

YEAR 2002 UPDATE
for the textbook
Business Math: Using Percents
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3.3 FICA and FUTA

The previous two sections of this chapter discussed the computation of gross earnings. Typically, employees do not receive the amount of their gross earnings in their paycheck, because various employment taxes, and possibly other benefits, are deducted. In addition, there are employment taxes which are paid directly by the employer, and not deducted from an employee's paycheck. Self-employed persons are also subject to employment taxes.

Employment taxes are basically computed as a percentage of wages or income. However, taxable income is not always the same as gross income, since some wages are often excluded from tax. Tax rates and wage bases change annually, to reflect cost of living adjustments or the desires of Congress. Three World Wide Web sources for current employment tax information are:

- the Employer's Tax Guide (Publication 15, Circular E, issued annually by the Internal Revenue Service), at <http://www.irs.ustreas.gov/>.
- the employer information section of the Social Security Administration's web site, found at <http://www.ssa.gov/>.
- the author's Business Math Information web page (designed specifically for this textbook) at <http://staff.jccc.net/swilson/>.

Since it is impossible for the examples in a textbook to remain current, this update provides examples using tax rates from the year 2002.

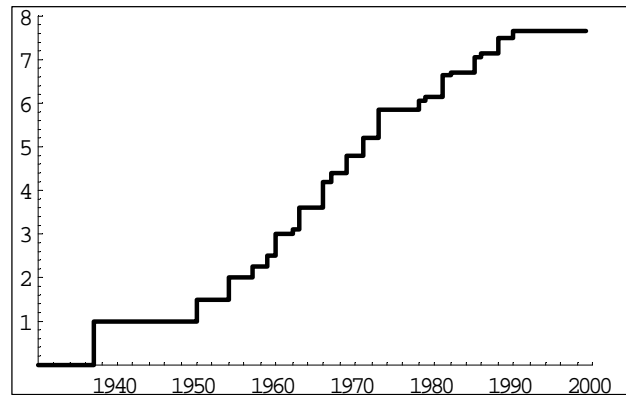
Some taxes assess the same rate on every taxpayer, and some taxes use a scale of rates. In this section, we shall discuss **flat taxes**, where (almost) every taxpayer pays the same rate. Flat employment taxes include the FICA (Social Security and Medicare) taxes, the Self-Employment Tax, and the Federal Unemployment Tax.

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Although flat taxes always use the same computational rate, definitions of the base on which the rate is assessed can alter the effect a tax has on different taxpayers. A flat tax may have an income **floor**, below which no income is taxed (alternatively, income below the floor is taxed at a 0% rate). Flat taxes may also have an income **ceiling**, above which no income is taxed (alternatively, income above the ceiling is taxed at a 0% rate.) The **wage base** of a flat employment tax is the income earned between the floor and the ceiling.

In 1935, the U.S. Congress passed the Social Security Act, which provided basic retirement benefits to old age survivors. The portion of the act which mandates tax withholding is sometimes referred to as the **Federal Insurance Contributions Act**, or **FICA**. Since 1935, because of changes to the system, disability and medical benefits are also provided. Due to the increasing availability of benefits, the proportion of eligible recipients in the population, and the increasing cost of living, the revenue required from the FICA tax has also increased. From an original rate of 1% on each employee's first \$3,000 of gross earnings in 1937, the tax reached 7.65% on the first \$51,300 of each employee's gross earnings in 1990. In the following year, the portion of the tax which provided for medical benefits was separated from the rest of the tax, so two separate computations became necessary. These are the **Social Security tax** (or **Old Age Survivors and Disability Insurance**, abbreviated **OASDI**) and the **Medicare tax** (or **Hospital Insurance**, sometimes abbreviated **HI**). Unfortunately, the combined FICA tax is sometimes called the Social Security tax, even in some official descriptions. This leads to confusion between the whole FICA tax and the part designated for OASDI. In this text, we shall use the term Social Security only for the OASDI portion of FICA. The 2002 rates for these taxes were:

Figure 1: FICA Rates



- Social Security: 6.2% of the first \$84,900 of gross wages
- Medicare: 1.45% of all gross wages

Employers will deduct the tax amounts, using these rates, from the gross earnings of their employees. Furthermore, employers are also obligated to pay these taxes themselves, so they will match the deductions of their employees dollar for dollar. Both the employee deductions and the employer's matching shares will be forwarded to a financial institution authorized to collect these taxes. Although they are submitted together, Social Security and Medicare taxes are generally reported separately, since the tax returns for businesses require separate accounting for these two taxes.

The Medicare tax is truly a flat tax, in which every taxpayer pays exactly the same rate of their gross income. The Social Security tax, however, has a wage ceiling, beyond which no tax is assessed.

Neither tax has a floor. This creates three cases into which a taxpayer's paycheck may fall

- cumulative wage will remain under the ceiling
- cumulative wage will change from under to over the ceiling
- cumulative wage is already beyond the ceiling

The following trilogy of examples illustrates these three different cases.

Example 1

Brenda had \$1186 in gross earnings for the pay period ending August 3, 2002. Prior to this pay period, she had earned a cumulative gross amount of \$82,952. How much will be deducted from her check for FICA taxes?

Solution

The sum of her current and her prior cumulative gross earnings,

$$82952 + 1186 = 84138$$

does not exceed the \$84,900 ceiling (as it won't for most employees). Therefore, we tax all of her current earnings at the rates given above. The Social Security computation is:

$$1186 \times 0.062 = 73.53$$

and the Medicare computation is:

$$1186 \times 0.0145 = 17.20$$

Brenda's Social Security and Medicare tax deductions are \$73.53 and \$17.20, respectively.

Example 2

Brenda also had gross earnings of \$1186 for the pay period ending August 10, 2002. How much will be deducted for FICA taxes for this pay period?

Solution

In example 1, we found that Brenda's cumulative gross earnings had reached \$84,138. Now, the sum of her current and prior cumulative gross earnings,

$$84138 + 1186 = 85324$$

does exceed the \$84,900 earnings ceiling for Social Security tax. Only that portion of the current \$1186 of earnings below the \$84,900 ceiling can be taxed for Social Security. The Social Security computation is:

$$84900 - 84138 = 762$$

$$762 \times 0.062 = 47.24$$

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All of her current earnings are taxed for Medicare. The computation is exactly the same as in example 1, and the answer is \$17.20. Brenda's Social Security and Medicare tax deductions this week are \$47.24 and \$17.20, respectively.

