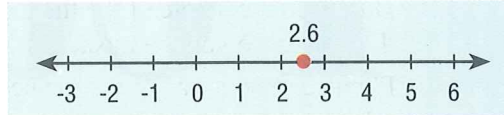A *number line* assigns each real number a point on the line. A number line is helpful in comparing numbers and examining some of the relationships between numbers, especially inequalities.

Graph each number on a number line and describe the position of each number.

Example   2.6

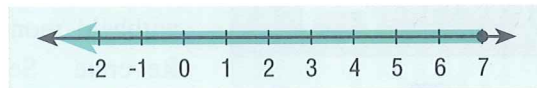The number 2.6 is a little more than half way between 2 and 3.

2.6
-3 -2 -1 0 1 2 3 4 5 6

1. -1.5 **2.** $6\frac{1}{3}$ **3.** $-\frac{8}{3}$ **4.** π **5.** $\sqrt{2}$ **6.** $(-2.5)^2$

Inequalities can be represented on the number line. A *solid circle* at an end point means that the point is included in the set. An *open circle* means the number is excluded.

Graph each inequality on a number line.

Example $x \leq 7$

-2 -1 0 1 2 3 4 5 6 7

7. $x > 1$ **8.** $x < -2$ **9.** $-2 \leq x$ **10.** $5 \geq x$

A *compound inequality* satisfies more than one condition. When two conditions are linked by "and," the solution set is the *intersection* of the sets satisfying the conditions. A number in both sets is in the solution set. Sometimes "and" is not written but it is clear that two conditions are given. When two conditions are linked by "or," the solution is the *union* of two sets. A number is in the solution set if it satisfies either one or the other condition or both conditions.
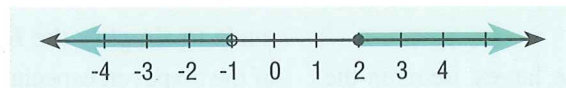
Graph the solution set on the number line.

Example: **a.** $-3 \leq x \leq 5$ **b.** $x < -1$ or $x \geq 2$

a. $-3 \leq x \leq 5$ means $-3 \leq x$ and $x \leq 5$

-4 -3 -2 -1 0 1 2 3 4 5 6

b. $x < -1$ or $x \geq 2$

-4 -3 -2 -1 0 1 2 3 4

11. $1 \leq x < 10$ **12.** $x \leq -2$ or $x > 3$ **13.** $x \leq 5$ and $x > 0$

14. $1 \geq x$ or $1 \leq x$ **15.** $-5 < x < 0$ **16.** $0 < x$ and $x < 1$

Federal

Paying the Price

WHETHER OR NOT WE AGREE WITH HOW our tax dollars are spent, most of us would not want to do without at least some of the services that our federal, state, and local governments provide.

Taxes are one of the largest items in the family budget. The average taxpayer works every year from January 1 to around early May just to cover tax obligations. However, most of the tax that we pay never goes through our hands; our employer withholds some of our pay for taxes and sends that withheld money directly to the Internal Revenue Service (IRS). In most communities, part of the withheld money goes also to the state and local governments for its taxes. If it were not for the discipline of having the government regularly withholding part of our pay, many of us might find it difficult to meet our tax obligation at all.

Even so, before every April 15, each of us must calculate our income for the previous year, and if it is above a certain minimum amount, we must file a tax form with the IRS. Since there are so many kinds of income, the IRS has devised forms to accommodate the various possibilities. These forms do take some getting used to.

From time to time, attempts have been made to simplify the forms for the benefit of the taxpayer, especially the taxpayer who does not have a complicated tax situation.

Income Tax:

Three of our high school students will examine the three tax forms that individuals most frequently encounter. The students will demonstrate how, for many individuals, the forms are fairly easy to complete. They will also come in contact with sources of assistance in filling out the forms. Unfortunately, these sources do not extend their assistance to making the tax payments themselves; for that, we are on our own!

