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Step-by-step solutions, alternate methods & exam tips for Class 12 Economics

Chapter 1: National Income Accounting

About this Chapter

This chapter builds the vocabulary of macroeconomic measurement. You will learn the four **factors of production** and their remunerations, the circular flow of income through the **product, expenditure and income methods** of measuring GDP, the differences between **GDP, NDP, GNP, NNP, NI, PI and PDI**, and how to use the **GDP deflator** and **CPI** to separate nominal from real changes. Every question below has full formula–substitution–arithmetic working.

Topics covered: Factors of production • Circular flow • GDP by three methods • Stocks vs flows • Budget and trade deficits • Personal Income & Disposable Income • GDP Deflator

Quick Formula Sheet

GDP (Expenditure method):

$\text{GDP} = C + I + G + (X - M)$

Macro identities:

$\text{NDP}_{\text{FC}} = \text{GDP}_{\text{MP}} - \text{Depreciation} - (\text{Indirect Tax} - \text{Subsidies})$

$\text{NNP}_{\text{FC}}\ (\text{National Income}) = \text{NDP}_{\text{FC}} + \text{NFIA}$

GDP Deflator:

$\text{Deflator} = \dfrac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$

Savings–Investment identity:

$(I - S) + (G - T) + (X - M) = 0$

Also see for this chapter: Revision Notes

Exercises

Q 1.1 **What are the four factors of production and what are the remunerations to each of these called?**

SOLUTION

Concept used. A *factor of production* is an input that households supply to firms so that firms can produce goods and services. NCERT identifies four such factors. Each factor earns an income payment, called its *remuneration* or factor income.

Step 1. **Land** : the gift of nature (soil, minerals, water bodies, forests). The remuneration paid for the use of land is called **rent**.

Step 2. **Labour** : the human effort, both physical and mental, that goes into production. The remuneration paid to labour is called **wages and salaries**.

Step 3. **Capital** : the produced means of production: machines, tools, buildings, etc., used to produce further output. The remuneration paid to capital is called **interest**.

Step 4. **Entrepreneurship** : the factor that organises the other three, takes the production decisions and bears the risk of loss. The residual that remains after paying rent, wages and interest is the entrepreneur's **profit**.

> **Final Answer:** Four factors: Land, Labour, Capital, Entrepreneurship. Remunerations: Rent, Wages, Interest and Profit respectively.

☞ Exam Tip

A common one-mark CBSE question is the pairing: "Rent–Land, Wages–Labour, Interest–Capital, Profit–Entrepreneur". Memorise this exact mapping; do not interchange "interest" and "profit".

EXPERT'S SOLUTION *: Aman Verma, M.A. Economics, Delhi School of Economics*

Strategic angle. The cleanest way to remember this is to notice that every factor income is the *price* a firm pays to use the factor's services for one production period.

Step 1. Land is a non-produced, durable natural resource; its hire price is **rent**.

Step 2. Labour is the time-and-effort of human beings; its hire price is **wage**.

Step 3. Capital is a produced resource that gets used up over time; the hire price of borrowed funds invested in capital is **interest**.

Step 4. The entrepreneur takes the residual risk; whatever revenue is left after paying the other three factors is **profit**.

Why this matters. The sum of these four factor incomes *is* the National Income (NI). Every later identity in this chapter is a re-statement of "output equals sum of factor incomes".

> **Final Answer:** Land $\rightarrow$ Rent, Labour $\rightarrow$ Wages, Capital $\rightarrow$ Interest, Entrepreneur $\rightarrow$ Profit.

Q 1.2 Why should the aggregate final expenditure of an economy be equal to the aggregate factor payments? Explain.

SOLUTION

Concept used. The circular flow of income says that every rupee that a household spends on final goods becomes revenue to some firm; the firm in turn pays out that revenue, eventually and completely, to the four factors of production as factor incomes. There is no leakage inside a single, closed period.

Step 1. When a household buys a final good for Rs P, the firm receives Rs P as sales revenue.

Step 2. The firm uses this revenue to pay for the inputs used to produce the good: Rs R as rent to land-owners, Rs W as wages to labour, Rs i as interest to capital and Rs π as profit to the entrepreneur (profit is the residual).

Step 3. By construction, $P = R + W + i + \pi$: the firm has no other source for these payments.

