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Money Math

Lessons for Life

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\$³ = \$ ¢ \$ $\frac{1}{2}$ \$ + \$ ∞ \$ ÷ \$

Lesson Description Students examine careers and reflect on how workers use math in their occupations. They study selected occupations, learning about the work skills (human capital) that different workers possess and salaries that those workers earn. Next, students learn about how taxes are paid on income that people earn and how income tax is calculated. They learn how the progressive federal income tax is based on the ability-to-pay principle.

Objectives Students will be able to:

1. describe examples of human capital.
2. explain the link between human capital and income earning potential and provide examples.
3. define and provide examples of human and capital resources.
4. define and provide examples of income, saving, taxes, gross income, and net income.
5. define and provide examples of ability-to-pay and progressive tax.
6. calculate tax rates (percents) and the dollar amount of taxes.
7. read and understand tax tables.

Mathematics Concepts computation and application of percents and decimals, using and applying data in tables, reasoning and problem solving with multi-step problems

Personal Finance Concepts income, saving, taxes, gross income, net income

Materials Required

- copy of Activity 3-1, cut apart so there is one card for each group of 3-4 students
- calculators
- copy of Activity 3-2, cut apart so there is one card for each pair of students
- copy of Activity 3-3 for each pair of students
- black markers, chalkboard, masking tape
- copy of Activity 3-4 for each pair of students
- copy of Activity 3-5 for each student
- transparency of Activity 3-5
- copy of Activity 3-6 for each student
- transparencies of Visuals 3-1 through 3-4

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Time Required 3 - 4 days

Procedure**Get Ready**

1. Divide the class into groups of 3 or 4. Give a card from Activity 3-1 to each group.
2. Explain that each card describes a person with a particular occupation and a problem facing that person. Tell students to read the cards, decide what types of math skills/calculations each person must use to solve his or her problem, solve the problem where possible, and explain their reasoning in words.
3. Allow time for students to work. Have groups share the information on their cards, the type of math skills required, and their answers and reasoning. Discuss the following.
 - a. What did all people described on the cards have in common? (*They all used mathematics skills to solve a work-related problem.*)
 - b. What types of mathematics skills were required? (*basic computation skills, calculation of area and volume, conversion from customary to metric measurement, understanding calculation of averages, calculation of percentages*)
 - c. Think of other occupations that also require the use of mathematics skills. (*Answers will vary.*)
 - d. Can you think of tasks that you or others at home do that require the use of mathematics? (*cooking, painting, wallpapering, buying carpeting, sewing, woodworking, doing math homework, balancing the checkbook*)
4. Divide students into pairs, and give a card from Activity 3-2 to each pair.
5. Tell students that these are occupation cards. Ask each pair to identify only the occupation to the class. Pairs should not read the information on the card to the class. After each pair states its occupation, discuss the following with the class.

- a. What type of work does a person with this occupation do?
(Answers will vary.)
 - b. What type of math skills do you think a person with this occupation might use? *(Answers will vary but might include: basic calculations, graphing, interpretation of data, charts, and tables, geometry, algebra.)*
6. If students have questions about a worker, attempt to answer the questions as a class.
 7. Have each pair answer the questions on Activity 3-3 based on the occupation chosen. Tell each pair to write its occupation on the back of Activity 3-3 with a black marker. Tell each pair to tape the paper with the occupation to the chalkboard.
 8. Have one member of each pair identify the occupation, describe the education necessary, and the math skills involved. After all occupations have been identified, discuss the following.
 - a. Which occupation do you think earns the highest salary?
(Answers will vary.)
 - b. Which occupation do you think earns the lowest salary?
(Answers will vary.)
 9. Combine student pairs into small groups. Have groups consider the occupations on the board and rank them according to yearly wage. The first occupation they list should be the occupation they think earns the highest wage, the second occupation should be the one they think earns the next highest wage, and so on.
 10. Allow time for students to work. Have a volunteer group place the signs on the board in order (left to right) according to its list. Allow time for other groups to comment or make changes.
 11. Have a student who worked with a particular occupation go up to the board and write the annual salary calculated for that occupation under the sign. Tell groups to check how well they did in ranking the occupations according to wage. Rearrange the signs and rewrite salaries so they are in the correct order. Discuss the following.