FINDING YOUR INCOME TAX
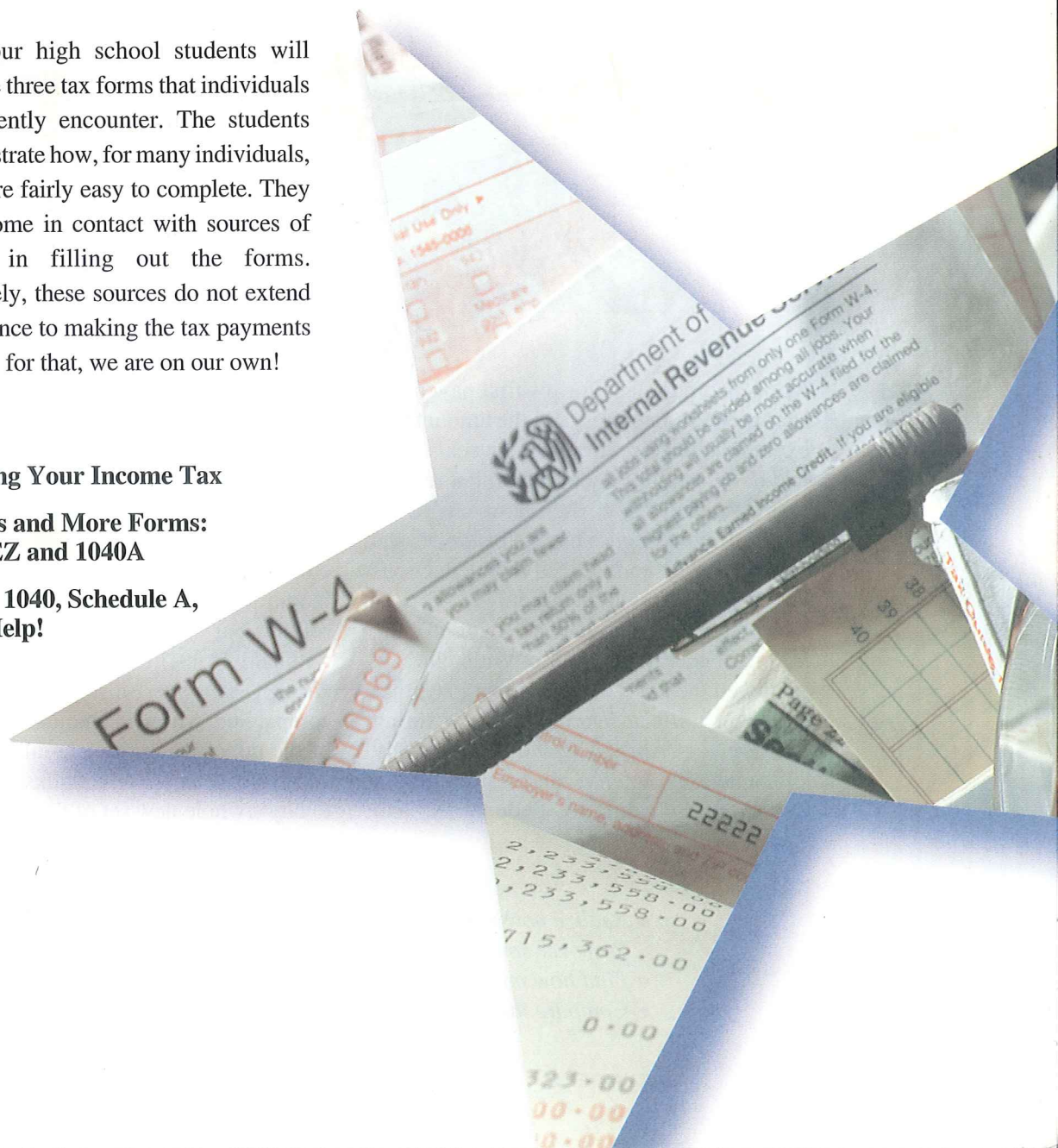
Luis had big plans for his first paycheck. His car needed some tires, and the amount that he expected to receive for his first week's work should have been just enough. For that reason, he was quite surprised when he received the check—$11.89 was missing! He examined the stub more closely and noticed that deductions had been made from his salary.