Step 4. Summing across all firms in the economy in the same period,

$$\sum P_{\text{final}} = \sum (R + W + i + \pi)$$

$$\text{Aggregate final expenditure} = \text{Aggregate factor payments.}$$

> **Final Answer:** Because every rupee of final expenditure becomes a firm's revenue, and every rupee of firm revenue is paid out as factor income (with profit as the residual), the two aggregates are equal by definition.

☞ **Two methods, one number**

This identity is exactly why the *expenditure method* and the *income method* must give the same GDP. The *product method* adds value-added across firms, which also equals the same number.

EXPERT'S SOLUTION *: Priya Singh, M.Sc. Economics, LSE*

Strategic angle. Think of profit as a *balancing item* in the firm's profit-and-loss account. Whatever revenue is not paid to land, labour or capital is, by definition, called profit and credited to the entrepreneur. That accounting convention is what *forces* the expenditure-side and income-side totals to be identical at the firm level, and therefore at the aggregate level.

Step 1. Define final expenditure E as the spending of all four kinds of buyers (households, firms on investment, government and foreigners on net exports) on final goods produced inside the country during the year.

Step 2. Define factor payments Y as $R + W + i + \pi$, the sum of rent, wage, interest and profit paid out by the producing firms.

Step 3. Each firm's accounts are closed by setting Revenue $-(R + W + i) = \pi$, so the residual is labelled profit. This gives Revenue $= R + W + i + \pi$ for every firm.

Step 4. Aggregating across all firms: $\sum$ Revenue $= \sum(R + W + i + \pi)$, i.e. $E = Y$. Inventory build-up is counted on both sides (as firm's own investment I in expenditure and as the firm's value-added in income), so the identity holds even for unsold output.

Why this matters. This is the single identity that makes the three GDP estimates internally consistent. If the income-side total differs from the expenditure-side total in published data, the gap is recorded as "statistical discrepancy", not as a violation of the identity.

> **Final Answer:** Aggregate final expenditure $\equiv$ Aggregate factor payments because profit is defined as the residual that closes the firm's revenue account.

Q 1.3 Distinguish between stock and flow. Between net investment and capital which is a stock and which is a flow? Compare net investment and capital with flow of water into a tank.

SOLUTION

Concept used. A **stock** variable is measured at a *point in time* and has no time dimension (e.g. wealth as on 31 March). A **flow** variable is measured *per unit of time* and is meaningless without a reference period (e.g. income per year).

Step 1. **Stock vs flow examples.** Stocks: capital, wealth, money supply, population, foreign exchange reserves.
Flows: income, investment, consumption, exports, imports, savings.

Step 2. **Capital** is the total quantum of produced means of production held by the economy on a given date $\Rightarrow$ capital is a **stock**.

Step 3. **Net investment** is the *addition* to the capital stock over a period (gross investment minus depreciation) $\Rightarrow$ net investment is a **flow**.

Step 4. **Water-tank analogy.**

- The water already in the tank at noon today $\longleftrightarrow$ capital stock.
- The rate at which water flows in through the tap (litres per minute) $\longleftrightarrow$ net investment.
- Increase in water level over an hour $\longleftrightarrow$ net investment in that hour.

Final Answer: Stock = quantity at a point in time; flow = quantity per unit of time. Capital is a stock, net investment is a flow. Tank water = capital; rate of inflow = net investment.

☞ **Exam Tip**

A standard one-mark trick: examiners offer "population" (stock) and "birth rate" (flow) and ask you to classify. Always test with the "per year" suffix: "population per year" is meaningless, so it is a stock; "births per year" is the standard reporting unit, so it is a flow.

EXPERT'S SOLUTION *: Rohan Sharma, M.A. Economics, JNU*

Strategic angle. Ask: "Can I attach a time unit (per year, per month) without nonsense?" If yes, it is a flow; if no, it is a stock.

Step 1. "Capital of Rs 50 lakh per year" makes no sense $\Rightarrow$ capital is a stock.

Step 2. "Net investment of Rs 5 lakh per year" is exactly what we report $\Rightarrow$ net investment is a flow.

Step 3. Tank analogy: water level (litres) is a stock; tap flow (litres/min) is a flow.

Why this matters. National income accounts mix the two; a sloppy student will add a stock to a flow and get a meaningless number.

Final Answer: Capital = stock; Net investment = flow; "water in tank vs water entering the tank".

Q 1.4 What is the difference between planned and unplanned inventory accumulation? Write down the relation between change in inventories and value added of a firm.

SOLUTION

Concept used. **Inventory** is the unsold stock of finished goods (or work-in-progress, or raw materials) held by a firm. **Planned (ex-ante) inventory change** is the addition the firm *intended* at the start of the period. **Unplanned (ex-post deviation) inventory change** is the residual between what was actually produced and what was actually sold.

