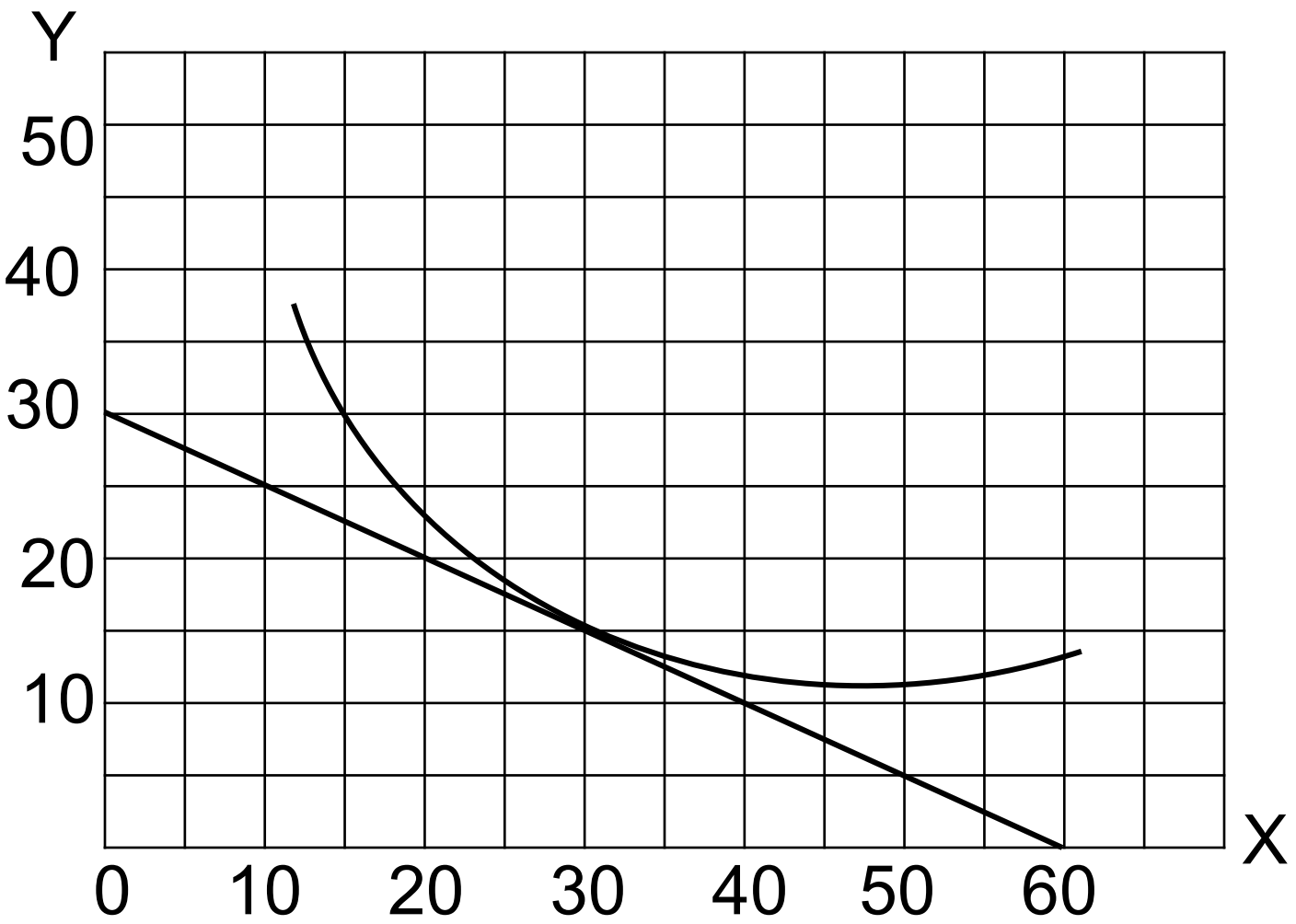


Price Consumption Curve

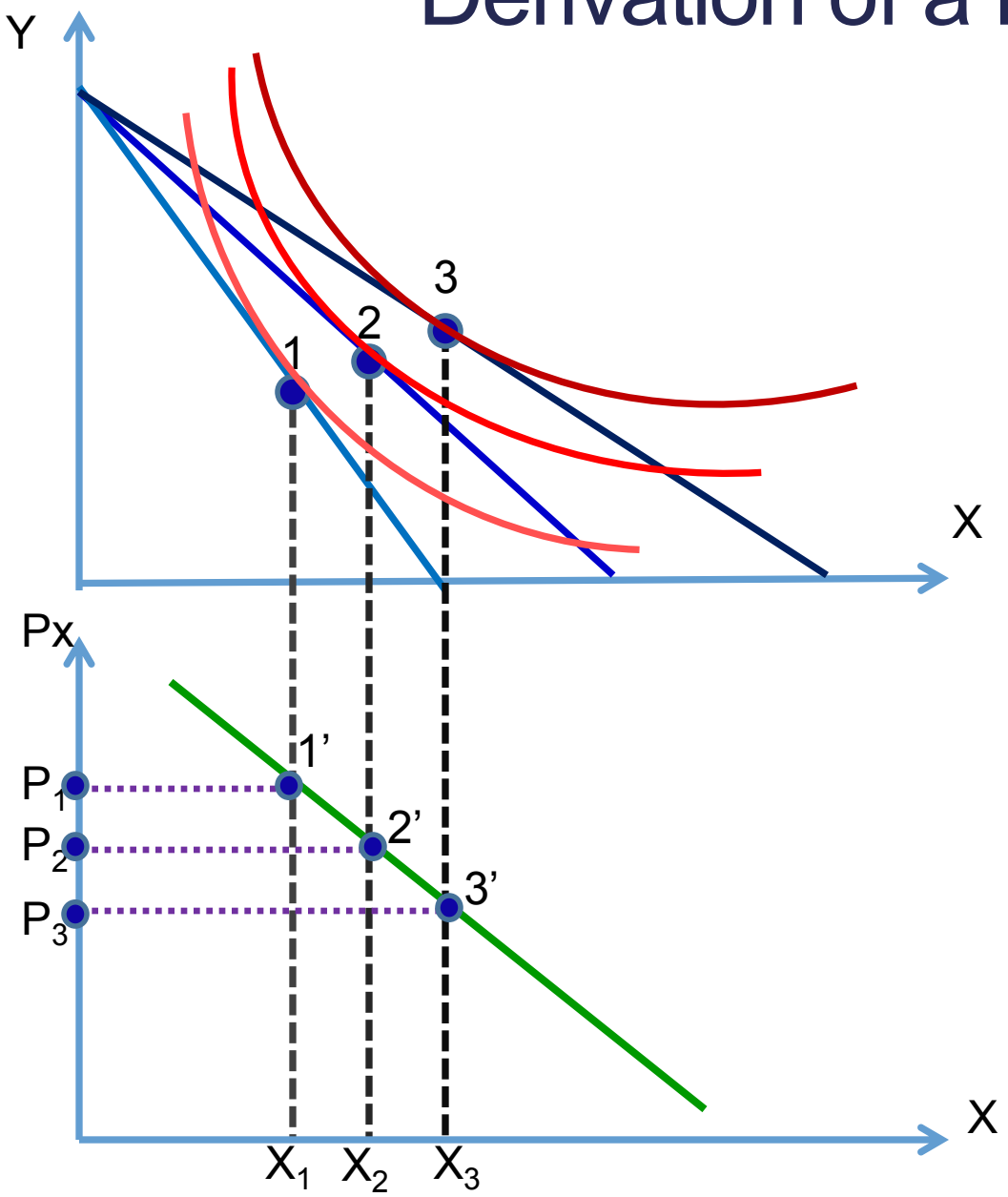
- A change in relative prices of two goods changes the slope of the budget constraint.
- Suppose Px changes while Py is constant. For each Px, there is a different utility-maximizing consumption bundle.
- **Price Consumption Curve (PCC)** is the line that connects all the utility-maximizing points for different Px's, given income and Py constant.
- I.e. , PCC shows how the consumer's purchases react to a change in one price with income and other prices being held constant.

Graph: PCC

- Suppose Px = $2, $3, $4, Py = $4, and B = 120.