The largest deduction caught his attention: "Federal Income Tax Withheld." He remembered the mass of papers that his father and mother shuffle and sort once a year during the first week of April. The activity is usually accompanied by intense discussions about depreciation, Schedule A deductions, and other equally strange notions. In addition, there are invariably many unkind comments about wasteful government spending. Now it is Luis's turn to deal with income taxes.

He is determined to figure out what it all means. He received his W-2 form from his employer and knows that he must file a federal income tax return. He hopes to receive a refund but wonders whether the amount withheld from his paycheck will *really* be enough to cover his taxes. He plans to compare the withheld amount with the amount of the tax given in the federal tax table. If he gets back as much as he thinks, he will be able to buy a whole new set of tires for his car.

OBJECTIVES: *In this lesson, we will help Luis to:*

● *Realize how much of the year a person works to pay income taxes.*
● *Discover some of the characteristics of the federal income tax system.*
● *Find how much income tax will be owed in specific cases.*
● *Compare the tax owed with the amount withheld by the employer.*

THE PRICE TAG OF GOVERNMENT

Taxes are what we pay for civilized society.
Oliver Wendell Holmes, Jr.

In this world nothing is certain but death and taxes.
Benjamin Franklin

Since Luis first realized that all his earnings were being taxed by the federal government, he has noticed newspaper and magazine articles about taxes. One that recently caught his attention was entitled "Tax-Freedom Day." As he read, he discovered that the Tax Foundation Incorporated, a private organization, calculates an annual Tax Freedom Day, the day each year when the average American will stop working to pay for government services. To Luis this meant that if he were working full time and receiving a full salary, the amount of money that he would pay the government in taxes for the year would be equivalent to what he would earn from the beginning of January to May 1.

The table that follows shows how the cost of government as measured by the number of working days has increased considerably between 1930 and the present. The Tax Foundation estimates that typical workers pay approximately one third of their earnings into local, state, and federal taxes. Luis certainly hopes that these governments are using his money wisely.

TAX FREEDOM DAYS	
1930	February 13
1940	March 8
1950	April 3
1955	April 9
1960	April 17
1965	April 15
1970	April 28
1975	April 28
1980	April 28
1985	May 1
1990	May 5
1991	May 8

HOW DID THIS HAPPEN?

Luis wondered whether governments in our country have always needed so much money. As he looked into the matter, he discovered that for its first 100 years the United States covered its expenses by imposing taxes on certain goods manufactured here and on products brought in from other countries. Then our country changed from a society that was mainly rural and agricultural to one that was mainly industrial. This change was accompanied

by a growth in the role played by the federal government. As a consequence, the federal government's need for income increased. The 16th Amendment, adopted in 1913, gave Congress the power to pass income tax laws. We now have taxes on income as well as on sales and property.

UNITED STATES INDIVIDUAL INCOME TAX

Luis also discovered some features of the elaborate process that we go through to supply funds to our government. The **individual income tax** is imposed on an individual's earnings from wages, salary, tips, interest, rents, dividends, and capital gains. It is the largest revenue-producing tax for the federal government. Each year, on or before April 15, U.S. citizens and other legal residents determine their tax liability and usually either pay the amount that is due or request a refund. The only other possibility is to allow the government to apply the refund toward next year's tax liability.

Here are some of the characteristics of our income tax system.

Ability to Pay The federal income tax rules are designed to match one's ability to pay. To accomplish this goal, the IRS has established a **progressive tax schedule,** one that takes an increasingly higher share of any additional income that you earn. That explains why Luis's parents will pay a higher percent of their income for taxes than he does. A person with a very low income may even owe no federal income tax at all.

Voluntary Compliance   Another characteristic of the federal personal income tax is voluntary compliance. The Internal Revenue Service relies on Luis and the rest of us to meet our tax responsibilities faithfully. However, any U.S. citizen or other legal resident who does not pay taxes voluntarily can be fined or even imprisoned; tax evasion is illegal.