Example 3

Brenda earned another \$1186 in gross earnings for the pay period ending August 17, 2002. How much will be deducted from her check for FICA taxes?

Solution

Her prior cumulative gross earnings (from example 2) exceeds the social security wage ceiling of \$84,900, so this week her earnings are not subject to Social Security tax. All of her current earnings are taxed for Medicare. The Medicare computation will be exactly the same as in example 1, and the answer is still \$17.20. Therefore, Brenda's Medicare tax deduction is \$17.20, and there is no Social Security tax deduction.

The most difficult case of the three examples is the middle case, when a taxpayer's cumulative income increases from below the Social Security ceiling to above the ceiling. When you do this computation, take caution that you are taxing the taxable amount below the ceiling, not the non-taxable portion above the ceiling.

Self-employed persons were first included in the Social Security program in 1951. The **Self-Employment Tax** is the method by which self-employed people make contributions for Social Security and Medicare. In 2002, the self-employed tax rates were:

15.3% of the first \$84,900 of net earnings
2.9% of net earnings above \$84,900

The 15.3% and 2.9% rates are actually double the combined rates for employee deductions. Essentially, self-employed people are required to pay both the employee's share and the employer's share, since they effectively employ themselves. Notice also that the tax is assessed on net earnings, not on gross earnings. The reason is that self-employed people are taxed in the same manner as businesses, on their net profit. Generally, self-employed people pay quarterly estimated taxes, as opposed to a more frequent withholding from an employee paycheck.

Self-employed persons are also allowed to subtract the business half (as opposed to the employee half) of the self-employment tax from their gross earnings, as a business expense, when finding net earnings. This provision complicates the actual computation of self-employment tax. In the examples which follow, we shall assume that this adjustment has already been made.

Example 4

Mike is self-employed, and had \$24,533 in net earnings for the first quarter of 2002. How much should he pay in estimated taxes for FICA?

Solution

Mike's earnings have not yet exceeded the \$84,900 ceiling for the year, since this is the first quarter payment. So the computation is:

$$24533 \times 0.153 = 3753.55$$

Mike should pay a total of \$3,753.55 in self-employment tax, for his share of social security and Medicare.

Many countries in the developed world have social insurance programs for their workers. Rates depend upon benefits provided. Figure 2 contains the 1996 rates for a variety of countries. When examining these figures, remember that these rates are not deductions, but combined rates for employer and employee together. For the United States, the rate not only includes Social Security and Medicare, but also unemployment taxes and workmen's compensation.

Figure 2: Combined Employee-Employer Social Insurance Rates

<u>Country</u>	<u>Combined Rate</u>
Australia	1.25%
Canada	14.10%
Germany	40.55%
Japan	26.62%
Netherlands	56.55%
U.K.	22.20%
U.S.A.	21.00%

The Social Security Act of 1935 also made provision for federal unemployment taxes and benefits, in a section often called the **Federal Unemployment Tax Act**, or **FUTA**. Employers, not employees, are required to pay the unemployment tax. Every state has also enacted a state unemployment tax, frequently referred to as **SUTA**. The federal government encouraged states to maintain their own unemployment programs by making the federal unemployment tax rate that a company pays depend on their state unemployment tax obligation. For this reason, we shall begin with a discussion of state unemployment taxes.

Many states use an **experience rating** system to determine state unemployment tax rates. That is, companies whose ex-employees receive more unemployment benefits pay a higher rate than companies whose ex-employees receive fewer benefits. For example, the 2002 state unemployment tax rate in Kansas varies from 0.10% to 7.4%. This rate is paid by the employer (not deducted from the employee's earnings) on the first \$8,000 of each employee's gross earnings in each year.

Employers are required to pay both federal and state unemployment taxes. The official 2002 FUTA rate is 6.2% of the first \$7,000 of each employee's gross earnings in each year. However, employers in states where the highest state unemployment rate is at least 5.4% are entitled to a 5.4% credit toward their FUTA taxes. Since the highest state rate in Kansas (our previous example) is 7.4%, this credit is available to every Kansas employer, though certain conditions apply (e.g. timely payment of SUTA taxes). This provision effectively produces a net FUTA rate of 0.8% of the first \$7,000 of each employee's gross earnings in each year. In this book, we shall use this net FUTA rate, rather than the official FUTA rate, in each example and exercise.

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Example 5

Joe Murphy's last biweekly gross earnings were \$1,895. His previous cumulative income was \$5,750. His employer has a state unemployment tax rate of 4.80% on the first \$8,000. Find his employer's federal and state unemployment tax liability.

Solution

The computations for unemployment taxes proceed in a manner very similar to the computations for the FICA taxes. The sum of Joe's current and prior cumulative gross earnings,

$$5750 + 1895 = 7645$$

exceeds the \$7,000 earnings ceiling for the Federal Unemployment Tax, but not the \$8,000 earnings ceiling for the state unemployment tax. Only those amounts below the ceilings are taxed. The FUTA computation is:

$$7000 - 5750 = 1250$$

$$1250 \times 0.008 = 10.00$$

The state unemployment tax computation is:

$$1895 \times 0.0480 = 90.96$$

Joe's employer will be paying \$10 in federal unemployment tax, and \$90.96 in state unemployment tax, as a result of Joe's earnings during the last two weeks.

Notice that the FUTA ceiling of \$7,000 was passed in the previous example. This means that Joe's employer will not owe any more FUTA tax as a result of Joe's employment in future weeks this year, though some state unemployment tax may be owed.

Most employers have more than a single employee. Unemployment taxes are paid on all employees, and computation methods can combine their taxable earnings.

Example 6

Sunflower Doodads has three employees. The earnings of each of their employees is given below. Sunflower's state unemployment tax rate is 2.57% on the first \$8,000. Find the federal and state unemployment taxes Sunflower owes on its employees' current gross earnings.