Step 1. **Planned vs unplanned.**

- *Planned*: firm expected sales below production and deliberately built up stocks (or vice versa).

- *Unplanned*: actual sales differed from expected sales, so the inventory change deviated from the planned level.

Step 2. For any single firm in a single period,

$$\begin{aligned}\text{Value Added}_{\text{firm}} &= \text{Value of output} - \text{Value of intermediate inputs} \\ &= \text{Sales} + \Delta\text{Inventory} - \text{Intermediate consumption}.\end{aligned}$$

Step 3. Rearranging,

$$\begin{aligned}\Delta\text{Inventory} &= \text{Value Added} + \text{Intermediate consumption} - \text{Sales} \\ &= \text{Production} - \text{Sales}.\end{aligned}$$

Final Answer: Planned ΔInventory is intended; unplanned ΔInventory is the surprise from sales differing from expectations. Value Added = Sales + ΔInventory − Intermediate consumption, i.e. ΔInventory = Production − Sales.

✗ Common Mistake

Students often forget that ΔInventory enters with a + sign in output. If output produced this year is unsold and added to stock, it must still be counted in this year's GDP, because the factor incomes used to produce it have already been paid.

EXPERT'S SOLUTION *: Neha Kapoor, M.A. Economics, Jawaharlal Nehru University*

Strategic angle. A firm always satisfies "what it made = what it sold + what it added to the godown".

Step 1. Output $\equiv$ Sales + ΔInventory.

Step 2. Value Added $\equiv$ Output − Intermediate consumption.

Step 3. So Value Added = Sales + ΔInventory − Intermediate consumption.

Step 4. If sales exceed plan, ΔInventory < planned $\Rightarrow$ *unplanned* decumulation.

Why this matters. In the Keynesian model of Ch. 3, unplanned inventory change is the signal that the goods market is out-of-equilibrium.

Final Answer: Value Added = Sales + ΔInventory − Intermediate consumption.

Q 1.5 Write down the three identities of calculating the GDP of a country by the three methods. Also briefly explain why each of these should give us the same value

of GDP.

SOLUTION

Concept used. GDP is the market value of all final goods and services produced inside a country in a year. It can be measured in three operationally distinct ways, which must give the same number because each is a re-arrangement of the same circular-flow identity.

Step 1. **Product (Value-Added) Method:**

$$\text{GDP} = \sum_{i=1}^{n} \left(\text{Sales}_i + \Delta\text{Inv}_i - \text{Intermediate consumption}_i\right).$$

Sum the value added by every firm in the economy.

Step 2. **Expenditure Method:**

$$\text{GDP} = C + I + G + (X - M),$$

where C is private final consumption, I is gross investment, G is government final consumption and $X - M$ is net exports.

Step 3. **Income Method:**

$$\text{GDP}_{\text{FC}} = \text{COE} + \text{OS} + \text{MI},$$

where COE is compensation of employees, OS is operating surplus (rent + interest + profit) and MI is mixed income of the self-employed. (Add net indirect taxes to reach GDP at market price.)

Step 4. **Why all three coincide.** Section 2.2 of NCERT shows:

- Method 1 counts the *output* side of every firm.
- Method 2 counts the *spending* on that same output.
- Method 3 counts the *income* earned producing that same output.

Since every rupee of output is bought and every rupee of revenue is paid out as factor income (with profit as the residual), Output = Expenditure = Income. The three methods are three windows on the same total.

Final Answer: GDP = $\sum$ Value Added = $C + I + G + (X - M)$ = COE + OS + MI + Net Indirect Taxes. They coincide because each measures the same circular flow at a different point.

♥ Why This Matters

The triple identity is what lets CSO publish a single GDP number even though three different statistical agencies (CSO product accounts, expenditure surveys, NSSO income-

side estimates) measure it from three different sides. Discrepancies are reported as "statistical discrepancy" and reconciled.

EXPERT'S SOLUTION *: Karan Mehta, M.A. Economics, Madras School of Economics*

Strategic angle. The triple identity is the heart of national accounts; learn it as "*What we made = What we spent = What we earned*", and treat it as the macroeconomic analogue of double-entry bookkeeping at the level of the whole country. Every rupee of output is a rupee earned by someone and a rupee spent by someone else.