Pay-as-You-Earn   Luis especially appreciates a feature of the federal tax system known as **pay-as-you-earn.** As we receive types of income that are subject to a tax, money is held back to pay the tax. These types of income include tips, pensions, gambling winnings, and, in Luis's case, wages. This system helps prevent Luis and other taxpayers from owing large amounts of taxes on April 15 of the following year. Luis's employer is responsible for withholding tax from Luis's paycheck and depositing it with the IRS. Luis learned how much money had been withheld from his paycheck during the year when he received his Form W-2 from his employer early in the following year.

1 Control number	22222	For Official Use Only ▶ OMB No. 1545-0008		
2 Employer's name, address, and ZIP code		6 Statutory employee ☐ Deceased ☐ Pension plan ☐ Legal rep. ☐ 942 emp. ☐ Subtotal ☐ Deferred compensation ☐ Void ☐		
		7 Allocated tips	8 Advance EIC payment	
		9 Federal income tax withheld	10 Wages, tips, other compensation	
3 Employer's identification number	4 Employer's state I.D. number	11 Social security tax withheld	12 Social security wages	
5 Employee's social security number		13 Social security tips	14 Medicare wages and tips	
19a Employee's name (first, middle initial, last)		15 Medicare tax withheld	16 Nonqualified plans	
		17 See Instrs. for Form W-2	18 Other	
19b Employee's address and ZIP code				
20	21	22 Dependent care benefits	23 Benefits included in Box 10	
24 State income tax	25 State wages, tips, etc.	26 Name of state	27 Local income tax	28 Local wages, tips, etc.	29 Name of locality

Copy A For Social Security Administration   Cat. No. 10134D   Department of the Treasury—Internal Revenue Service

Form **W-2 Wage and Tax Statement 19--**

For Paperwork Reduction Act Notice and instructions for completing this form, see separate instructions.

FORM W-2

Every employer for whom Luis works during the year must provide him with a W-2 form for the period of time during which he worked. This form provides a record of wages earned as well as federal, state, and other taxes withheld during the year. When Luis files his tax return, he must submit a copy of each of his W-2 forms at the same time.

TAX TABLES

You can find your **tax liability,** the amount you owe, in the **tax tables,** which you can obtain from the IRS. (A typical set of these tables are in the Reference Section at the back of the book.) Before you can use the tables, however, you need to find your *taxable income.* **Taxable income** is the amount of money that you actually make during the year *minus* certain adjustments, deductions, and exemptions that the government allows.

After you know your taxable income, you use the column in the table that is appropriate for your filing status. A portion of a tax table is shown in Skill 1. There are columns for single people, married people filing jointly, married people filing separately, and heads of households. Read down the income column until you find your taxable income. Then read across to the column that applies to you. The amount shown is your tax. (For married couples, filing a **joint return** often results in lower taxes, especially if one income is lower than the other.)

Ask Yourself

1. What is an income tax?

2. How long does the average person have to work in a year to earn the amount of money that he or she pays to the government in taxes?

3. What are two characteristics of our income tax system?

SKILL 1

EXAMPLE 1 Elizabeth's taxable income for the past year was $2,275.

QUESTION How much tax does she owe?

SOLUTION

Use the portion of the Tax Table shown below. Read down the income column headed "If line 5 (Form 1040EZ), line 22 (Form 1040A), or line 37 (Form 1040) is—" to find 2,275.

Notice that 2,275 is listed twice, once under the column marked "At least" and once under "But less than." Use the line where 2,275 is shown under the "At least" column. Read across to the column headed "Single." The amount in that column is 343.

Elizabeth owes $343.00 in income tax for the year.