Derivation of a Demand Curve



Income and Substitution Effects

- A fall in Px has two effects:

Substitution effect

- Change in X due to change in relative price with *real income* unchanged
- A fall in Px makes Y more expensive relative to X, causing consumer to buy more X and less Y

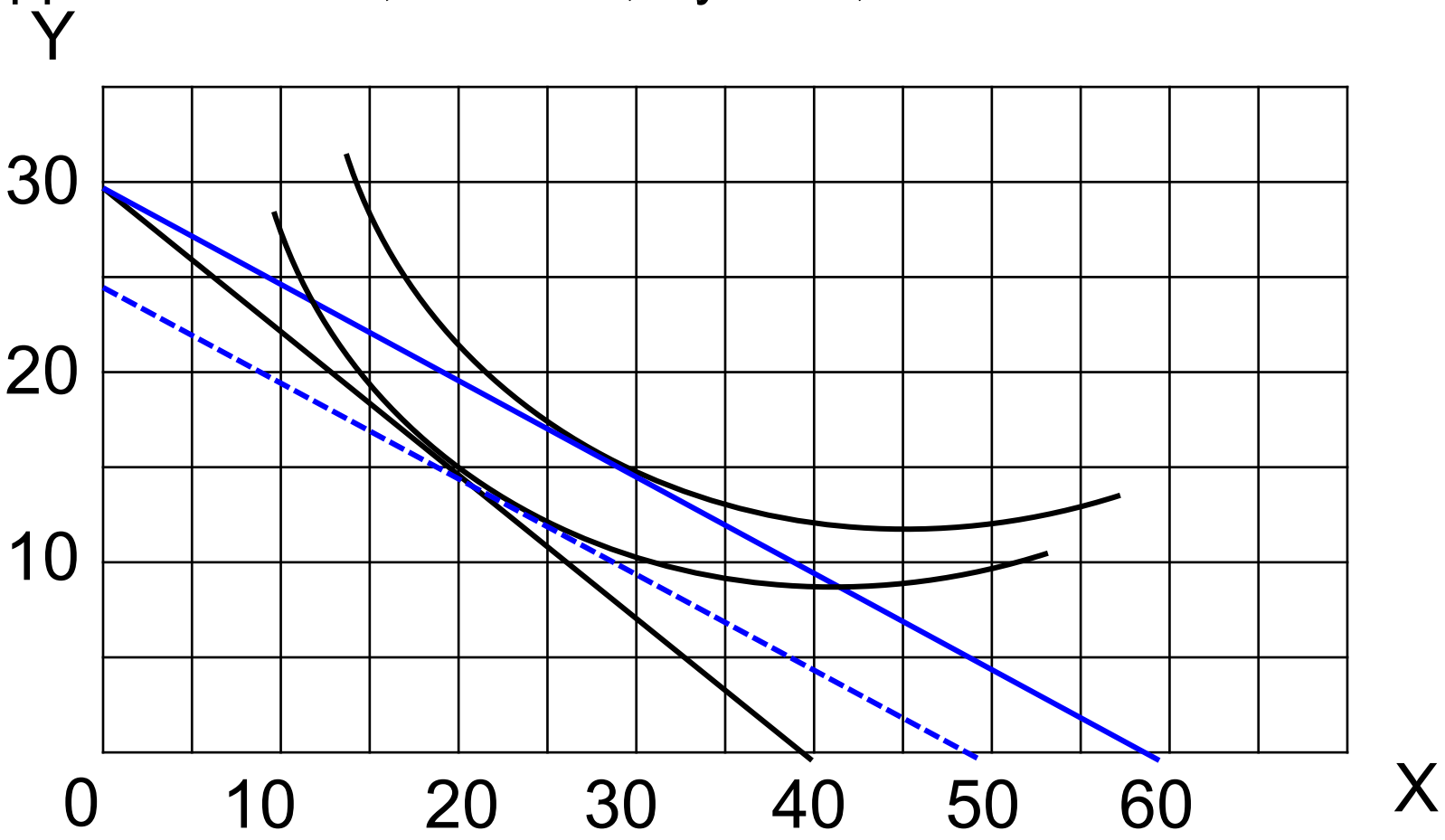
(Note: Real income is kept unchanged by staying on the original IC.)

Income effect

- Change in X due to change in real income
- A fall in Px increases the consumer's purchasing power, allowing him to reach a higher IC

Graph

- Suppose Px = $3, P'x = $2, Py = $4, and B = 120.



Applications:

- Giffen good
- Subsidy
- Vouchers
- Work & leisure
- Intertemporal consumption