<u>Employee</u>	<u>Current Gross Earnings</u>	<u>Prior Cumulative Gross Earnings</u>
Earl	\$3522	\$4132
Janet	\$6944	\$7133
Samuel	\$8442	\$9113

Solution

For the FUTA tax, only the first \$7000 of each employee's gross earnings can be taxed. Janet and Samuel both made their first \$7000 before the current earnings, and none of their current earnings are taxable. Earl did not have \$7000 in previous earnings, but the sum of his prior and current earnings,

$$3522 + 4132 = 7654$$

does exceed \$7000. Earl's current taxable earnings can be computed by subtracting the prior cumulative earnings from the wage ceiling. That is,

$$7000 - 4132 = 2868$$

Therefore, the taxable earnings (for FUTA) for all employees were:

<u>Employee</u>	<u>Taxable Earnings</u>
Earl	2868
Janet	0
<u>Samuel</u>	<u>0</u>
Total	2868

Sunflower's FUTA liability for its three employees is:

$$2868 \times 0.008 = 22.94$$

For the state unemployment tax, the first \$8000 of each employee's gross earnings is taxed. Samuel made his first \$8000 previously, so none of his earnings are taxable. The sum of Janet's current and previous earnings,

$$6944 + 7133 = 14077$$

will put her earnings over the \$8000 ceiling, and only that portion under the ceiling,

$$8000 - 7133 = 867$$

is taxable. The sum of Earl's current and previous earnings (computed above) does not put him over the \$8000 ceiling, so all of his earnings are taxable.

Therefore, the taxable earnings (for the state unemployment tax) were:

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<u>Employee</u>	<u>Taxable Earnings</u>
Earl	3522
Janet	867
<u>Samuel</u>	<u>0</u>
Total	4389

Based on the total, we can compute the state unemployment tax (rounding to the nearest cent).

$$4389 \times 0.0257 = 112.80$$

These tax amounts, \$22.94 for federal and \$112.80 for state unemployment tax, are paid by Sunflower Doodads, and are not deducted from the earnings of their employees.

Exercises 3.3

A

Find the amounts of each of the FICA taxes for each of the following employees. Use the 2002 rates of 6.2% on the first \$84,900 of gross earnings, and 1.45% on all gross earnings.

	<u>Employee</u>	<u>Current Gross Earnings</u>	<u>Prior Cumulative Earnings</u>
1.	S. Turner	\$358.41	\$8,662.15
2.	M. Bell	\$583.16	\$30,411.18
3.	F. Whitecross	\$1,225.22	\$15,596.12
4.	T. Baker	\$1,801.61	\$63,017.41
5.	C. Gould	\$2,533.61	\$85,611.59
6.	M. Towne	\$3,142.53	\$90,772.44
7.	P. Baldwin	\$1,184.21	\$84,786.14
8.	G. Falk	\$952.41	\$84,304.33
9.	N. Schwarz	\$1,538.44	\$83,789.41
10.	T. Talley	\$955.41	\$84,121.33
11.	Z. McCombs	\$1,246.33	\$83,532.18
12.	O. Ledwith	\$2,013.59	\$82,792.44

Find the amounts of the FUTA and state unemployment taxes for each of the following employees. Assume that the state tax rate is based on the first \$8,000.

	<u>Employee</u>	<u>Current Gross Earnings</u>	<u>Prior Cumulative Gross Earnings</u>	<u>State Tax Rate</u>
13.	F. Todd	\$1088.64	\$6959.28	3.15%
14.	T. Silverman	\$827.44	\$7882.51	5.11%
15.	R. Manley	\$1528.99	\$7136.44	0.89%
16.	F. Chastain	\$952.38	\$6485.47	0.65%

- B** Use the 2002 tax rates for these problems.
17. Philip earned \$1,589 last week, and had previous earnings of \$83,694 for the year. Calculate the amounts for the social security and Medicare taxes.
 18. Bill earned \$3,592 on his last biweekly check, and had previous cumulative earnings of \$82,641. Calculate the amounts for Social Security and Medicare.
 19. Linda earned \$2,095 on her last check, and had previous earnings of \$28,338. Find the amounts of each of the FICA taxes.
 20. Laura earned \$2,095 on her last check, and had previous earnings of \$146,338. Find the amounts of each of the FICA taxes.
 21. Grace had previous earnings of \$84,666, and earned \$1,335 on her last check. Find the amounts of each of her FICA taxes.
 22. Tom had previous earnings of \$86,666, and earned \$1,335 on his last check. Find the amounts of each of his FICA taxes.
 23. Kelly is self-employed, earned \$795 last week, and had previous earnings of \$19,443. Find the amount of his Self-Employment Tax.
 24. Karen is self-employed, earned \$3,522 last month, and had previous earnings of \$32,495. Find the amount of her Self-Employment Tax.
 25. Frederick is married, earned \$655 last week, and had previous cumulative earnings of \$84,359. Find the amounts of his FICA taxes.
 26. Jessie is single, earned \$1,335 for the last two weeks, and her previous cumulative earnings were \$83,792. Find the amounts of her FICA taxes.
 27. Zebulon earned \$3,258 on his last check, which brings his current cumulative earnings up to \$86,721. Find the amounts of his FICA taxes.
 28. Althea earned \$2,598 on her last check, which brings her current cumulative earnings up to \$84,785. Find the amounts of her FICA taxes.
 29. Quincy earned \$816.51 on his last weekly check, and had prior cumulative earnings of \$6,543.26. Find the unemployment taxes on those earnings, if his employer's state tax rate is 5.70% on the first \$8,000.
 30. Yuri earned \$925.43 on his last weekly check, and had prior cumulative earnings of \$6,827.55. Find the unemployment taxes on those earnings, if his employer's state tax rate is 6.20% on the first \$8,000.
 31. Linda earned \$2,433.88 on her last semimonthly check, and had prior cumulative earnings of \$5,931.47. Find the unemployment taxes on those earnings, if her employer's state tax rate is 2.77% on the first \$8,000.
 32. Terry earned \$1,478.25 on her last biweekly check, and had prior cumulative earnings of \$6,829.33. Find the unemployment taxes on those earnings, if her employer's state tax rate is 0.11% on the first \$8,000.

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Find the federal and state unemployment tax liability for the following employers. Assume that the state tax rate is based on the first \$8,000.