Tax Table

If line 5 (Form 1040EZ), line 22 (Form 1040A), or line 37 (Form 1040) is–		And you are—				If line 5 (Form 1040EZ), line 22 (Form 1040A), or line 37 (Form 1040) is–		And you are—			
At least	But less than	Single	Married filing jointly *	Married filing sepa- rately	Head of a house- hold	At least	But less than	Single	Married filing jointly *	Married filing sepa- rately	Head of a house- hold
		Your tax is—						Your tax is—			
1,900	1,925	287	287	287	287	3,400	3,450	514	514	514	514
1,925	1,950	291	291	291	291	3,450	3,500	521	521	521	521
1,950	1,975	294	294	294	294	3,500	3,550	529	529	529	529
1,975	2,000	298	298	298	298	3,550	3,600	536	536	536	536
2,000						3,600	3,650	544	544	544	544
						3,650	3,700	551	551	551	551
2,000	2,025	302	302	302	302	3,700	3,750	559	559	559	559
2,025	2,050	306	306	306	306	3,750	3,800	566	566	566	566
2,050	2,075	309	309	309	309						
2,075	2,100	313	313	313	313	3,800	3,850	574	574	574	574
2,100	2,125	317	317	317	317	3,850	3,900	581	581	581	581
2,125	2,150	321	321	321	321	3,900	3,950	589	589	589	589
2,150	2,175	324	324	324	324	3,950	4,000	596	596	596	596
2,175	2,200	328	328	328	328	**4,000**					
2,200	2,225	332	332	332	332	4,000	4,050	604	604	604	604
2,225	2,250	336	336	336	336	4,050	4,100	611	611	611	611
2,250	2,275	339	339	339	339	4,100	4,150	619	619	619	619
2,275	2,300	343	343	343	343	4,150	4,200	626	626	626	626
2,300	2,325	347	347	347	347	4,200	4,250	634	634	634	634
2,325	2,350	351	351	351	351	4,250	4,300	641	641	641	641
2,350	2,375	354	354	354	354	4,300	4,350	649	649	649	649
2,375	2,400	358	358	358	358	4,350	4,400	656	656	656	656

Taxpayers whose taxable income is over $100,000 do not use tax tables. Instead, they use the **Tax Rate Schedules** X, Y-1, Y-2, or Z. Schedule X, for filers who are single, is shown below.

Tax Rate Schedules

Caution: *Use only if your taxable income (Form 1040, line 37) is $100,000 or more. If less, use the Tax Table. Even though you cannot use the tax rate schedules below if your taxable income is less than $100,000, all levels of taxable income are shown so taxpayers can see the tax rate that applies to each level.*

Schedule X—Use if your filing status is **Single**

If the amount on Form 1040, line 37, is: Over—	But not over—	Enter on Form 1040, line 38	of the amount over—
$0	$21,450	.... 15%	$0
21,450	51,900	$3,217.50 + 28%	21,450
51,900	....	11,743.50 + 31%	51,900

You can construct a formula for any tax that is calculated using the Tax Rate Schedules. (Recall that the symbol < means "is less than" and the symbol ≤ means "is less than or equal to.")

Formulas for Tax Rate Schedule X (for *single* taxpayers)

i. $t = 0.15I$ if $I \le 21,450$

ii. $t = 3,217.50 + 0.28(I - 21,450)$ if $21,450 < I \le 51,900$

iii. $t = 11,743.50 + 0.31(I - 51,900)$ if $51,900 < I$

where I = taxable income
t = tax on the income

Although only taxpayers with income over $100,000 use the Tax Rate Schedules, the above formulas can be used by *any* single taxpayer as a rough check of the tax obtained from the Tax Table. The difference between the two methods of finding the tax may be about 5 or 10 dollars, although for someone with a high income the difference can be almost 20 dollars. The Tax Table, the Tax Rate Schedules, and other tax-related forms and schedules are those that were in effect for 1992. From time to time, tax laws are changed so that the particular details shown here may differ from those currently in effect. However, the overall principles and procedures affecting your tax obligations have not significantly changed.

EXAMPLE 2 Marilyn's taxable income is $102,000.