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- a. In general, do the very high-earning occupations require more or less education than the very low-earning occupations? (*more*)
 - b. Give an example of this generalization. (*Doctors earn higher wages and require more education than roofers.*)
12. Explain that people who work in the economy are **human resources**. **Human capital** is the quality and quantity of skills, education, and talents a person has. When people attend classes, become apprentices, obtain graduate degrees, and receive on-the-job training, they are investing in or improving their human capital. Have students identify examples of investment in human capital made by the people about whom they read. (*finished high school; attended trade school, college, or university; practice; apprenticeships*)
13. Have students explain how, in general, investment in human capital helps a person succeed or “pays off.” (*People who invest in their human capital tend to earn more income over time than those who don’t.*) Ask students why participation in mathematics classes throughout a student’s school career is considered an investment in human capital. (*Math skills are essential to day-to-day living as well as required for various occupations. Learning and improving math skills improves a person’s human capital.*)

Keep It Going

1. Explain that the wage or salary that people earn for the work they do is called **income**. There are three things that people do with their income. They can save it, spend it, and pay taxes with it. Everyone must pay taxes, but it is up to each individual whether to determine what to do with the money that is left after paying taxes. Some might spend all of the money; some might spend some and save some.
2. Explain that **saving** occurs when people do not spend all their income on goods and services right away. **Taxes** are required payments to government. Discuss the following.
 - a. What taxes do you pay or are you aware adults pay? (*sales tax, income tax, property tax*)

- b. On what items do you pay sales tax? (*Answers will vary; however, usually on items purchased such as books, toys, clothes, and food.*)
 - c. For what do you think the money collected as sales tax is used? (*Answers will vary.*)
 - d. To whom do people pay property tax? (*local government*)
 - e. For what do you think property taxes are used? (*Answers will vary.*)
 - f. To whom do people pay income tax? (*federal and state governments*)
 - g. For what do you think federal income taxes are used? (*Answers will vary.*)
3. Explain that federal income taxes are used to provide goods and services for citizens of the United States and to support the operation of the federal government. Ask students for examples of goods and services that the federal government provides. (*interstate highways, bridges, defense, medical research, national weather service, college loan programs, welfare payments, food stamps, approval of new drugs through the FDA, testing of meat and other agricultural products, disaster relief*)
4. Point out that people usually learn about income tax when they get their first job and must pay income taxes. However, the class will have the opportunity to learn from a young woman named Hannah. Read the following.

It is March in Hannah's senior year of high school. She is going to college in the fall and has a scholarship that covers two-thirds of her tuition. Her parents have agreed to pay the remaining one-third of her tuition and her room and board. Hannah must pay for her books each semester and for her miscellaneous expenses such as pizza, movies, and other entertainment. Hannah has been looking for a job for several weeks and has finally found one. Let's listen while Hannah tells her mother about her new job.

"Mom! I did it! I found a job. I'll earn \$7.50 per hour at Toys for You. The manager said I could work weekends until school is out. That will be about 12 hours a week. She said that I

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could work at least 25 hours a week during the summer. Mom, I'll have almost \$2000 before college starts in the fall. If I combine that with what I've already saved, I'll have more than enough money for school. Can you believe it? I start next week—that's spring break. The manager said to count on 25 hours."

"Hannah that's great. Be careful though, before you start counting your money you need to remember that you have to pay taxes."

"Yeah, yeah, I know. They gave me some forms to fill out. I have to take them back tomorrow when I start. What's the big deal about taxes? All I have to do is fill out some forms. No problem."

"Hannah, it is more than just forms. Toys for You will take money from your check each week. That money will be sent to the state and federal governments. So don't plan to receive as much money as you expected each week."

"Come on, Mom. No matter what happens, you always have to talk about the negative stuff. Just be happy I have a job and that I start tomorrow. Now, I have to figure out what to wear for my first day. Maybe I'll go buy a new pair of slacks. After all, I am going to have a lot of money!"

5. Pause and ask what Hannah's mom was trying to tell her about taxes and her pay. (*Answers will vary. Perhaps some student will recognize that because taxes will be withheld, Hannah's take-home pay will be less than she expects.*) Continue with the story as follows.

"Mom, Mom, where are you?" Hannah shouted. "I have a really big problem."

"Hannah, for heaven's sake, what are you yelling about?" Mom replied.

"I just got my first paycheck from Toys for You. Mom, they didn't pay me as much as they said they would. I've been cheated."

“Calm down and let me see your paycheck and receipt,” Mom replied.

6. Display Visual 3-1 and continue reading.

“Hannah, they paid you what they said they would. You worked 30 hours last week and your gross income is \$225.”

“But Mom, the check is only for \$162. That’s the gross part if you ask me. They cheated me out of \$63.”