	<u>Employer</u>	State <u>Tax Rate</u>	<u>Employee</u>	Current <u>Gross Earnings</u>	Prior Cumulative <u>Gross Earnings</u>
33.	Speedy Sneakers	5.28%	E. Bender	\$864.22	\$4251.33
			T. DeLeon	\$1141.92	\$7851.33
			F. Raleigh	\$952.33	\$6431.22
34.	Herb's Herbs	0.34%	J. Thompson	\$966.44	\$9231.88
			P. Waters	\$455.20	\$5842.33
			L. Wilson	\$633.51	\$6588.39
			E. Wings	\$826.87	\$7466.53
			S. Zoellner	\$966.32	\$8668.80

3.4 Withholding for Income Tax

Since 1913, the federal government has collected a **Federal Income Tax**, based on the incomes of individual citizens. Today it is the largest single source of revenue for the federal government. Since its inception, the federal income tax has assigned higher tax rates (not simply higher amounts of tax) to taxpayers with larger incomes, and lower rates to taxpayers with lower incomes. That is, the federal income tax is a multi-rate tax, and uses **tax brackets**.

In order to facilitate collection of the federal income tax, employers are required by law to deduct amounts from the gross earnings of each of their employees. The required deduction for the payment of federal income taxes is called the **Federal Withholding Tax**, or **FWT**. The withholding tax computation is designed to predict each employee's income tax obligation. After an employer deducts the withholding tax, it is sent to a financial institution authorized to collect taxes for the U.S. Treasury. When individual taxpayers file their returns after the end of the year, the accumulated Federal Withholding Taxes are applied to their Federal Income Tax bill.

Most states also tax the income of individuals. State withholding taxes are usually collected from employees through payroll deductions, in the same fashion that federal withholding taxes are collected. Sometimes the state withholding tax is abbreviated as **SWT**.

The amount of the withholding tax (for federal and state taxes) depends on five factors. These factors are:

- Gross earnings for the payroll period
- Marital status
- Number of allowances claimed
- Length of the payroll period
- Method used for the computation

The first four factors are used to attempt to reach some sort of fairness in our tax system. Income taxes are based on the principle that those individuals who earn larger incomes ought to be subject to larger taxes. Therefore, gross earnings must be a part of the withholding computation. However, the tax code also recognizes that some incomes are used to support only a single individual, and some incomes support large families. In an effort to recognize the greater needs of a family, the income tax code includes different tax tables for married individuals, as well as exemptions for each family member. Exemptions on the income tax correspond to allowances on the withholding tax. Each employee provides this information to their employers at the time they are hired when they fill out a W-4 form. Lastly, employees who are paid less frequently will need to have larger tax deductions from each paycheck in order to meet their income tax obligation.

There are two basic methods by which withholding taxes may be computed. These methods provide approximately, but not exactly, the same withholding tax amounts. The method we shall use is the **Percentage Method of Withholding**. This method requires fewer tables, and the computations are based on the conceptual framework of the tax system. The main advantage of the other method (the **Wage-Bracket** or **Table Method of Withholding**) is that the percentages are built into the tables and do not need to be computed.

Figure 3: A portion of the Percentage Method of Withholding Tables for 2002

TABLE 2 — BIWEEKLY Payroll Period			
(b) MARRIED person—			
If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:	
Not over \$248		\$0	
Over—	But not over—		of excess over—
\$248	—\$710	10%	—\$248
\$710	—\$1,983	\$46.20 plus 15%	—\$710
\$1,983	—\$4,219	\$237.15 plus 27%	—\$1,983
\$4,219	—\$6,800	\$840.87 plus 30%	—\$4,219
\$6,800	—\$11,996	\$1,615.17 plus 35%	—\$6,800
\$11,996	. . . . .	\$3,433.77 plus 38.6%	—\$11,996

Due to the many factors involved in computing withholding for federal income tax, as well as the presence of tax brackets, the Percentage Method of Withholding uses several tables. The combination of a taxpayer’s marital status (single or married) and payroll period (weekly, biweekly, semimonthly, monthly, quarterly, semiannually, annually, or daily/miscellaneous) determine the table to be used. (There are 16 possible combinations, but the tables are numbered 1a, 1b, 2a, 2b, etc., up to 8b.) In figure 3, you will find the 2002 biweekly-married table for the Percentage Method of

Figure 4: Federal Withholding Allowance Values, 2002

<u>Payroll Period</u>	<u>Allowance</u>
Weekly	\$ 57.69
Biweekly	\$ 115.38
Semimonthly	\$ 125.00
Monthly	\$ 250.00
Annually	\$3,000.00

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Withholding. The most commonly used Percentage Method of Withholding Tables for the 2002 Federal Income Tax can be found on pages 21-23 of this update.

Each table, as can be seen in the excerpt from figure 3, contains a set of rules for computing the withholding tax, depending on the wage and withholding allowances. The range of wages for each separate rule is usually referred to as a "tax bracket", and identified by the tax rate. For example, the federal withholding tax for a married person receiving biweekly checks of \$2,555 (after subtracting withholding allowances) would be found in Table 2b (shown in Figure 3), in the range of wages from \$1,983 to \$4,219. This range of wages is the 27% tax bracket for a married person paid biweekly.

Before using any of the Percentage Method tables, a taxpayer's withholding allowances must be subtracted from their gross income. The 2002 federal withholding allowance values are given in figure 4. The value of each withholding allowance depends on the payroll period. For example, the weekly allowance value is simply the annual allowance value divided by 52. The amounts are subject to change annually.

When using these tax tables to compute the withholding tax, you will generally do the following steps:

1. Find the value of the employee's withholding allowances.
2. Find the taxable earnings by subtracting the allowances from the gross earnings.
3. Find the correct tax bracket in the correct table.
4. Use the rule provided to compute the tax. Information in the rule is always used from right to left.

Example 1

During 2002, Albert, a married employee, was paid \$890 biweekly. On his W-4 form, he claimed 2 allowances. Compute the federal withholding tax.