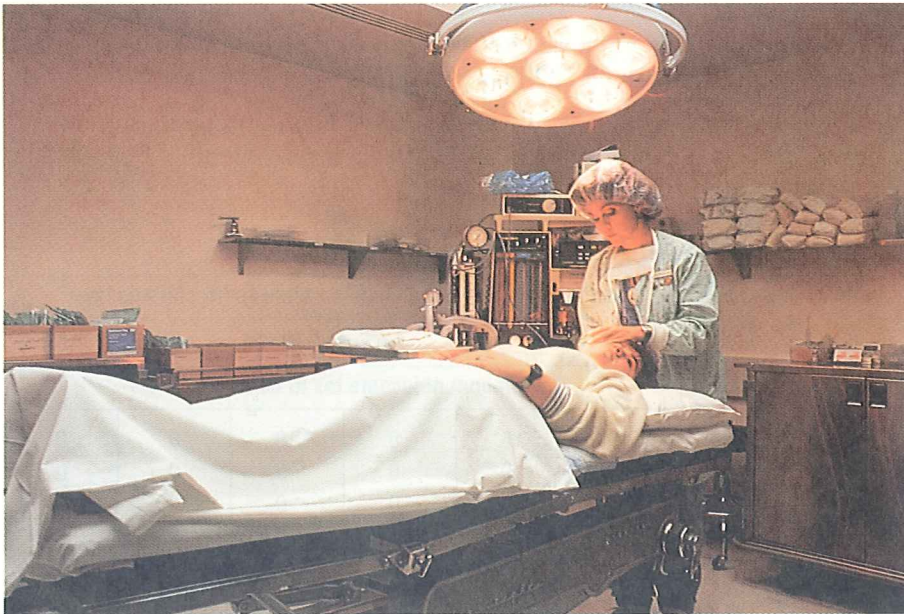**QUESTION** How much does Marilyn, who is single, pay in taxes?

SOLUTION

Since $51,900 < I,$ use the third Schedule X formula.

$t = 11,743.50 + 0.31(102,000 - 51,900)$
$t = 27,274.50$

Marilyn's tax is $27,274.50.

SKILL 3

To find taxable income $I,$ you must reduce the total income T by any *deductions D* and any *exemptions E.*

Taxable income = total income − (deductions + exemptions)
$$I = T - (D + E)$$

Deductions and exemptions will be explained more fully in later lessons.

EXAMPLE 3 Luis's monthly income for this year was $675. He had a deduction of $3600 and an exemption of $2300. He has one withholding allowance.

QUESTIONS 1. What was Luis's total income for the year?

2. What was his taxable income?

3. How much income tax does he owe?

4. How much was withheld from his paychecks?

5. Does he have a refund? If so, how much is it?

SOLUTIONS

1. His total yearly income was

    675 • 12,   or $8100

2. To find Luis's taxable income, you must reduce his total income by a *deduction* of $3600 and an *exemption* of $2300. Luis's taxable income is

    $I = T - (D + E)$
    $I = 8100 - (3600 + 2300)$
 $I = 2200$

    Luis's taxable income is $2200.

3. Use the Tax Table in the Reference Section or the abbreviated table in this section. The tax on $2200 is $332.

4. To find the amount that would have been withheld from Luis's check, look at the withholding tables for Single Persons—Monthly Payroll Period. A portion of that table is shown below.

SINGLE Persons—MONTHLY Payroll Period

If the wages are—		And the number of withholding allowances claimed is—					
		0	1	2	3	4	5
At least	But less than	The amount of income tax to be withheld is—					
500	520	45	16	0	0	0	0
520	540	48	19	0	0	0	0
540	560	51	22	0	0	0	0
560	580	54	25	0	0	0	0
580	600	57	28	0	0	0	0
600	640	61	32	3	0	0	0
640	680	67	38	9	0	0	0
680	720	73	44	15	0	0	0
720	760	79	50	21	0	0	0
760	800	85	56	27	0	0	0
800	840	91	62	33	3	0	0
840	880	97	68	39	9	0	0
880	920	103	74	45	15	0	0
920	960	109	80	51	21	0	0
960	1,000	115	86	57	27	0	0

In the table, locate Luis's monthly income of $675. It falls on the line that reads "At least 640, But less than 680." Use the column for one withholding allowance, the number that Luis chose when he completed his Form W-4 (see Lesson 1–4). Under that column, find the amount withheld, $38 per month. To find the yearly withholding, multiply the monthly amount by 12: 38 • 12 = 456. The withheld amount was $456.