“Hannah, gross income means the total amount you earned before taxes are withheld. The \$162 is your net income. That’s the amount left after you pay taxes. Remember I tried to tell you about taxes. Gross income is the actual amount you earned before taxes were withheld.”

“Oh, yeah, those forms I filled out, right?”

“Yes, you filled out forms so that Toys for You could withhold federal income tax, Social Security and Medicare/Medicaid tax, and state income tax. Look at your pay receipt.”

7. Refer to the transparency, and ask the following questions.

- a. What is Hannah’s gross income? (\$225)
- b. What is gross income? (*the amount earned before taxes are withheld*)
- c. How was this amount determined? (*by multiplying the number of hours Hannah worked by her hourly wage, $\$7.50 \times 30$*)
- d. How much did Hannah pay in Federal Income Tax? (\$33.75)
- e. What percent of Hannah’s total earnings is that? (15%)
How did you find the percent? [$(\$33.75 \div \$225) \times 100$]

8. Ask if students know what FICA is. (*Answers will vary.*) Explain that FICA stands for Federal Insurance Contribution Act. This is money withheld to support Social Security and Medicare/Medicaid programs. **Social Security** is a tax paid by

today's workers that is used today to pay benefits to retired and disabled workers and their dependents. **Medicare** is a health insurance program for the aged and certain disabled persons. **Medicaid** provides health and hospitalization benefits to people who have low incomes. Continue discussing the pay receipt as follows.

- a. How much did Hannah pay in Social Security and Medicare/Medicaid tax? (\$20.25)
- b. What percent of Hannah's total earnings is that? (9%)
- b. How did you find that percent? [$(\$20.25 \div \$225) \times 100$]
- c. How much did Hannah pay in state income tax? (\$9)
- d. What percent of Hannah's total earnings is that? (4%)
How did you find that percent? [$(\$9 \div \$225) \times 100$]
- f. What is Hannah's net income? (\$162)
- g. What is net income? (*the amount of earnings received after taxes are paid*)
- h. What percent of her income did Hannah pay in taxes? (28%) How did you find that percent? ($[(\$225 - \$162) \div \$225] \times 100$) or ($15\% + 9\% + 4\% = 28\%$)

9. Continue the story.

"Well, Mom, this is ridiculous. I am just a kid. Why do I have to pay taxes? What do I get from the government? This just isn't fair. I shouldn't have to pay taxes."

"Hannah, think. You get some goods and services from the government. Plus, you won't earn much income during the year, so you'll probably get a refund. This means that the state and federal government may give back part or all of the income tax you paid. The Social Security taxes won't be refunded."

10. Ask what types of goods and services Hannah might receive from the government. (*highways, bridges, defense, fire and police protection, national weather service, testing of meat and other agricultural and medical products for her protection*)
11. Display Visual 3-2. Have students determine Hannah's expected earnings if she works 20 hours per week for 20 weeks. (\$3,000) Using this income and the tax table, show

In these examples, gross income is equated with taxable income for simplification. We have suggested incorporating more advanced tax concepts in *Going Beyond X A Challenge Activity*, which is the extension section of the lesson.

how to look up the amount of federal tax that Hannah must pay.

- Find \$3,000 of taxable income. Point to the next to last row.
- Explain that Hannah earned at least \$3,000 but less than \$3,050.
- Hannah is single. Read across the row to the column labeled “single.”
- The amount found in this row and column is the amount of federal income tax Hannah must pay – \$454.

12. Have students return to work with their “occupation” partners. Give a copy of Activity 3-4 to each pair and a copy of Activity 3-5 to each student. Go over the example at the bottom of the Activity 3-5.

13. Demonstrate how to use the tax rate schedules for the Fixits. Display the transparency of Activity 3-5. Have students write their answers as you demonstrate.

- Locate the “married filing jointly” schedule.
- Locate the income category for the Fixits. (*Over \$283,150*)
- Read the base tax for this income category. (*85,288.50*)
- Show the tax rate for the income amount over 283,150. (*39.6%*)
- Calculate the amount of tax. ($[(285,000-283,150) \times .396] = 732.60 + 85,288.50 = 86,021.10$)

14. Have students enter the information for the mechanic in the table on Activity 3-4 and complete the remaining problems.

15. When students have completed the work, display Visual 3-3 and have students check their answers.

16. Refer students to both the tax rate schedule and the table they completed. Ask students if they can determine any relationship between the amount of tax paid and the amount of income earned? (*Those who earn more, pay more in taxes.*)

17. Explain that the federal income tax system is based on the **ability-to-pay** principle of taxation. This principle states that a tax is fair if those who earn different amounts of income pay

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different amounts of taxes. The federal income tax is a **progressive tax** — those who earn more income pay a larger percent of their income in tax.

