

3.10: Extension- Taxes

Governments collect taxes to pay for the services they provide. In the United States, federal income taxes help fund the military, the Environmental Protection Agency, and thousands of other programs. Property taxes help fund schools. Gasoline taxes help pay for road improvements. While very few people enjoy paying taxes, they are necessary to pay for the services we all depend upon.

Taxes can be computed in a variety of ways, but are typically computed as a percentage of a sale, of one's income, or of one's assets.

✓ Example 3.10.1

The sales tax rate in a city is 9.3%. How much sales tax will you pay on a \$140 purchase?

Solution

The sales tax will be 9.3% of \$140. To compute this, we multiply \$140 by the percent written as a decimal: $\$140(0.093) = \13.02 .

When taxes are not given as a fixed percentage rate, sometimes it is necessary to calculate the **effective rate**.

📌 Definition: Effective Rate

The **effective tax rate** is the equivalent percent rate of the tax paid out of the dollar amount the tax is based on.

✓ Example 3.10.2

Joan paid \$3,200 in property taxes on her house valued at \$215,000 last year. What is the effective tax rate?

Solution

We can compute the equivalent percentage: $\frac{3200}{215000} = 0.01488$, or about 1.49% effective rate.

Taxes are often referred to as progressive, regressive, or flat.

📌 Definition: Tax Categories

A **flat tax**, or proportional tax, charges a constant percentage rate.

A **progressive tax** increases the percent rate as the base amount increases.

A **regressive tax** decreases the percent rate as the base amount increases.

✓ Example 3.10.3

The United States federal income tax on earned wages is an example of a progressive tax. People with a higher wage income pay a higher percent tax on their income.

For a single person in 2011, adjusted gross income (income after deductions) under \$8,500 was taxed at 10%. Income over \$8,500 but under \$34,500 was taxed at 15%.

Solution

A person earning \$10,000 would pay 10% on the portion of their income under \$8,500, and 15% on the income over \$8,500, so they'd pay:

$$8500(0.10) = 850 \text{ (10\% of \$8500)}$$

$$1500(0.15) = 225 \text{ (15\% of the remaining \$1500 of income)}$$

$$\text{Total tax:} = \$1075$$

$$\text{The effective tax rate paid is } \frac{1075}{10000} = 10.75\%$$

A person earning \$30,000 would also pay 10% on the portion of their income under \$8,500, and 15% on the income over \$8,500, so they'd pay:

$$8500(0.10) = 850 \text{ (10\% of \$8500)}$$

$$21500(0.15) = 3225 \text{ (15\% of the remaining \$21500 of income)}$$

$$\text{Total tax:} = \$4075$$

$$\text{The effective tax rate paid is } \frac{4075}{30000} = 13.58\%$$

Notice that the effective rate has increased with income, showing this is a progressive tax.

✓ Example 3.10.4

A gasoline tax is a flat tax when considered in terms of consumption, a tax of, say, \$0.30 per gallon is proportional to the amount of gasoline purchased. Someone buying 10 gallons of gas at \$4 a gallon would pay \$3 in tax, which is $\frac{\$3}{\$40} = 7.5\%$. Someone buying 30 gallons of gas at \$4 a gallon would pay \$9 in tax, which is $\frac{\$9}{\$120} = 7.5\%$, the same effective rate.

Solution

However, in terms of income, a gasoline tax is often considered a regressive tax. It is likely that someone earning \$30,000 a year and someone earning \$60,000 a year will drive about the same amount. If both pay \$60 in gasoline taxes over a year, the person earning \$30,000 has paid 0.2% of their income, while the person earning \$60,000 has paid 0.1% of their income in gas taxes.

Try It 3.10.1

A sales tax is a fixed percentage tax on a person's purchases. Is this a flat, progressive, or regressive tax?

Answer

While sales tax is a flat percentage rate, it is often considered a regressive tax for the same reasons as the gasoline tax.

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