5. The amount owed is less than the amount already withheld. The difference is 456 − 332, or 124. Luis can expect a refund of $124.
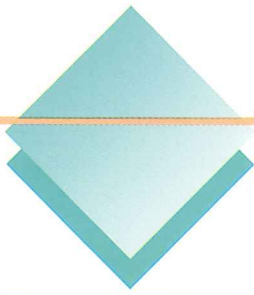
TRY YOUR SKILLS
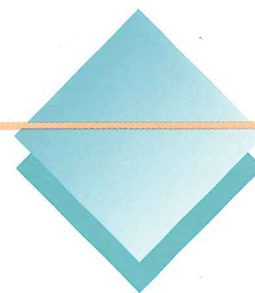
Use the Tax Table in this lesson or in the Reference Section to find the taxes owed on each of the following incomes. (In Exercise 4 a "head of household" could be a single parent or a person caring for an elderly parent.)

	Filing Status	Taxable Income	Tax Owed
1.	Single	$ 2,050	_____
2.	Married, filing jointly	2,200	_____
3.	Married, filing separately	2,268	_____
4.	Head of household	2,132	_____
5.	Single	11,000	_____
6.	Married, filing jointly	27,500	_____
7.	Head of household	42,000	_____
8.	Head of household	52,600	_____

People with taxable incomes over $100,000 must use the Tax Rate Schedules, but those with taxable incomes of less than $100,000 can also use the Tax Rate Schedules as a rough check on the tax that they obtain from the Tax Table. Use the appropriate Tax Rate Schedule formula to find the tax owed on each of the following incomes.

	Filing Status	Taxable Income	Formula	Tax Owed
9.	Single	$ 2,245	_____	_____
10.	Single	23,000	_____	_____
11.	Single	104,000	_____	_____
12.	Single	151,900	_____	_____
13.	Single	132,000	_____	_____
14.	Single	185,000	_____	_____
15.	Single	200,000	_____	_____

16. The taxpayers of Exercises 9 and 10 are not permitted to use the Tax Rate Schedule. Why not? If they were, which taxpayer would have a lower tax by using the Tax Rate Schedule than by using the Tax Table?

KEY TERMS

individual income
  tax
joint return
pay-as-you-earn
progressive tax
  schedule
tax liability
Tax Rate Schedules
tax tables
taxable income

1. Why is it necessary for people to pay federal income taxes?

2. What is the date by which personal income tax returns must be filed for the previous year?

3. Does the voluntary compliance nature of our income tax system mean that you legally have the right not to pay if you wish? If not, what does it mean?

Use the Tax Table in the Reference Section of the book to find the taxes owed on each of the following incomes.

	Filing Status	Taxable Income	Tax Owed
4.	Married, filing jointly	$ 8,870	_____
5.	Married, filing separately	47,850	_____
6.	Head of household	7,280	_____
7.	Single	10,170	_____

Use Tax Rate Schedule X or Y-1 in the Reference Section to find the tax owed on each of the incomes given in Exercises 8–12. (For taxpayers with taxable incomes less than $100,000, this method serves only as a rough check on the actual tax found in the tax table.) Use the two sets of formulas shown below, where I = taxable income and t = tax on the income.