18. (Optional) Have students choose a career/occupation in which they are interested. Use the Internet to determine the average yearly income for this occupation. Use a recent IRS tax rate schedule to determine the amount of tax that would be paid and the tax rate as a single person or married couple.

Wrap It Up

Discuss the major points of the lesson as follows.

1. What is income? (*money earned for the use of resources*)
2. What is saving? (*income not spent on goods and services now*)
3. What are taxes? (*required payments to government*)
4. What is gross income? (*the amount earned before taxes and other deductions are withheld*)
5. What is net income? (*the amount available after taxes and other deductions are withheld*)
6. What are human resources? (*people working in the economy*)
7. What is human capital? (*the quality of the education, skills, and talents people possess*)
8. How can people invest in their human capital? (*through education, training, practice*)
9. What is the relationship between income and human capital? (*people with more and better human capital tend to earn more income*)
10. What are some examples of investment in human capital related to mathematics? (*learning basic computation skills, learning to calculate percents, ratios, area, perimeter, learning to use the calculator efficiently*)
11. What is the ability-to-pay principle of taxation? (*People who are able to pay more should pay more taxes.*)
12. What is a progressive tax? (*a tax requiring those who earn more to pay a larger percentage of their income in tax and those who earn less to pay a smaller percentage of their income in tax*)

Check It — Assessment

Hand out Activity 3-6 and have students complete the work. Display Visual 3-4, and allow students to check their work.

Going Beyond — A Challenge Activity

1. Using their work from Activity 3-4, have students consider the following problem using the example of Pierre.

Next year, Pierre moves to a fancier restaurant and gets a great big raise! Now, Pierre has his own television show on the Eat Well channel. He's still single and earning \$165,000 a year. How does the amount of tax he pays change? (He will pay more taxes because he has a larger income AND because he will pay a higher tax rate as he moves to a higher income category.)

2. Point out that the chef has moved to a new income category. Explain that people would usually say that Pierre has reached a new “tax bracket.” In the higher tax bracket, Pierre will pay a higher percentage of tax. However, he pays the higher percentage only on his additional earnings beyond \$158,550. This is the case with each tax bracket (income category) change. Taxpayers only pay the higher tax rate on a portion of their earnings. This idea of paying a higher percentage of tax on additional or extra earnings over some amount is referred to as marginal tax rates.
3. Have students speculate as to what marginal means in this context. Explain that in economics **marginal** means the extra or additional of something. So **marginal tax rates** are the extra taxes paid on extra earnings.
4. Have students look at the initial incomes of Pierre and the Joneses. Tell them to calculate the percent of total income that Pierre and the Joneses paid in income tax. When work is completed, have students share their answers. ($30,429 \div 115,000 = 26.5\%$; $46,324.50 \div 175,000 = 26.5\%$)

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5. Have students conjecture why that percent is lower than the marginal tax rates of 31% and 36%, respectively. (*The taxpayers don't pay the marginal tax rates of 31% and 36% on all their income. They pay the marginal tax rates only on the income that exceeds the lowest income amount in their tax bracket. On the other income, they are paying lower rates.*)
6. Explain that when taxpayers complete their income tax forms, they are allowed to deduct certain items from their taxable earnings. For example, taxpayers may deduct the interest on mortgage payments and charitable donations. Ask students how deductions would affect the amount of tax a person pays. (*Deductions reduce the amount of tax a person pays because deductions are subtracted from the gross earning amount.*)
7. Have students visit the IRS website to research the types of things that are tax deductible. Then have them complete scenarios for their occupation that include number of family members, mortgage costs, and charitable donations. Then allow them to complete a tax form using a commercial software tax package.
8. Have a certified public accountant visit the class and discuss deductions, exemptions, and tax credits. Have students complete the scenarios for their occupation/ family to include the number of family members and deductions. Then have them complete a tax form using a commercial software tax package.
9. Have W-4 forms available and help students complete those forms.
10. For additional information about Social Security students can visit the Social Security Administration website at www.ssa.gov/kids.

Wanda Woodworker is a carpenter. She is putting a two-room addition on Mr. Smith's house. She must decide how many pieces of drywall to order. Each sheet of drywall is 4' X 8'. The rooms will have 8' ceilings. One room is 12' X 16'; the other room is 12' X 12'. How many sheets of drywall does she need? Explain your reasoning.