Step 1. **Product side.** For each firm i, gross value added is $\text{GVA}_i = \text{Output}_i - \text{Inputs}_i$. Summing across all producing units (formal manufacturing, services, informal sector, agriculture) gives $\text{GDP}_{\text{FC}} = \sum_i \text{GVA}_i$. The product method is what NSO and the State Domestic Product accounts publish at quarterly frequency.

Step 2. **Expenditure side.** $\text{GDP}_{\text{MP}} = C + I + G + (X - M)$, where C is Private Final Consumption Expenditure, I is gross fixed capital formation plus changes in inventories, G is Government Final Consumption Expenditure, and $X - M$ is net exports of goods and services.

Step 3. **Income side.**
GDP_{FC} = Compensation of Employees + Operating Surplus + Mixed Income. Operating surplus itself is rent + interest + profit. Add net indirect taxes (Indirect Tax − Subsidies) to reach GDP_{MP}.

Step 4. **Sources of statistical mismatch in practice.** Timing of data releases, informal-sector estimation, smuggling and rounding errors mean the three published numbers differ by a few percent. Conceptually, however, they must be equal, because every entry on the product side has a paired entry on the expenditure side (the buyer) and the income side (the seller's factors of production).

Why this matters. CBSE asks one-line statements of all three plus a one-line reason. Practising the writing-out exercise helps the 3-mark answer.

> **Final Answer:** Three methods = three views of the same circular flow, hence the same GDP.

Q 1.6 **Define budget deficit and trade deficit. The excess of private investment over saving of a country in a particular year was Rs 2,000 crores. The amount of budget deficit was (−) Rs 1,500 crores. What was the volume of trade deficit of that country?**

SOLUTION

Concept used. For an open economy, the savings-investment identity from Section 2.4 is

$$(I - S) + (G - T) + (X - M) = 0,$$

where $S - I$ is private net lending, $G - T$ is budget deficit and $X - M$ is net exports (negative of trade deficit).

Step 1. **Budget deficit** = Government expenditure − Government revenue $= G - T$.

Step 2. **Trade deficit** = Imports − Exports $= M - X$. Equivalently, $X - M = -$Trade deficit.

Step 3. Given: $I - S = +2000$ crores; $G - T = -1500$ crores.

Step 4. Substitute into the identity:

$$\begin{aligned}(I - S) + (G - T) + (X - M) &= 0\\ 2000 + (-1500) + (X - M) &= 0\\ 500 + (X - M) &= 0\\ X - M &= -500.\end{aligned}$$

Step 5. Therefore $M - X = +500$. Trade deficit = Rs 500 crores.

Final Answer: Trade deficit = Rs 500 crores.

☞ Exam Tip

Re-read the sign convention before substituting. Budget deficit is stated as "(−)Rs 1500 crore" here meaning $G - T = -1500$, i.e. a *budget surplus* of Rs 1500 crore. Always translate the words to a signed number first.

EXPERT'S SOLUTION *: Anjali Nair, M.A. Economics, IGIDR Mumbai*

Strategic angle. Memorise the three-sector balance in the clean "surplus" form: $(S - I) + (T - G) + (M - X) = 0$, i.e. *private surplus* + *government surplus* + *external surplus* = 0. Writing it this way removes every sign-flip and converts each term into a financial-balance interpretation.

Step 1. Private balance: $S - I = -(I - S) = -2000$ crore. The private sector is borrowing (negative net lending).

Step 2. Government balance: $T - G = -(G - T) = -(-1500) = +1500$ crore. The government runs a surplus.

Step 3. External balance: $M - X =?$. A positive value means the country imports more

than it exports, i.e. it borrows from the rest of the world.

Step 4. Apply the three-sector identity:
$-2000 + 1500 + (M - X) = 0 \Rightarrow (M - X) = 500.$

Step 5. Interpret: the rest of the world is financing Rs 500 crore of the private-sector borrowing that the government surplus could not cover.

Why this matters. The identity tells you that domestic imbalances must be financed by, or financed for, the rest of the world. It is the conceptual bridge between this chapter and the open-economy chapter on Balance of Payments.

Final Answer: Trade deficit = Rs 500 crores.

Q 1.7 Suppose the GDP at market price of a country in a particular year was Rs 1,100 crores. Net Factor Income from Abroad was Rs 100 crores. The value of Indirect taxes − Subsidies was Rs 150 crores and National Income was Rs 850 crores. Calculate the aggregate value of depreciation.