Solution

Each 2002 biweekly allowance was worth \$115.38. So two allowances were worth

$$2 \times 115.38 = 230.76$$

The allowances estimate the portion of the gross income which is not subject to federal income tax. This amount is subtracted from the gross income to find the taxable income, as follows:

$$890.00 - 230.76 = 659.24$$

For Albert's tax, we need to find the table for a married person paid biweekly. This is found in table 2b (figure 3). His taxable income (after subtracting withholding allowances), puts him in the 10% tax bracket. This row reads:

Over \$248 But not over \$710 10% of excess over \$248

According to this tax rule, we compute the "excess over \$248" by subtracting it from the taxable income, as follows:

$$659.24 - 248.00 = 411.24$$

and then compute 10% of that amount, rounding to the nearest cent:

$$411.24 \times 0.10 = 41.12$$

We have found that Albert's federal withholding tax deduction was \$41.12.

Example 2

Barry, a married employee, was paid \$3,746.65 biweekly during 2002. On his W-4 form, he claimed 3 allowances. Compute his federal withholding tax.

Solution

The procedure is almost identical, except that Barry is in a higher tax bracket than Albert was. Three federal withholding allowances are worth:

$$3 \times 115.38 = 346.14$$

This leaves a taxable income of:

$$3746.65 - 346.14 = 3400.51$$

On Table 2b (figure 3), this income puts Barry in the 27% tax bracket. This row reads:

Over \$1983 But not over \$4219 \$237.15 plus 27% of excess over \$1983

The tax is then computed as follows:

$$3400.51 - 1983.00 = 1417.51$$

$$1417.51 \times 0.27 = 382.73$$

$$382.73 + 237.15 = 619.88$$

Therefore, Barry's federal income tax withholding was \$619.88. Notice that in this example, one additional step was necessary. The reason is that Barry was not in the lowest non-zero tax bracket, and therefore the \$237.15 amount was the tax on the first \$1,983 of his taxable income.

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When you work problems involving withholding taxes, remember that the order of operations is critical. Using the steps in the wrong order, or omitting steps, will produce incorrect answers.

Exercises 3.4

A Find the federal and state withholding taxes for each of the following employees.

	<u>Employee</u>	<u>Earnings</u>	<u>Pay period</u>	<u>Status</u>	<u>Allowances</u>
1.	D. Carter	\$1800	monthly	M	3
2.	F. Ellis	\$625	weekly	M	2
3.	H. Gardner	\$958.25	semimonthly	S	1
4.	P. Tuttle	\$1014.18	biweekly	S	1
5.	V. Sanchez	\$948.51	weekly	S	3
6.	K. Johnson	\$641.83	biweekly	M	0
7.	L. Porter	\$6853.55	monthly	S	0
8.	T. Pritchett	\$7341.88	semimonthly	M	6

- B
9. Joe is married and claims 3 allowances. The gross earnings on his last biweekly check were \$1895. Find Joe's federal and state withholding taxes.
 10. Diana's gross earnings for last week were \$589. She is single and claims 2 allowances. Find the deductions for her federal and state withholding taxes.
 11. Walter's gross earnings were \$4,596 on his last monthly check. He is single and claims 1 allowance. Find his federal and state withholding taxes.
 12. Lorraine is married and claims 5 allowances. Her gross earnings on her last semimonthly check were \$2,095. Find her federal and state withholding taxes.
 13. Carla is married and claims no allowances. On last week's semimonthly check, her gross earnings were \$8,399.52. Find her federal and state withholding taxes.
 14. John is single and claims 3 allowances. His gross earnings were \$2,533.41 for the last two weeks. Find his federal and state withholding taxes.
 15. Linda is married and claims 6 allowances. Her gross earnings last week were \$952.44. Find her federal and state withholding taxes.
 16. Steve is married and claims 10 allowances. The gross earnings on his last monthly check were \$3,152.44. Find his federal and state withholding taxes.
 17. Jeanne receives gross earnings of \$2,554.33 every month. She is married and claims 4 allowances. Find her federal and state withholding taxes.
 18. Don receives gross earnings of \$679.92 every week. He is single and claims one allowance. Find his federal and state withholding taxes.
 19. Lucille is single and claims two allowances. Her gross earnings for the last two weeks were \$1,336.50. Find her federal and state withholding taxes.
 20. Larry is married and claims three allowances. His gross earnings for the last half-month were \$1,446.25. Find his federal and state withholding taxes.

3.5 After Taxes

In the previous two sections we discussed six specific taxes, namely federal and state withholding tax, Social Security and Medicare, and federal and state unemployment tax. (In this discussion, we are considering the Self-Employment Tax as Social Security and Medicare for the self-employed person, rather than as a separate tax.) These six payroll taxes are those which are incurred by either the employee or the employer as a result of the employee-employer relationship. Both employees and employers pay many other taxes, but most others are not as a result of employment. (For example, employees pay sales tax on purchases, and employers pay income taxes on profits.)

Some payroll taxes are deducted from the gross earnings of employees, and some are paid by the employer from his revenues. It is very important to remember which taxes are paid by which party. We can summarize the situation regarding required payroll taxes as follows:

<u>Employee Deductions</u>	<u>Employer Expense</u>
Federal Withholding Tax (FWT)	Social Security (OASDI)
State Withholding Tax (SWT)	Medicare (HI)
Social Security (OASDI)	Federal Unemployment Tax (FUTA)
Medicare (HI)	State Unemployment Tax (SUTA)

The FICA taxes (Social Security and Medicare) show up in each list, since they are both an employee deduction and an employer expense. That is, the employer must match the amount deducted from an employee's check, and submit both portions to the federal government.

Both employer and employee shares of the two FICA taxes, and the employee deductions for the federal withholding tax, are sent to a financial institution authorized by the U.S. Treasury to collect these taxes. Businesses with large tax liabilities may be required to make these payments almost daily, whereas very small businesses may only need to make annual payments. In any case, businesses must submit a quarterly federal tax return (Form 941) reporting the details. Federal unemployment taxes are paid separately from FICA and FWT, and are reported annually (on Form 940). State withholding and unemployment taxes are, of course, paid and reported to the state, not the federal, government.