Formulas for Tax Rate Schedule X (for single taxpayers)

i. $t = 0.15I$ if $I \leq 21,450$

ii. $t = 3,217.50 + 0.28(I - 21,450)$ if $21,450 < I \leq 51,900$

iii. $t = 11,743.50 + 0.31(I - 51,900)$ if $51,900 < I$

Formulas for Tax Rate Schedule Y-1 (married filing jointly or qualifying widow or widower)

i. $t = 0.15I$ if $I \leq 35,800$

ii. $t = 5,370.00 + 0.28(I - 35,800)$ if $35,800 < I \leq 86,500$

iii. $t = 19,566.00 + 0.31(I - 86,500)$ if $86,500 < I$

	Filing Status	Taxable Income	Tax Owed
8.	Single	$107,000	_____
9.	Married, filing jointly	138,500	_____
10.	Qualifying widow	30,750	_____
11.	Single	42,654	_____
12.	Qualifying widow	68,756	_____

For the taxpayers of Exercises 10–12, find their actual tax using the Tax Table in the Reference Section. Then answer Exercises 13–15.

13. Which of the three taxpayers has the greatest dollar difference between the two methods of calculating the tax?

14. Which of the three differences is the greatest when expressed as a percent of the tax found by using the Tax Table?

15. Which, if any, of the taxpayers of Exercises 10–12 would pay a lower tax if he or she were allowed actually to use the Tax Rate Schedule?

Find the yearly income, the taxable income, the taxes owed, and the amounts to be withheld annually for the incomes described below. Use a deduction of $3600 for a single person, $6000 for a married couple, and $5250 for a head of household. Each exemption is $2300. Assume that the married couples are filing a joint return and that the head of household is single. Use the Tax Table where possible. Otherwise, use the Tax Rate Schedules.

	Filing Status	Monthly/ Yearly Income	Number of Exemptions	Taxable Income	Tax Owed	Withholding Allowances Number	Withholding Allowances Annual Amount	Refund (+) or Money Owed (−)
16.	Single	$ 825/9900	1	$ 4,000		1	$744	+$140
17.	Single	1555/	1			1		
18.	Single	785/	1			0		
19.	Single	2378/	0			0		
20.	Single	4634/	0			1		
21.	Married	3500/	4	26,800	4,024	4		
22.	Married	3777/	5			6		
23.	Married	5300/	2			2		
24.	Married	4200/	5			4		
25.	Head of household	1780/	3			3		
26.	Head of household	2116/	2			2		
27.	Head of household	3209/	4			6		

28. Write a set of algebraic formulas for Tax Rate Schedule Y-2 (for married couples filing separately), which is in the Reference Section.

29. Because of unusually large medical expenses, a married woman finds that it is to the family's advantage for her and her husband to file separately one year rather than jointly. Her taxable income that year is $111,500. Use one of the formulas that you wrote in Exercise 28 to calculate her income tax.

MIXED REVIEW

1. Daniel has a small business grooming dogs. He charges $20 for each dog that he grooms but gives a 10% discount to each customer who brings him a new customer. One week he had 27 customers, six of whom brought in a new customer. What were Daniel's gross earnings that week?

Use the table for weekly withholding amounts for single persons in the Reference Section and the fact that 7.65% of gross pay is withheld for FICA taxes to find the missing entries in the payroll summary below. Assume that the number of claimed withholding allowances is 1.

	Week Ending	Gross Pay	Withholding	FICA	Take-home Pay
2.	5/17	$115.00			
3.	5/17	$287.00			

4. Your credit card balance from 4/1–4/12 was $750. You made a payment of $125 on 4/13. You made no further charges or payments for the remainder of the month. The monthly finance charge is 1.25% and is calculated on the last day of the month. Determine your average daily balance for April.

Make a table to show the multiplier effect on the amounts below if the Federal Reserve requirement is 20%. Show the first five levels and find the total extra money that is generated at the fifth level.

5. Initial deposit: $1,200   6. Initial deposit: $10,000

7.–8. For the initial deposits of Exercises 5–6, find the total amount of new money created by the multiplier effect.

9. You have a loan of $17,500 at 9.5% for 5 years. What are the monthly payments? Determine how much money you will save if you prepay the loan at the end of 30 months.

Some students purchased some canvas bags for $2.00 each and painted them for $1.50 each. They plan to sell the painted canvas bags.

10. What is the unit cost for purchasing and repairing the canvas bags?

11. Find the total cost for 56 canvas bags.

12. The fixed costs are $75. What are the total costs?