SOLUTION

Concept used. The chain that links GDP at market price to National Income is

$$\begin{aligned} \text{NDP}_{\text{MP}} &= \text{GDP}_{\text{MP}} - \text{Depreciation}, \\ \text{NDP}_{\text{FC}} &= \text{NDP}_{\text{MP}} - (\text{Indirect Taxes} - \text{Subsidies}), \\ \text{NI} = \text{NNP}_{\text{FC}} &= \text{NDP}_{\text{FC}} + \text{NFIA}. \end{aligned}$$

Step 1. Given: $\text{GDP}_{\text{MP}} = 1100$, NFIA $= 100$, Indirect Tax − Subsidies $= 150$, NI $= 850$ (all in Rs crore). Let depreciation $= D$.

Step 2. Compute NDP_{MP}: $\text{NDP}_{\text{MP}} = 1100 - D$.

Step 3. Convert to factor cost: $\text{NDP}_{\text{FC}} = (1100 - D) - 150 = 950 - D$.

Step 4. Add NFIA: $\text{NNP}_{\text{FC}} = (950 - D) + 100 = 1050 - D$.

Step 5. Set equal to NI: $1050 - D = 850 \Rightarrow D = 1050 - 850 = 200$.

Final Answer: Depreciation = Rs 200 crores.

✗ Common Mistake

A common slip is to subtract Net Indirect Taxes *after* adding NFIA, mixing the factor-cost / market-price conversion with the domestic-to-national conversion. Always finish the FC

conversion first, then add NFIA. The sequence is $\text{GDP}_{\text{MP}} \to \text{NDP}_{\text{MP}} \to \text{NDP}_{\text{FC}} \to \text{NNP}_{\text{FC}}$, never the other way round.

EXPERT'S SOLUTION *: Vikram Patel, M.A. Economics, Gokhale Institute Pune*

Strategic angle. Always reduce these problems to "$\text{GDP}_{\text{MP}} \to \text{NDP}_{\text{FC}} \to$ NI" in two explicit subtractions and one addition.

Step 1. $\text{NDP}_{\text{MP}} = \text{GDP}_{\text{MP}} - \text{Depreciation} = 1100 - D$.

Step 2. $\text{NDP}_{\text{FC}} = \text{NDP}_{\text{MP}} - \text{NIT} = 950 - D$.

Step 3. NNP_{FC} (NI) $= \text{NDP}_{\text{FC}} + \text{NFIA} = 1050 - D$.

Step 4. $1050 - D = 850 \Rightarrow D = 200$.

Why this matters. The same arithmetic pattern (Mkt $\to$ Factor cost $\to$ National) repeats in 4–5 board questions every year.

Final Answer: $D =$ Rs 200 crores.

Q 1.8 **Net National Product at Factor Cost of a particular country in a year is Rs 1,900 crores. There are no interest payments made by the households to the firms/government, or by the firms/government to the households. The Personal Disposable Income of the households is Rs 1,200 crores. The personal income taxes paid by them is Rs 600 crores and the value of retained earnings of the firms and government is valued at Rs 200 crores. What is the value of transfer payments made by the government and firms to the households?**

SOLUTION

Concept used. The chain from National Income to Personal Disposable Income is

$$\begin{aligned}\text{PI} = \text{NI} &- \text{Retained Earnings} - \text{Corporate Tax} - \text{Interest paid by HH} \\ &+ \text{Interest received by HH} + \text{Transfer Payments to HH},\end{aligned}$$

$$\text{PDI} = \text{PI} - \text{Personal Tax}.$$

Step 1. Given: NI $= \text{NNP}_{\text{FC}} = 1900$; PDI $= 1200$; Personal tax $= 600$; Retained Earnings $= 200$; all interest items $= 0$; Corporate tax $= 0$ (none mentioned). Let transfer payments $= T_r$.

Step 2. PI $=$ PDI $+$ Personal tax $= 1200 + 600 = 1800$.

Step 3. PI $=$ NI $-$ Retained Earnings $+$ Transfers

$1800 = 1900 - 200 + T_r$

$$1800 = 1700 + T_r$$
$$T_r = 100.$$

Final Answer: Transfer payments = Rs 100 crores.

☞ **The NI–PI chain in one line**

PI = NI − (Retained Earnings) − (Corporate Tax) − (Interest paid by HH) + (Interest received by HH) + (Transfers to HH). Memorise the sign of each term: leakages from NI carry a minus, injections to HH carry a plus.