In addition to these required payroll taxes, employees often choose to have the costs of other benefits deducted from their earnings (e.g. union dues, medical benefits, retirement annuities, and savings bonds), while employers may often provide other benefits for their employees (e.g. medical benefits, pension plans, and vacation time). All of the tax deductions, and any other deductions, are subtracted from an employee's gross earnings to obtain his **net earnings**. Also, additional taxes and other costs to the employer will increase the employer's cost of doing business beyond the gross earnings of his employees.

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Example 1

Gina is married, claims 3 withholding allowances, and earned \$2,533 on her last biweekly check. Her prior cumulative earnings were \$6,882.57. Besides the required taxes, she has chosen to have her union dues (\$442 per year, prorated biweekly) and her share of the cost of medical benefits (20% of the annual cost of \$4,200, prorated biweekly) deducted from her gross earnings. Gina's employer, Nelson Automotive, pays 80% of the cost of the medical benefits. Nelson Automotive's state unemployment tax rate is 3.88% on the first \$8,000. Find Gina's net pay for this week.

Solution

There are normally four required deductions (state and federal withholding tax, Social Security and Medicare) and two elective deductions (union dues and medical benefits). We compute them as follows:

Federal Withholding:	$3 \times 115.38 = 346.14$ allowances $2533 - 346.14 = 2186.86$ taxable Table 2b: \$237.15 plus 27% of excess over \$1983 $2186.86 - 1983 = 203.86$ $203.86 \times 0.27 = 55.04$ $55.04 + 237.15 = \underline{\$292.19}$
State Withholding:	$3 \times 86.54 = 259.62$ allowances $2533 - 259.62 = 2273.38$ taxable Table 2b: \$40.38 plus 6.25% of excess over \$1385 $2273.38 - 1385 = 888.38$ $888.38 \times 0.0625 = 55.52$ $55.52 + 40.38 = \underline{\$95.90}$
Social Security:	$6882.57 + 2533 = 9415.57$, not over ceiling of \$84900 $2533 \times 0.062 = \underline{\$157.05}$
Medicare:	$2533 \times 0.0145 = \underline{\$36.73}$
Union Dues:	$442 \div 26 = \underline{\$17.00}$
Medical Benefits:	$4200 \times 0.20 = 840$ $840 \div 26 = \underline{\$32.31}$
Total Deductions:	$292.19 + 95.90 + 157.05 + 36.73 + 17.00 + 32.31 = \631.18
Net Pay:	$2533 - 631.18 = \$1901.82$

Gina will have \$631.18 deducted from her \$2,533 gross salary, leaving her with a net pay of \$1,901.82.

Example 2

Using example 1, find the cost to Nelson Automotive for employing Gina this week.

Solution

Nelson Automotive will have incurred four required payroll taxes (Social Security and Medicare, and federal and state unemployment tax), plus the medical benefits they elected to provide their employees. We can compute them as follows:

Social Security: \$157.05 (a matching share)

Medicare: \$36.73 (a matching share)

Federal Unemployment: $6882.57 + 2533 = 9415.57$, over ceiling of \$7000
 $7000 - 6882.57 = 117.43$
 $117.43 \times 0.008 = \underline{\$0.94}$

State Unemployment: $6882.57 + 2533 = 9415.57$, over ceiling of \$8000
 $8000 - 6882.57 = 1117.43$
 $1117.43 \times 0.0388 = \underline{\$43.36}$

Medical Benefits: $4200 \times 0.80 = 3360$
 $3360 \div 26 = \underline{\$129.23}$

Total Taxes and Benefits: $157.05 + 36.73 + 0.94 + 43.36 + 129.23 = \367.31

Total Cost: $2533 + 367.31 = \$2900.31$

Nelson Automotive will spend \$2,900.31 this week for employing Gina. This includes Gina's gross salary of \$2,533, plus \$367.31 in additional taxes and benefits.

Employment taxes are a large cost to employers, and a large deduction from an employee's gross pay. Economists measure this tax burden through the use of an **effective tax rate**, which computes the rate of tax paid based on the gross salary, as if all income were taxed at the same rate. Effective tax rates can be computed for single taxes, for all tax deductions, or for both tax deductions and hidden taxes (those paid by the employer are essentially hidden from the employee).

Example 3

Using the details from example 1, find Gina's effective federal income tax rate.

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Solution

From Gina's \$2,533 gross salary, she paid \$292.19 in withholding for the federal income tax. Using a PBR diagram, we find

$$R = \frac{P}{B} = \frac{292.19}{2533.00} \approx 0.1154 = 11.54\%$$

Gina paid an effective federal income tax rate of 11.54%.

Notice that Gina's effective tax rate, 11.54%, is not the same as the 27% rate of the tax bracket for her salary. The tax bracket rate is a **marginal tax rate**, or rate paid on the next dollar of earnings. Since much of Gina's income was taxed at a rate lower than her 27% marginal rate, her effective rate was also lower than 27%.

The use of multirate taxes, or the use of tax floors or ceilings, will generally cause the marginal tax rate to be different than the effective tax rate. When the tax rates increase for larger salaries, then the tax is called a **progressive tax**, and the effective tax rate will be lower than the marginal rate. The federal income tax is an example of a progressive tax. On the other hand, when tax rates decrease for larger salaries, then the tax is called a **regressive tax**, and the effective tax rate will be larger than the marginal rate. The use of wage ceilings produces regressive taxes, since the tax bracket for the highest incomes is basically 0%. The Social Security tax and the unemployment taxes are examples of regressive taxes.

Example 4

Using all of the tax deductions from example 1, find Gina's effective tax rate.

Solution

We have to be careful not to use deductions for other benefits, only for taxes. The total tax deductions from Gina's gross pay are:

$$292.19 + 95.90 + 157.05 + 36.73 = \$581.87$$

Using a PBR formula, we find

$$R = \frac{P}{B} = \frac{581.87}{2533.00} \approx 0.2297 = 22.97\%$$

Gina's tax deductions produced an effective tax rate of 22.97%. In other words, Gina had 22.97% of her gross pay withheld for taxes.

