ACCELERATED MATHEMATICS: CHAPTER 13

FINANCIAL LITERACY

TOPICS COVERED:

- Simple and compound interest
- Budgeting
- Net Worth
- Credit Cards
- Saving for college

Created by Lance Mangham, 6th grade math, Carroll ISD

Financial Literacy Objectives
7th grade
calculate sales tax for a purchase and calculate income tax for earned wages
identify the components of a personal budget including: income, savings for college, retirement and emergencies, taxes AND fixed and variable expenses and calculate what percentage each category comprises of the total budget
create and organize assets and liabilities and construct a net worth statement
use a family budget estimator to determine the budget and wage needed for a family to meet its basic needs in a Texas city
calculate and compare simple interest and compound interest earnings
analyze and compare monetary incentives, including sales, rebates, and coupons
8th grade
calculate and compare simple interest and compound interest earnings
solve real-world problems comparing how interest rate and loan length affect the cost of credit
explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time
estimate the cost of a two-year and four-year college education, including family contribution, and devise a savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college
calculate the total cost of repaying a loan, including credit cards and easy access loans using an online calculator * *Not tested*
identify and explain the advantages and disadvantages of different payment methods * *Not tested*
analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial responsibility * *Not tested*

7th and 8th Grade Financial Literacy

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When you put money into a savings account your money will earn interest. **Interest** is the amount the bank pays you for using your money and it is usually expressed as a percentage.

There are two main types of interest. **Simple interest** is a percentage that is paid only on the original principal while **compound interest** is a percentage that is paid on the principal and interest after each time period. Simple interest is simple to calculate, but compound interest is much more commonly used.

Principal is the amount of money upon which interest is paid. It is the starting amount of money.

Compare the amount of simple and compound interest in the table below. Describe the rate of increase for each investment option. Describe the shape of each graph if the total value is plotted as a function of time.

Time (years)	Total Value with simple interest ($)	Total Value with compound interest ($)
0	5000	5000
1	5150	5150
2	5300	5304.50
3	5450	5463.64
5	5750	5796.37
10	6500	6719.58

Jose is saving for his son's college education. Calculate the interest earned from $9000 invested for 18 years in an account that earns 3% simple interest.

Year 1: What is 3% of $9000? $0.03 \bullet 9000 = 270$ Jose will make $270 in interest the first year.
Year 2: What is 3% of $9000? $0.03 \bullet 9000 = 270$ Jose will make $270 in interest the second year.

We could keep doing this for 18 years and every year he will earn $270 interest. At the end of 18 years he will have the following:

Principal = $9,000

Interest = $\$270 \bullet 18 = \$4,860$

Total = $9000 + $4860 = $13,860

Complete the table to determine the total value of $400 invested at 3% for 4 years in a simple interest account.

Time (years)	Principal invested ($)	Interest earned ($)	Balance ($)
1	$400.00	$I = (400)(0.03)(1) = \$12$	$412.00
2	$400.00	$I =$	
3	$400.00	$I =$	
4	$400.00	$I =$	

Principal (p or P) – The principal is the amount of money upon which interest is paid. It is the amount of money at the beginning.

Annual Rate of Interest (r) – The percentage an investor will earn on an investment each year.

Interest (I) – For the saver, interest is the price a financial institution pays for using a saver's money and is normally expressed as a percentage of the amount saved.

Time (t) – The amount of time, in years, that the original money will accumulate interest.

Simple Interest – The amount of interest earned on the principal only.

Compound Interest – The interest that is earned on the principal ***and*** the interest already earned.

Compound interest is always better for people that save and invest their money. Savings that earns compound interest will earn more money over a period of time than with simple interest.

Just about all interest you will encounter in real-life is compound interest.

Simple Interest $I = prt$	**Compound Interest** $A = P(1+r)^t$
This simple interest formula computes the **amount of interest** at the end of a period of time.	This compound interest formula computes the **total amount** you would have (principal + interest) at the end of a period of time

Activity FL7-3: **Simple and Compound Interest** Name:

Simple Interest	$I = prt$	**Compound Interest**	$A = P(1+r)^t$

1. Jessica opened a savings account with a one-time deposit of $100 that will be left in the account for 5 years. The savings account will pay 5% simple interest each year. Calculate the amount of interest she will earn in 5 years.

$$I = prt$$
$$I = (100)(0.05)(5)$$
$$I = \$25 \leftarrow$$

This is the total interest. Add it to the original $100 for a total of $125.

You can also see the simple interest each year in the table below.