Paul Prentice is a painter. He owns Paul's Paints and Papers. Paul charges \$20 per hour for painting plus the cost of the paint. He is painting the exterior of Sandy Beaches' house. He has determined that he will need 15 gallons of paint. The paint Sandy selected is \$25 per gallon. Paul estimates that the job will take 24 hours. What is the estimate? Explain your reasoning.

Patrick Zabrocki is a student teacher. He is teaching a fifth-grade class a lesson on averages. He has decided to begin by calculating the average height of students in the class. What does he have to do? List the steps and explain your reasoning.

Andrea Sooter is a furniture salesperson at a large furniture store. She receives a monthly base salary of \$1000 plus a ten-percent commission on her sales. Last weekend was Labor Day weekend. The furniture store had a sale. Andrea's sales for the weekend brought her monthly total to \$45,000. Andrea wants to estimate her pay for the month. What is the estimate? Explain your reasoning.

Math Is Everywhere

Alan Pretzal is an attorney. He works with many different clients. He is required to bill each client's account according to the amount of time he spends working on that client's legal problems. Mr. Pretzal charges \$100 per hour. Yesterday, he spent thirty minutes on the ABC account; fifteen minutes on the phone with another client, Mr. Jones; three and one-half hours on the Clark Candy account; ten minutes on the phone with Alexis Borgmeyer; and 45 minutes on E-mail correspondence with Henry's Hardware. How much should Alan bill each account? Explain your reasoning.

Kathryn McCorkle is a chef. She has an excellent recipe for burritos. The recipe serves six people. Kathryn is catering a party and wants to expand the recipe to serve 100 people. What must Kathryn do to determine how much of each ingredient she needs? Explain your reasoning.

Dr. Harry Lessman is a family practitioner. A patient, Ms. Strep, has a sore throat for which the doctor must prescribe an antibiotic. The dose of antibiotic is 10 milligrams per kilogram of body weight. This dose should be taken twice per day for ten days. Ms. Strep weighs 135 pounds. What dose should Dr. Lessman prescribe? Explain your reasoning.

Martin Walsh owns a gasoline station. It is time for him to order gasoline. The volume of each tank is 10,000 gallons. He knows how wide the tank is, how tall it is, and how deep it is. He has measured the height of gasoline remaining in each of the three tanks. What must Martin do to determine how much gasoline to order to fill the tanks? Explain your reasoning.

Courtney Rosser is a seamstress. She is making drapes for the windows in Mrs. Plum's conservatory. The windows are 48" wide and 63" long. There are four windows. The material Mrs. Plum has selected comes in widths of 24". Drapes require two and one-half times the width of the window. How much material should Courtney buy? Explain your reasoning.

1. You are a **carpenter**. Before graduating from high school, you met with a counselor who asked you many questions. She helped you recognize that you were physically fit, had excellent manual dexterity, good mathematics skills, and enjoyed creating things. She asked you if you might be interested in pursuing a career as a carpenter. You agreed that this might be a career for you. Once you graduated from high school, you took classes at a carpenter trade school and participated in an apprenticeship program that lasted three years and included on-the-job training.

You are able to work from blueprints, measuring, marking, and arranging materials. You check the accuracy of your work with levels, rules, plumb bobs, and framing squares. Your hourly wage is \$18.50. Last year, there were two months during which you were unable to work because of inclement weather.

2. You are a **painter and paperhanger**. During the summers of your junior and senior years in high school, you worked for a master painter who was an independent contractor. You set up and cleaned up. While helping, you learned a lot by watching the painter work. After you graduated from high school, you spoke with the contractor about being an apprentice. The contractor agreed to hire you. You attended classes and worked as an apprentice for three years. Some of the classes were mathematics classes.

As a painter and paperhanger you have to prepare surfaces for paint or paper, mix and apply paints, incorporate some decorating concepts, and use cost-estimating techniques. Your hourly wage is \$16. You worked the full year last year because you were able to work inside during inclement weather.

3. You are a **roofer**. You chose this career because your family owns a roofing company and has been in the roofing business for years. You learned your skills by participating in a three-year apprenticeship program that combined on-the-job training and classroom work. In addition to math classes, you also took a course in mechanical drawing. It is important that you stay in good physical condition and have excellent balance. Roofing is strenuous, hot, and dirty work. The longer you have worked in the business the more involved in budgeting, cost-estimation, and time estimation you have become. Last year, you earned \$15 per hour. You were out of work three months because of bad weather.