EXPERT'S SOLUTION *: Shreya Reddy, M.Sc. Economics, University of Warwick*

Strategic angle. Reduce the long chain to "what stays with households after every leak and injection" and treat the zero-interest condition as removing two terms.

Step 1. Start from NI = 1900.

Step 2. Subtract retained earnings (firms don't pass these on): $1900 - 200 = 1700$.

Step 3. Add transfers: $1700 + T_r =$ PI.

Step 4. PDI = PI − Personal tax $\Rightarrow 1200 = (1700 + T_r) - 600 \Rightarrow T_r = 100$.

Why this matters. The PI $\leftrightarrow$ NI chain is the single trickiest formula in the chapter; line-by-line bookkeeping prevents sign errors.

Final Answer: Transfer payments = Rs 100 crores.

Q 1.9 **From the following data, calculate Personal Income and Personal Disposable Income.**

	Item	Rs (crore)
(a)	Net Domestic Product at factor cost	8,000
(b)	Net Factor Income from abroad	200
(c)	Undisbursed Profit	1,000
(d)	Corporate Tax	500
(e)	Interest Received by Households	1,500
(f)	Interest Paid by Households	1,200
(g)	Transfer Income	300
(h)	Personal Tax	500

SOLUTION

Concept used. "Undisbursed Profit" is another name for retained earnings of firms. The full chain is

$$\begin{aligned} \text{NI} &= \text{NDP}_{\text{FC}} + \text{NFIA}, \\ \text{PI} &= \text{NI} - (\text{Undisbursed Profit}) - \text{Corporate Tax} \\ &\quad - \text{Interest paid by HH} + \text{Interest received by HH} + \text{Transfer Income}, \\ \text{PDI} &= \text{PI} - \text{Personal Tax}. \end{aligned}$$

Step 1. Compute NI: $\text{NI} = 8000 + 200 = 8200$.

Step 2. Compute PI:

$$\begin{aligned} \text{PI} &= 8200 - 1000 - 500 - 1200 + 1500 + 300 \\ &= 8200 - 2700 + 1800 \\ &= 8200 - 900 \\ &= 7300. \end{aligned}$$

Step 3. Compute PDI: $\text{PDI} = 7300 - 500 = 6800$.

> **Final Answer:** Personal Income $=$ Rs $7{,}300$ crores; Personal Disposable Income $=$ Rs $6{,}800$ crores.

✗ Common Mistake

Don't forget to *subtract* interest paid by households (it is a leakage out of household income) and *add* interest received (an injection in). Confusing the two signs is the most common arithmetic error in this question.

EXPERT'S SOLUTION *: Aditya Iyer, M.A. Economics, CDS Thiruvananthapuram*

Strategic angle. Tabulate the leakages and injections separately, then plug into one line.

Step 1. NI $= 8000 + 200 = 8200$.

Step 2. Leakages from NI (do not reach HH): Undisbursed Profit 1000, Corporate Tax 500, Interest paid by HH 1200; total $= 2700$.

Step 3. Injections to HH: Interest received 1500, Transfer Income 300; total $= 1800$.

Step 4. PI $= 8200 - 2700 + 1800 = 7300$.

Step 5. PDI $= 7300 - 500 = 6800$.

Why this matters. Direct numerical pattern repeats every year in CBSE 6-mark questions.

Final Answer: PI $= 7300$; PDI $= 6800$ (Rs crore).

Q 1.10 **In a single day Raju, the barber, collects Rs 500 from haircuts; over this day, his equipment depreciates in value by Rs 50. Of the remaining Rs 450, Raju pays sales tax worth Rs 30, takes home Rs 200 and retains Rs 220 for improvement and buying of new equipment. He further pays Rs 20 as income tax from his income. Based on this information, complete Raju's contribution to the following measures of income (a) Gross Domestic Product (b) NNP at market price (c) NNP at factor cost (d) Personal income (e) Personal disposable income.**

SOLUTION

Concept used. Treat Raju as a one-person firm that supplies the haircut (output), pays sales tax (indirect tax), and pays depreciation out of revenue. His remaining income, after corporate retention and personal tax, is what he can spend.

Step 1. **(a) GDP contribution** = market value of final services produced = Rs 500.

Step 2. **(b) NNP at market price** = GDP − Depreciation $= 500 - 50 =$ Rs 450.

Step 3. **(c) NNP at factor cost** $= \text{NNP}_{\text{MP}}$ − (Indirect Tax − Subsidies)
$= 450 - 30 =$ Rs 420.
This is the factor income generated by Raju.