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance
1	$100	5%	$5	$105
2	$100	5%	$5	$110
3	$100	5%	$5	$115
4	$100	5%	$5	$120
5	$100	5%	$5	$125
Total			$25	

2. Charles opened a savings account with a one-time deposit of $100 that will be left in the account for 5 years. The savings account will pay 5% compound interest each year. Calculate the amount of interest she will earn in 5 years.

$$A = P(1+r)^t$$
$$A = 100(1+0.05)^t$$
$$A = 100(1.05)^5$$
$$A = 100(1.2761)$$
$$A = \$127.61 \leftarrow$$

This is the total amount. For just interest, you would subtract the original $100 ($27.61).

You can also see the compound interest each year in the table below.

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance
1	$100	5%	$5	$105
2	$105	5%	$5.25	$110.25
3	$110.25	5%	$5.51	$115.76
4	$115.76	5%	$5.78	$121.54
5	$121.54	5%	$6.07	$127.61
Total			$27.61	

Griffin opened two savings accounts with a one-time deposit of $300 in each account. The first savings account will pay 5% simple interest each year. The second will pay 5% compound interest each year. Use the charts below to calculate the amount of interest he will earn in a 5 year period.

1. SIMPLE INTEREST

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance
1				
2				
3				
4				
5				
Total				

2. Complete the formula below to show the total amount of interest earned in #1.

$$I = prt$$

3. COMPOUND INTEREST

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance (*nearest dollar*)
1				
2				
3				
4				
5				
Total				

4. Complete the formula below to show the total balance at the end of five years of compound interest.

$$A = P(1+r)^t$$

5. In words, write a comparison of simple interest and compound interest.

Ella opened two savings accounts with a one-time deposit of $1200 in each account. The first savings account will pay 5% simple interest each year. The second will pay 5% compound interest each year. Use the charts below to calculate the amount of interest she will earn in a 5 year period.

1. SIMPLE INTEREST

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance
1				
2				
3				
4				
5				
Total				

2. Complete the formula below to show the total amount of interest earned in #1.

$$I = prt$$

3. COMPOUND INTEREST

Year	Amount to earn interest	Interest Rate	Interest Earned	Ending Balance (*nearest dollar*)
1				
2				
3				
4				
5				
Total				

4. Complete the formula below to show the total balance at the end of five years of compound interest.

$$A = P(1+r)^t$$

5. In words, write a comparison of simple interest and compound interest.

You may use a calculator on this page.

If you have savings that earns simple interest the interest earnings are calculated once a year. Remember that the formula for simple interest is $I = P \bullet r \bullet t$.

1.	Calculate the simple interest on savings of $18,470. Use an annual interest rate of 2.7%.
2.	Calculate the simple interest on savings of $9,028 invested for two years at a rate of 3.4%.

3. Analyze the table below which shows the total value over time of $1000 invested in accounts earning 4% interest. What do you notice about simple interest compared to compound interest as the years increase?

Number of Years Invested	Total Value in Simple Interest	Total Value in Compound Interest
1	$1040	$1040.00
2	$1080	$1081.60
3	$1120	$1124.86
4	$1160	$1169.90
5	$1200	$1216.70
10	$1400	$1480.20
20	$1800	$2191.10
30	$2200	$3243.40

4.	Use simple interest and compound interest of 3% to compare the earnings on savings of $20,000 invested for two years.
5.	Calculate simple interest on $7,000 at 3.2% for a year.
6.	Calculate compound interest on $5,400 for 2 years at 4%.
7.	Calculate and compare simple interest and compound interest of 5% on the amount of $12,000 for 5 years.
8.	Calculate and compare simple and compound interest of 4.2% on savings of $15,000 for 10 years.
9.	Calculate simple interest on $12,000 at 4% for 30 months.
10.	Calculate simple interest on $3,500 at 3.8% for 18 months.
11.	Calculate compound interest on $500 for 42 months at 5%.

Most workers pay yearly federal income tax based on the wages they earn. Employees deduct money called federal **withholding** from worker's wages and send it to the federal government as partial payment of the worker's yearly income tax. Each year around April 15 workers submit a federal income tax return. At that time they may owe addition taxes or may get a refund depending on several factors, including the amount already paid through withholding.

Net Pay = Gross Pay – Total Deductions

1. Robert's gross monthly pay is $2,000. Federal withholding is 11% of his gross pay. Find the missing numbers in the table below.

Gross Pay	$2000.00
Tax: Federal withholding	
Tax: Social security	$127.00
Tax: Medicare	$29.00
Total Deductions	
Net Pay	

2.	Anita's monthly gross pay is $4,200. Federal withholding is 16% of her pay. Her other deductions total $321.30. Find her net pay.	
3.	Juan earns a monthly salary of $3,200. Federal withholding is 14% of his gross pay. Juan has a total of $244.80 deducted for Social Security and Medicare. Find his net pay.	