When I Grow Up

4. You are a **teacher**. When you graduated from high school, you decided to attend a state university and obtain a degree in education. When you obtained your degree, you had to pass a test in order to be certified as a teacher. You are certified to teach elementary school. To maintain your certification, you must attend professional development programs each year. Within two years from receiving your certification, you must begin work on your masters degree.

You teach fifth-grade. You have a minor in math so you teach all of the fifth-grade math classes. In exchange, your teaching partner teaches all of the fifth-grade social studies classes. In addition to teaching math, you use math skills to prepare bulletin board displays, prepare grades, and in many other ways. You work very hard to provide hands-on activities and math manipulatives so your students will enjoy and learn mathematics.

You have been teaching for $1\frac{1}{2}$ years. Your salary last year was \$24,390. You are in school for ten months. You have two months paid vacation. However, during that time, you must pursue educational opportunities that will help you obtain your masters degree.

5. You are a **lawyer**. After graduating from high school, you earned a bachelor of science degree in economics. After completing your undergraduate degree, you entered law school. This took an additional three years. When you finished law school, you had to pass the state bar exam, a test that determines whether lawyers are certified to practice law in a given state. You obtained certification in your state and three neighboring states. You specialize in real-estate law. You are a partner in a firm and, as a result, earn a yearly salary plus bonuses. Your bonuses are based on the percentage of work you bring to the firm. You must attend yearly courses and workshops to maintain your qualifications and to learn about recent developments in real-estate law.

In your work, you must be able to analyze and interpret tables of data, graphs, and charts. You also employ basic mathematics computation skills. Last year, your salary combined with bonuses averaged \$15,000 per month.

6. You are a **chef**. In high school, you took business mathematics and business administration. After high school, you attended a special cooking school - a culinary institute. This included classroom instruction as well as two internships at restaurants. Then you began work as an apprentice chef in a restaurant. Over time, you developed the experience necessary to establish your own catering business. You also took some basic business courses at a local community college. Some important skills necessary in your work are the ability to supervise less-skilled workers, limit food costs by minimizing waste, accurately anticipate the amount of perishable supplies needed, and maintain day-to-day bookkeeping. You measure, mix, and cook ingredients according to recipes. You also develop specialties. You organize and plan menus for your clients. Last year you estimate that you earned \$17.50 per hour and worked an average of 50 hours per week.

7. You are a **physician**, a Doctor of Medicine. You examine patients; order, perform, and interpret diagnostic tests; diagnose illnesses; and prescribe and administer treatment. Your specialty is pediatric cardiology. While in high school, you took many mathematics and advanced science courses. In college, you majored in pre-med. After earning your bachelors degree, you went to medical school for four years. After medical school you spent 7 years in internship and residency. You had to pass both the state medical exam and a special exam given by the American Board of Medical Specialists. Now you are in practice with other pediatric specialists.

As a partner in a medical practice you have office hours, hospital visits, in-office meetings, and must be on call to serve patients every other weekend. In general, you work 50 to 60 hours per week. Last year, your average monthly salary was \$18,750. You are still paying back student loans for your many years of education. But you are grateful to have reached your goal.

When I Grow Up

8. You are a **mechanical engineer**. You apply the theories and principles of science and mathematics to solve technical problems. You design products and machinery to build those products. Engineering knowledge is applied to improving many things.

You were always fascinated with how things work. Often you took things apart to see how they worked and then put them back together. In high school, you took all the mathematics and science classes offered. After high school, you attended a university that offered degrees in a number of engineering fields. It took four years to complete your degree. You went on to earn a masters degree in engineering. You are licensed as a professional engineer. To get this license, you had to work four years after finishing school and pass a special exam. To maintain your license, you must attend programs and courses each year. These courses help you maintain the technical knowledge you need to be successful. You enjoy your work because it is challenging. Last year, your hourly salary was \$35.

9. You are an **automobile mechanic/service technician**. You inspect, maintain, and repair automobiles and light trucks, such as vans and pickups with gasoline engines. People who did this work in the past were called auto mechanics. Now, because of computerized shop equipment and electric components, they are increasingly called service technicians.

You've always liked learning how things work and fixing things that didn't work. You had good reading, mathematics, communication, and analytical skills. After high school, you attended an intensive, two-year program that included classroom work as well as hands-on practice. Your classroom work included English, basic mathematics, and computers. After receiving your associate degree, you went to work for a large automobile dealership. Each year, the dealership sends you to a training center where you learn how to repair new car models and receive special training in the repair of things like fuel-injection systems or air conditioners. Last year, the dealership was extremely busy. You worked many hours of overtime. As a result, your weekly salary was \$1000.