Effective tax rates of 20% to 30% are quite common. However, economists will (rightly) point out that the computation ignores taxes hidden from the employee, by requiring the employer to pay them without deducting them from the employee's salary. Their argument is that the employer paid a certain amount in labor costs, and if the government had not taken some of that amount, it

would all have gone to the employee as salary. An economist would combine the \$581.87 tax deductions (which we found in example 4) with \$238.08 in employer taxes (unemployment and FICA from example 2), and compare that total with the income of \$2900.31 (from example 2), for an effective tax rate of 28.27%. That is, 28.27% of the costs paid for Gina's labor went for taxes. In this book, though, we will assume that the base is the employee's gross pay, unless a problem states otherwise.

Exercises 3.5

- B**
1. Joan earns \$1700 biweekly. She is married and claims 3 allowances. Her employer has a state unemployment tax rate of 4.6%.
 - a. Find her net pay for one pay period.
 - b. Find Joan's effective tax rate.
 - c. How much does it cost to employ her for the first pay period of the year?
 - d. Express the net pay as a percent of the employer's cost.

 2. Felix is paid \$2000 per month. He is single and claims 2 allowances. So far this year he has earned \$6000. His employer has a 2.9% state unemployment tax rate.
 - a. What is his net pay for this month?
 - b. Find the effective tax rate.
 - c. How much does it cost to employ him for this month?
 - d. Express the net pay as a percent of the employer's cost.

 3. Karl has earned \$12,000 so far this year. He is married, claims no allowances, and is paid \$1350 weekly. His employer has a state unemployment tax rate of 5.7%.
 - a. What is his net pay for the next week?
 - b. Find Karl's effective tax rate.
 - c. How much does it cost to employ him during the next week?
 - d. Express the net pay as a percent of the employer's cost.

 4. John McDonald is employed by Lee & Sterling. He is married, claims 2 withholding allowances, and earns \$16.97 per hour. He has also chosen to have his union dues (\$405 annually) and medical insurance (\$5500 per year, of which his employer pays 70%) deducted from his weekly paycheck. His cumulative gross earnings prior to this paycheck were \$7858.26. This week he worked 49 hours and 45 minutes. The union contract states that time-and-a-half is paid for all hours worked over 38 hours per week. Lee & Sterling's Kansas unemployment tax rate is 3.25%.
 - a. Find John McDonald's net pay for this week.
 - b. Find John's effective tax rate.
 - c. Find Lee & Sterling's total cost for employing John McDonald this week.
 - d. Express the net pay as a percent of the employer's cost.

Chapter 3 Review

Summary of Important Concepts

- Pay periods: monthly, semimonthly, biweekly, weekly
- Salary
- Hourly wages and overtime
- Commission and returns
- Piecework and chargebacks
- FICA: Social Security and Medicare
- FUTA & SUTA (unemployment) taxes
- FWT & SWT (withholding) taxes
- Gross pay and net pay
- Effective tax rates

Exercises

1. Ron earns \$2584 monthly. How much is that each week?
2. Sheila earns \$8.55 per hour, with time-and-a-half paid for working over 40 hours per week. How much is her gross pay, if she works 45 hours and 15 minutes this week?
3. Tom earns a 4% commission on the first \$16000 worth of sales each month, and 7% on all sales in excess of \$16000. How much is his commission if he sells \$44200 this month and has returns of \$2490?
4. Sally boxes peaches. She earns 35 cents per box for the first 200 boxes per week, and 40 cents per box for boxes beyond the first 200. If she packs 375 boxes, what are her gross earnings?
5. Lynn is married and claims 4 allowances. The gross wages on her biweekly paycheck are \$2039.88. How much are Lynn's federal and state withholding taxes?
6. Mark had prior cumulative gross earnings of \$84,825.41. The gross wages on this week's paycheck are \$1566.97. What are the amounts of this week's Social Security and Medicare deductions?
7. Nora is self-employed. If she earned \$19,428.23 during the first quarter of this year, what will be the amounts of her first quarter Self-Employment Tax?
8. Brian earned \$4889.92 during the first quarter of the year. His employer, Stevens Industries, has a Kansas unemployment tax rate is 2.66%. For the first quarter of this year, how much does Stevens owe for federal and state unemployment taxes due to employing Brian?
9. Cathy is single and claims five allowances. She earned \$1,925.57 for the last week. Her prior cumulative earnings were \$34,562.71. What will be her net pay for the current paycheck? What is Cathy's effective tax rate?
10. Don is married and claims two allowances. He earned \$2,688.42 during this month, and his prior cumulative earnings were \$5,277.83. What is the cost to Don's employer for having Don on the payroll this month? Use a SUTA rate of 4.28% on the first \$8,000.

Withholding Tax Tables: 2002

for the textbook *Business Math: Using Percents*, by Steven J. Wilson

Federal Allowance Values - 2002

Payroll Period	One Withholding Allowance
Weekly	\$ 57.69
Biweekly	115.38
Semimonthly	125.00
Monthly	250.00
Annually	3,000.00

State Allowance Values - 2002

Payroll Period	One Withholding Allowance
Weekly	\$ 43.27
Biweekly	86.54
Semimonthly	93.75
Monthly	187.50
Annually	2,250.00

**Tables for Percentage Method of Federal Withholding
(For Wages Paid in 2002)**

TABLE 1 – WEEKLY Payroll Period							
(a) SINGLE person (including head of household)– If the amount of wages (after subtracting withholding allowances) is:				(b) MARRIED person– If the amount of wages (after subtracting withholding allowances) is:			
		The amount of income tax to withhold is:				The amount of income tax to withhold is:	
Not over \$51		\$0		Not over \$124		\$0	
Over–	But not over		of excess over–	Over–	But not over		of excess over–
\$51	–\$164 . . .	10%	–\$51	\$124	–\$355 . . .	10%	–\$124
\$164	–\$570 . . .	\$11.30 plus 15%	–\$164	\$355	–\$991 . . .	\$23.10 plus 15%	–\$355
\$570	–\$1,247 . . .	\$72.20 plus 27%	–\$570	\$991	–\$2,110 . . .	\$118.50 plus 27%	–\$991
\$1,247	–\$2,749 . . .	\$254.99 plus 30%	–\$1,247	\$2,110	–\$3,400 . . .	\$420.63 plus 30%	–\$2,110
\$2,749	–\$5,938 . . .	\$705.59 plus 35%	–\$2,749	\$3,400	–\$5,998 . . .	\$807.63 plus 35%	–\$3,400
\$5,938	. . . . .	\$1,821.74 plus 38.6%	–\$5,938	\$5,998	. . . . .	\$1,716.93 plus 38.6%	–\$5,998