Identifying components of a personal budget

- Income – the money you earn
- Expenses – the money you spend

Income is added to the total amount available and expenses are subtracted from the total amount available. **Expenses** include planned savings for college, retirement, emergencies, and taxes.

Expenses can be fixed or variable. **Fixed expenses**, such as car and house payments, occur regularly and do not change from month to month. **Variable expenses**, such as purchases of food and gas, occurs regularly and is necessary for living, but you have some control over the amount.

Which of these would be fixed expenses? Snacks, weekly flute lesson, saving for a new flute, entertainment, savings for college, monthly bus pass

Activity FL7-8: **Budgets** Name:

Many people create a budget to manage current income and expenses, while also planning ahead for long-term financial goals. A **budget** is an estimate of expected income and expenses.

Monthly Budget			
Income (annual take home pay of $64,646)			
Salary/wages (take-home pay)	5388		
Other (bank account interest)	60		
Total monthly income	5448		
Expenses			**Fixed/Variable**
Housing (mortgage/rent)	1080	24%	F
Property tax	385		F
Insurance (home, car, life)	200		F
Food	970		V
Utilities (water, gas, electricity)	230		V
Cell phones	128		F
Cable/internet	145		F
Gasoline	210		V
Child care	400		F
Pet expenses	0		V
Credit card charges	410		V
Entertainment costs	300		V
Gifts/charities	100		V
Other	0		V
Total expenses	4558		
Savings			
Emergency fund	100		
Retirement savings	340		
College savings	450		
Total savings	890		

1.	What is the amount of total monthly income?	
2.	What is the amount of total expenses?	
3.	For each expense calculate its percentage of total expenses. Round to the nearest whole percent. (Calculator)	
4.	Which expenses take up the largest share of the budget?	
5.	What percentage of total take-home pay is saved by this family?	

A family budget is a financial plan based on the amount of money needed to live. In general, the total family income must meet or exceed the total family expenses. The number of children, employment benefits such as insurance, and where the family lives all affect the budget.

Below is an example of the minimum monthly expenses for the Jones' family, who live in Beaumont. There are two parents and two children.

Jones Family's Monthly Expenses		
Description	Expenses in Beaumont ($)	Expenses in Dallas-FW-Arlington ($)
Housing	$697	
Food	$731	
Child Care	$548	
Medical Costs	$508	
Transportation	$494	
Other Necessities	$309	
Total Monthly Expenses	$3,287	
Federal Taxes	$285	
Federal Tax Credits	(-$267)	
Total Monthly Income Needed	$3,591	
Household Hourly Wage	$16	

1. Living in different parts of the country or state can mean different budgets for even the same family. The Jones family is considering a move to the Dallas-Ft. Worth area. Use http://www.familybudgets.org/ to complete the table for the Dallas expenses. Remember it is a family of 4. Assume their employer pays part of their premium and that they are saving for emergencies, retirement, and college.

2.	Mr. Underwood has a net monthly income of $4,000. If he allocates 5% of his money to an emergency fund, how much goes to the fund each month?	
3.	How much goes to clothing if he spends 8% of his money on clothing?	
4.	What percentage is allocated to housing if he pays $1,400 for his mortgage each month?	

Net worth is the difference between what is owned and what is owed.
Assets are items owned. They include a house, a car, savings, and investments.
Liabilities are amounts owed. They include a mortgage, credit card debt, and any other loans.

Net Worth of Katniss Everdeen	
Assets	
House	238,000
General savings	48,000
College fund	28,000
Retirement fund	72,000
Total assets	$386,000
Liabilities	
Mortgage owed	110,000
Credit card debt	1,800
Balance on student loans	23,000
Equity loan for home improvement	25,000
Total liabilities	$159,800
NET WORTH	$226,200

1.	Calculate the net worth of someone with assets of $198,000 and liabilities of $154,000.
2.	What is the value of assets if someone has a net worth of $142,500 and liabilities of $87,400?
3.	What is the value of liabilities if total assets are $204,800 and net worth is $128,900?

Determine whether each item is an asset or a liability.

Money in checking	Credit cards	Savings	Student loans
Investments	Retirement money	Car loans	Mortgage
Home equity loan	Vehicles	Your home	Personal loans

Mr. Mangham's accounts are shown below:

Checking account: $2876	Student loan: $9560
Credit card: $980	401(k) account: $14,432
Car loan: $18,680	Savings account: $5500

Place Mr. Mangham's account into the table below and determine Mr. Mangham's net worth.