10. You are a **registered nurse**. You help promote health, prevent disease, and help patients cope with illness. You provide direct patient care so you must observe, assess, and record symptoms, reactions, and progress. You assist physicians during treatments and examinations; administer medications; and assist patients with recovery. You supervise licensed practical nurses and aides on your floor.

You are a very caring and sympathetic person. You can direct others, follow precise orders and determine when assistance is needed. After graduating from high school, you attended a university that offered a four-year bachelor of science in nursing degree. Your training included classroom instruction and supervised clinical experience in hospitals and other health facilities. You took courses in anatomy, physiology, microbiology, chemistry, nutrition, psychology, and other behavioral sciences as well as nursing. Upon graduation, you went to work at the hospital. You take continuing education courses to advance your skills. Last year, you earned \$4,208 per month.

11. You are a **certified public accountant**. You prepare, analyze, and verify financial documents in order to provide information to your clients. You provide accounting, auditing, tax and consulting services for your clients. Your clients include businesses, governments, nonprofit organizations, and individuals.

You have a bachelor's degree in accounting. While in college, you participated in an internship program at a public accounting firm. After graduating from college, you took the certified public accountant exam. This two-day exam was very difficult, but you passed. As a result, you have a license as a certified public accountant (CPA). In order to renew your license, you must attend continuing education classes each year. Last year, you earned \$95,000.

When I Grow Up

12. You are a **retail salesperson**. You sell new and used automobiles. You help customers find the vehicle they are looking for and try to interest them in buying the auto. You describe the auto's features, demonstrate its use, and show various models and colors. You are able to explain the features of various models, the meaning of manufacturers' specifications, and the types of options and financing available. You fill out sales contracts and complete the paperwork necessary for various payment options.

You have always been able to communicate clearly and effectively. You have a real talent for persuasion. After finishing high school, you earned an associate degree in communication. Once you completed your degree, you went to work for a large automobile dealer. You participated in a dealer-training program and in manufacturer's training. This training provided information about the technical details of standard and optional equipment. Each year, you attend additional training regarding new models. You have been working for the same automobile dealership for several years. Last year you earned \$15 per hour.

13. You are a **firefighter**. You are called on to put out fires, treat injuries, and provide other emergency functions. Firefighting requires organization and teamwork. Between alarms, you clean and maintain equipment, conduct practice drills and fire inspections, and participate in physical fitness activities. You are required to prepare written reports on fire incidents and review fire-science literature to keep up with technology and changing practices and policies.

After graduation from high school, you had to pass a written exam; tests of strength, physical stamina, coordination, and agility, and a medical examination that included drug screening. You were among those with the highest scores on all the tests. That is why you were selected for your job. After accepting the job, you participated in weeks of training at the department's fire academy. This included classroom instruction and practical training. Some topics you studied were firefighting techniques, fire prevention, hazardous materials control, and first aid. You learned how to use axes, fire extinguishers, chain saws, ladders, and other firefighting equipment. You continue to study and acquire advanced skills in various fire-related topics. Last year, you worked an average of 50 hours per week and earned \$22 per hour.

1. What is your occupation?
2. What kinds of tasks do people with this occupation do?
3. How much and what type of education does your occupation require?
(vocational training, community college, four-year college or university, advanced degrees)
4. What types of mathematics does the occupation require?
5. What is your weekly and monthly salary or wage? How did you determine your weekly and monthly salary or wage?
6. What is your annual salary? How did you determine your annual salary?
7. Is this an occupation you might consider for your future? Why?

Who Pays? How Much?

Enter the answers for the mechanic from the calculations done in class on the table below. Use Activity 3-5 to answer the following questions. Please use a separate sheet of paper to show your work. Enter your answers in the table below.

1. Pierre Haricots, an executive chef at an exclusive restaurant in New York City, earns \$115,00 per year. If his filing status is single, how much federal income tax must he pay? What is the tax rate on the amount over the base amount?
2. In the Jones family, both parents work. One is a successful stockbroker and the other is a chemical engineer. Their combined income is \$175,000. Their filing status is married filing jointly. How much federal income tax must they pay? What is the tax rate on the amount over the base amount?