TABLE 2 – BIWEEKLY Payroll Period							
(a) SINGLE person (including head of household)– If the amount of wages (after subtracting withholding allowances) is:				(b) MARRIED person– If the amount of wages (after subtracting withholding allowances) is:			
		The amount of income tax to withhold is:				The amount of income tax to withhold is:	
Not over \$102		\$0		Not over \$248		\$0	
Over–	But not over		of excess over–	Over–	But not over		of excess over–
\$102	–\$329 . . .	10%	–\$102	\$248	–\$710 . . .	10%	–\$248
\$329	–\$1,140 . . .	\$22.70 plus 15%	–\$329	\$710	–\$1,983 . . .	\$46.20 plus 15%	–\$710
\$1,140	–\$2,493 . . .	\$144.35 plus 27%	–\$1,140	\$1,983	–\$4,219 . . .	\$237.15 plus 27%	–\$1,983
\$2,493	–\$5,498 . . .	\$509.66 plus 30%	–\$2,493	\$4,219	–\$6,800 . . .	\$840.87 plus 30%	–\$4,219
\$5,498	–\$11,875 . . .	\$1,411.16 plus 35%	–\$5,498	\$6,800	–\$11,996 . . .	\$1,615.17 plus 35%	–\$6,800
\$11,875	. . . . .	\$3,643.11 plus 38.6%	–\$11,875	\$11,996	. . . . .	\$3,433.77 plus 38.6%	–\$11,996

TABLE 3 – SEMIMONTHLY Payroll Period							
(a) SINGLE person (including head of household)– If the amount of wages (after subtracting withholding allowances) is:				(b) MARRIED person– If the amount of wages (after subtracting withholding allowances) is:			
		The amount of income tax to withhold is:				The amount of income tax to withhold is:	
Not over \$110		\$0		Not over \$269		\$0	
Over–	But not over		of excess over–	Over–	But not over		of excess over–
\$110	–\$356 . . .	10%	–\$110	\$269	–\$769 . . .	10%	–\$269
\$356	–\$1,235 . . .	\$24.60 plus 15%	–\$356	\$769	–\$2,148 . . .	\$50.00 plus 15%	–\$769
\$1,235	–\$2,701 . . .	\$156.45 plus 27%	–\$1,235	\$2,148	–\$4,571 . . .	\$256.85 plus 27%	–\$2,148
\$2,701	–\$5,956 . . .	\$552.27 plus 30%	–\$2,701	\$4,571	–\$7,367 . . .	\$911.06 plus 30%	–\$4,571
\$5,956	–\$12,865 . . .	\$1,528.77 plus 35%	–\$5,956	\$7,367	–\$12,996 . . .	\$1,749.86 plus 35%	–\$7,367
\$12,865	. . . . .	\$3,946.92 plus 38.6%	–\$12,865	\$12,996	. . . . .	\$3,720.01 plus 38.6%	–\$12,996

TABLE 4 – MONTHLY Payroll Period							
(a) SINGLE person (including head of household)– If the amount of wages (after subtracting withholding allowances) is:				(b) MARRIED person– If the amount of wages (after subtracting withholding allowances) is:			
		The amount of income tax to withhold is:				The amount of income tax to withhold is:	
Not over \$221		\$0		Not over \$538		\$0	
Over–	But not over		of excess over–	Over–	But not over		of excess over–
\$221	–\$713 . . .	10%	–\$221	\$538	–\$1,538 . . .	10%	–\$538
\$713	–\$2,471 . . .	\$49.20 plus 15%	–\$713	\$1,538	–\$4,296 . . .	\$100.00 plus 15%	–\$1,538
\$2,471	–\$5,402 . . .	\$312.90 plus 27%	–\$2,471	\$4,296	–\$9,142 . . .	\$513.70 plus 27%	–\$4,296
\$5,402	–\$11,913 . . .	\$1,104.27 plus 30%	–\$5,402	\$9,142	–\$14,733 . . .	\$1,822.12 plus 30%	–\$9,142
\$11,913	–\$25,729 . . .	\$3,057.57 plus 35%	–\$11,913	\$14,733	–\$25,992 . . .	\$3,499.42 plus 35%	–\$14,733
\$25,729	. . . . .	\$7,893.17 plus 38.6%	–\$25,729	\$25,992	. . . . .	\$7,440.07 plus 38.6%	–\$25,992

Answers to Selected Exercises

Exercises 3.3

1.	\$22.22, \$5.20	13.	\$0.33, \$32.78	25.	\$33.54, \$9.50
3.	\$75.96, \$17.77	15.	\$0, \$7.69	27.	\$89.09, \$47.24
5.	\$0, \$36.74	17.	\$74.77, \$23.04	29.	\$3.65, \$46.54
7.	\$7.06, \$17.17	19.	\$129.89, \$30.38	31.	\$8.55, \$57.30
9.	\$68.86, \$22.31	21.	\$14.51, \$19.36	33.	\$11.46, \$103.76
11.	\$77.27, \$18.07	23.	\$121.64		

Exercises 3.4

1.	\$51.20, \$25.81	9.	\$172.03, \$56.03	15.	\$60.80, \$20.24
3.	\$96.19, \$29.04	11.	\$819.15, \$228.85	17.	\$102.45, \$45.65
5.	\$127.67, \$39.98	13.	\$2,111.24, \$486.27	19.	\$139.21, \$49.65
7.	\$1,539.74, \$386.56				

Exercises 3.5

1a.	\$1,383.33	1d.	71.98%	3c.	\$1,453.28
1b.	18.63%	3a.	\$969.82	3d.	66.73%
1c.	\$1,921.85	3b.	28.16%		

Exercises – Chapter 3 Review

1.	\$596.31	5.	\$176.45, \$59.68	8.	\$39.12, \$130.07
2.	\$409.33	6.	\$4.62, \$22.72	9.	\$1,308.81, 32.03%
3.	\$2,439.70	7.	\$2,972.52	10.	\$3,022.92
4.	\$140				