Assets		**Liabilities**	
Type	**Amount**	**Type**	**Amount**
TOTAL		TOTAL	
Net Worth			

Assets are things you own. They have a positive cash value. Examples of assets are goods that are paid for and owned, such as houses, cars or bicycles, positive bank accounts, and savings bonds.

Liabilities are debts you owe. They have a negative cash value. Examples of liabilities are car loans, house mortgages, credit card debt, or student loans.

The Johnsen family has two adults and two young children. Both parents work full-time jobs; one child is in day care all day and the other child is in first grade and in after-school care. They own a house and two cars and carry some credit card debt. Complete a net worth statement for this family. Remember that most monthly expenses are not considered liabilities.

- The house is valued at $95,000 with a mortgage balance of $45,000.
- First car is worth $12,000. The family owes $5,000 on their auto loan.
- Second car is worth $10,000 which is paid in full.
- Child care costs are $600 per month.
- Retirement accounts are valued at $15,000.
- Balance on credit cards total $2,000.
- Checking account has a balance of $500.
- Savings account has a balance of $1,200.
- They have $75 in cash.
- The value of their furniture is approximately $4,500 which is paid in full.
- The miscellaneous household items are valued at $1,200 which is paid in full.
- Mrs. Johnsen's jewelry is valued at $900; this was paid with her credit card and is included above.

Assets		**Liabilities**	
Type	**Amount**	**Type**	**Amount**
TOTAL		TOTAL	
Net Worth			

Activity FL8-1: **Credit Cards** Name:

CREDIT CARD STATEMENT

SEND PAYMENT TO
Box 1244
Anytown, USA

ACCOUNT NUMBER	NAME	STATEMENT DATE	PAYMENT DUE DATE
4125-239-412	John Doe	2/13/09	3/09/09
CREDIT LINE	**CREDIT AVAILABLE**	**NEW BALANCE**	**MINIMUM PAYMENT DUE**
$1200.00	$1074.76	$125.24	$20.00

REFERENCE	SOLD	POSTED	ACTIVITY SINCE LAST STATEMENT	AMOUNT
483GE7382		1/25	PAYMENT THANK YOU	-168.80
32F349ER3	1/12	1/15	RECORD RECYCLER ANYTOWN, USA	14.83
89102DIS2	1/13	1/15	BEEFORAMA REST ANYTOWN, USA	30.55
NX34FJD32	1/18	1/18	GREAT ESCAPES BIG CITY, USA	27.50
84RT3293A	1/20	1/21	DINO-GEL GASOLINE ANYTOWN, USA	12.26
973DWS321	2/09	2/09	SHIRTS 'N SUCH TINYVILLE, USA	40.10

Previous Balance	(+)	168.80	Current Amount Due	125.24
Purchases	(+)	125.24	Amount Past Due	
Cash Advances	(+)		Amount Over Credit Line	
Payments	(-)	168.80	Minimum Payment Due	20.00
Credits	(-)			
FINANCE CHARGES	(+)			
Late Charges	(+)			
NEW BALANCE	(=)	125.24		

FINANCE CHARGE SUMMARY	PURCHASES	ADVANCES
Periodic Rate	1.65%	0.54%
Annual Percentage Rate	19.80%	6.48%

For Customer Service Call:
1-800-xxx-xxxx
For Lost or Stolen Card, Call:
1-800-xxx-xxxx
24-Hour Telephone Numbers

1.	What is the minimum payment for this statement?	
2.	How does this credit card statement show financial responsibility by the credit card holder?	
3.	What is the Annual Percentage Rate (APR) for purchases?	
4.	What is the new balance?	
5.	What is the previous balance?	
6.	How many charges were made during the billing cycle?	
7.	How many payments were made during this billing cycle?	
8.	What is the total amount of the credit line?	
9.	What is the total amount of available credit?	
10.	What is the Annual Percentage Rate (APR) for cash advances?	
11.	What is the date for the next payment?	

Saving for college or retirement are long-term goals for many people. To help determine a savings plan, it is important to know approximately what your college costs will be or the amount of money you will need for retirement. Both require regular savings and wise money management.

Choose four schools you think you might like to attend.

- One two-year school, such as a community college
- One four-year public, state-supported university in Texas
- One four-year public, state-supported university outside Texas
- One private college or university

Research the estimated costs for tuition, room and board, and other expenses at each of the three schools. Then make a plan for at least your first year.

When researching online you may want to include College Board as part of your search as they have information you may find useful in estimating costs.

COSTS	Tuition	Room/board	Other/fees	Totals
Two-year college				
Texas public university				
Out-of-state public university				
Private college				