Occupation	Yearly Income	Filing Status	Amount of Tax	Tax Rate on Income over Base Income
Fixits				
Pierre				
Joneses				

Use this schedule if your filing status is **Single**

If your income is: over—	But not over—	Your tax is:	of the amount over—
\$ 0	25,750	----- 15%	\$ 0
25,750	62,450	3,862.50 + 28%	25,750
62,450	130,250	14,138.50 + 31%	62,450
130,250	283,150	35,156.50 + 36%	130,250
283,150	-----	90,200.50 +39.6%	283,150

Use this schedule if your filing status is **Married filing jointly**

If your income is: over—	But not over—	Your tax is:	of the amount over—
\$ 0	43,050	----- 15%	\$ 0
43,050	104,050	6,457.50 + 28%	43,050
104,050	158,550	23,537.50 + 31%	104,050
158,550	283,150	40,432.50 + 36%	158,550
283,150	-----	85,288.50 +39.6%	283,150

Tax calculation example for Mr. & Mrs. Fixit

Mr. Fixit is Cartown’s best auto mechanic. He owns a busy auto repair shop and has a popular television show. He earns \$285,000 a year. His wife doesn’t work outside the home. Their filing status is married filing jointly.

1. Look at the bottom schedule because the Fixits are married filing jointly.
2. Under which income category do they fall? _____
3. What is the base (bottom) tax for this category? _____
4. What is the tax rate for any income above the lowest income amount in their category? _____
5. Calculate the total tax by adding the base (bottom) tax amount to the dollar amount of the percent of income over the lowest income.
6. What is the tax rate that the Fixits pay on all income? _____

Assessment—A Taxing Situation

This summer, you found your first part-time job working at the mall in the food court. You are earning \$6.50 per hour and have been working 20 hours per week. You are paid every two weeks. You did some research and found out that the company will withhold 15% of your pay in federal income tax, 9% in FICA and Medicare tax, and 3% in state income tax. On a separate sheet of paper, answer questions 1-5. Be sure to show your work.

1. What is your gross income for two weeks?
2. How much do you pay in federal income tax each time you are paid? FICA? State income tax?
3. What is your net income each pay period?
4. At the end of 8 weeks, how much net income will you earn? How much federal income tax will you pay?
5. What human capital do you possess now? What investments can you make in your human capital?
6. Ms. Lawes is an attorney with a large, successful law firm. Last year she earned \$135,000. How much tax must Ms. Lawes pay? Use the tax information below to answer the question.

If your income is over—	But not over—	Your tax is:	of the amount over—
104,050	158,550	23,537.50 + 31%	\$104,050

7. Ms. Lawes’ assistant earns \$35,800 per year. Based on what you know about the federal income tax system, would you expect the assistant to pay a larger percentage of her income in tax than Ms. Lawes? Why?

Toys for You Pay Receipt Store #87				Hannah Smith SSN 494-90-1234	
Earnings	Hours	Amount	Deduction	Current	Year To Date
Regular	30.00	225.00	FICA Tax and Medicare Tax	20.25	20.25
Overtime	0.00	0.00	Federal Tax	33.75	33.75
Total	30.00	225.00	State Tax	9.00	9.00
Year-to-Date Gross		225.00	Total	63.00	63.00
			Net Pay	162.00	162.00

Sample Tax Table

If your taxable income is —		And you are —			
At least	But less than	Single	Married Filing Jointly	Married Filing Separately	Head of Household
		Your tax is —			
2,975	3,000	448	448	448	448
3,000	3,050	454	454	454	454
3,050	3,100	461	461	461	461

Occupation	Yearly Income	Filing Status	Amount of Tax	Tax Rate on Income over the Base Income
Pierre	\$115,000	single	\$30,429.00	31%
Joneses	\$175,000	married filing jointly	\$46,354.50	36%

Pierre: $[.31 \times (115,000 - 62,450)] + 14,138.50 = 30,429.00$

Joneses: $[.36 \times (175,000 - 158,550)] + 40,432.50 = 46,354.50$

Answers to Activity 3-6

1. $6.50 \times 40 = \$260$
2. **federal income tax: $\$260 \times .15 = \39**
FICA/Medicare: $\$260 \times .09 = \23.40
state income tax: $\$260 \times .03 = \7.80
3. $\$260 - \$39 - \$23.40 - \$7.80 = \$189.80$
4. $\$189.80 \times 8 = \1518.40
 $\$39 \times 8 = \312.00
5. **Ability to read, use math skills, special talents students may possess**
Attend school. Finish high school. Go to college. Attend a trade school.
Participate in an apprenticeship program.
6. $[(135,000 - 104,050) \times .31] + 23,537.50 = \$33,132$
7. **No, because the federal income tax is designed to be a progressive tax. This means that those who earn less pay a smaller percentage of their income in tax than those who earn more.**