Step 4. **(d) Personal income.** Of the Rs 420 factor income, Raju has retained Rs 220 in the business (retained earnings); the rest, Rs 200, accrues to him personally as his "take-home" income before personal tax.
PI $= 420 - 220 =$ Rs 200.

Step 5. **(e) Personal disposable income** = PI − Personal Tax $= 200 - 20 =$ Rs 180.

Final Answer: (a) Rs 500 (b) Rs 450 (c) Rs 420 (d) Rs 200 (e) Rs 180.

☞ **Exam Tip**

"Take-home" in CBSE questions usually means *personal income before* personal tax, not after. The personal tax line is always applied last, to convert PI into PDI. Subtracting the personal tax too early is the most common single mistake.

EXPERT'S SOLUTION *: Megha Joshi, M.A. Economics, University of Hyderabad*

Strategic angle. March down the income hierarchy one row at a time; subtract a single, named item at each step.

Step 1. GDP $= 500$.

Step 2. Subtract depreciation 50 $\Rightarrow$ $\text{NNP}_{\text{MP}} = 450$.

Step 3. Subtract sales tax 30 $\Rightarrow$ $\text{NNP}_{\text{FC}} = 420$.

Step 4. Subtract retention 220 $\Rightarrow$ PI $= 200$.

Step 5. Subtract personal tax 20 $\Rightarrow$ PDI $= 180$.

Why this matters. The same five-row table is exactly how the income side of the national accounts is built. Once Raju's row is clear, replicate across all producers to get the country total.

> **Final Answer:** 500 / 450 / 420 / 200 / 180 (in Rs).

Q 1.11 **The value of the nominal GNP of an economy was Rs 2,500 crores in a particular year. The value of GNP of that country during the same year, evaluated at the prices of same base year, was Rs 3,000 crores. Calculate the value of the GNP deflator of the year in percentage terms. Has the price level risen between the base year and the year under consideration?**

SOLUTION

Concept used. The **GNP deflator** measures the average price level of all goods and services that enter the GNP basket. Formally,

$$\text{GNP Deflator} = \frac{\text{Nominal GNP}}{\text{Real GNP}} \times 100.$$

Step 1. Identify the inputs:

- Nominal GNP (at current prices) $=$ Rs 2500 crore.
- Real GNP (at base-year prices) $=$ Rs 3000 crore.

Step 2. Apply the formula:

$$\text{Deflator} = \frac{2500}{3000} \times 100 = \frac{250000}{3000} = 83.\overline{3}.$$

Step 3. So the deflator $\approx 83.33\%$.

Step 4. Compare with the base-year deflator, which is by definition 100%. Since $83.33\% < 100\%$, the average price level in the current year is *lower* than in the base year. Prices have **fallen**, not risen.

Final Answer: GNP Deflator $\approx 83.33\%$. The price level has *fallen* between the base year (deflator $= 100$) and the current year (deflator ≈ 83.33).

☞ Exam Tip

The ratio $\dfrac{\text{Nominal}}{\text{Real}}$: never the other way around. If you accidentally compute Real/Nominal you will report 120 and conclude that prices have risen, which is the exact opposite of the correct answer.

EXPERT'S SOLUTION *: Ravi Bhardwaj, M.A. Economics, Ambedkar University Delhi*

Strategic angle. Always set the base-year deflator $= 100$ mentally; then the current-year deflator's deviation from 100 is the cumulative price change between the two years. This sidesteps the most common board-exam slip of computing the deflator the wrong way round.

Step 1. Identify the inputs. Nominal GNP (at current prices) is Rs 2500 crore. Real GNP (at base-year prices) is Rs 3000 crore. The base year is defined as the year in which the price index $= 100$.

Step 2. Apply the deflator formula:
$$\text{Deflator} = \frac{\text{Nominal GNP}}{\text{Real GNP}} \times 100 = \frac{2500}{3000} \times 100 = 83.33.$$

Step 3. By construction, the base-year deflator is 100. Compare: $83.33 < 100$, so the current-year price level is below the base-year price level.

Step 4. Quantify: the cumulative price change is $\dfrac{83.33 - 100}{100} \times 100 = -16.67\%$ from base year to current year. The economy has experienced *deflation* on average, not inflation.

Step 5. Sanity-check with a single-good intuition. If the same basket cost Rs 100 in the base year and Rs 83.33 today, the same nominal spending now buys $\frac{100}{83.33} \approx 1.20$ baskets, consistent with Real $>$ Nominal.

Why this matters. Real values are the right ones for welfare comparisons across years; the deflator is the conversion tool that strips out the contribution of pure price changes from the contribution of genuine quantity growth.

Final Answer: Deflator ≈ 83.33. Prices have *fallen* by $\approx 16.67\%$ since the base year.

Q 1.12 Write down some of the limitations of using GDP as an index of welfare of a country.

SOLUTION

Concept used. GDP measures *aggregate market output*. "Welfare" is a much broader idea involving distribution, leisure, non-market work, environmental quality and access to public goods. Hence GDP is an imperfect proxy.

Step 1. **Distribution of income.** Two countries with the same per-capita GDP can have very different inequality; GDP says nothing about how income is shared.

Step 2. **Non-monetary exchanges.** Domestic services produced by family members, volunteer work, and barter transactions are excluded. A self-cooked meal yields the same welfare as a restaurant meal but only the latter enters GDP.

Step 3. **Externalities.** Pollution from factories does not net out of GDP; in fact, expenditure on cleaning up the pollution adds to GDP, giving a false welfare signal.

Step 4. **Quality and composition of output.** An economy that produces more guns and less butter has the same GDP for many parameter values, but welfare implications differ.

Step 5. **Leisure.** If working hours rise but per-capita GDP stays constant, welfare has actually fallen even though GDP did not.

Step 6. **Depreciation and natural-resource depletion.** Gross figures ignore that producing today's GDP may have used up capital stock or non-renewable resources.

> **Final Answer:** GDP ignores income distribution, non-market production, externalities, leisure, composition and resource depletion : so it is a noisy welfare indicator.

♥ Why This Matters

The *Human Development Index*, *Genuine Progress Indicator* and *green GDP* are alternative measures developed precisely to address these GDP limitations. CBSE often follows up with a one-mark question on HDI; remember that HDI = function of (life expectancy, education, per-capita income).

EXPERT'S SOLUTION *: Tanya Bose, M.Sc. Economics, ISI Kolkata*

Strategic angle. Group the limitations into four buckets: *Distribution, Non-market, Externalities, Composition*. It is easier to recall four buckets than ten separate points, and each bucket maps cleanly to a real-world example a CBSE student can quote in a six-mark answer. The trick is to give one concrete example per bucket rather than abstract statements.

Step 1. **Distribution.** GDP is silent on *who* gets the income. A country with the same

per-capita GDP can have a Gini coefficient of 0.30 or 0.60; welfare implications differ sharply. CBSE often pairs this with a one-mark question on the Lorenz curve.

Step 2. **Non-market production.** Domestic labour, volunteer work, barter and a large part of the informal sector are excluded from GDP. The same hour of care work produces the same welfare whether paid or unpaid, but only the paid hour enters GDP.

Step 3. **Externalities.** Pollution, congestion, biodiversity loss, groundwater depletion are unpriced costs of GDP growth. Worse, mitigation expenditure (water purifiers, air filters) *adds* to GDP, giving a perversely positive signal when welfare is falling.

Step 4. **Composition and depreciation.** Gross figures ignore capital consumed in producing today's GDP, and they do not distinguish between defence spending and education spending even though their welfare contributions are radically different. Net measures (NDP, NNP) and HDI-style composites partly address this.

Why this matters. Policy design now routinely supplements GDP with HDI, Genuine Progress Indicator, green GDP and SDG dashboards precisely to plug these four gaps. CBSE typically asks a follow-up one-mark on the HDI components (life expectancy, education, per-capita income), so memorise that triplet alongside the four-bucket list.

Final Answer: Four buckets: Distribution, Non-market, Externalities, Composition.

Key Takeaways

- Four factors of production (Land, Labour, Capital, Entrepreneur) earn four factor incomes (Rent, Wage, Interest, Profit). Their sum is National Income.
- GDP can be computed by Product, Expenditure or Income method; all three are equal by the circular-flow identity.
- The chain $\text{GDP}_{\text{MP}} \to \text{NDP}_{\text{MP}} \to \text{NDP}_{\text{FC}} \to \text{NNP}_{\text{FC}} \to \text{PI} \to \text{PDI}$ governs every numerical question.
- Savings-investment identity $(I - S) + (G - T) + (X - M) = 0$ ties private, government and external balances.
- GNP deflator $= \frac{\text{Nominal GNP}}{\text{Real GNP}} \times 100$ separates price changes from real growth.
- GDP is an imperfect welfare measure: distribution, non-market work, externalities and leisure are all ignored.

End of Exercises

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