

Studying the Stock Market Using Fractions, Decimals and Graphs

Jerri Lafer

Academic Setting

School Setting

Teaching seventh grade mathematics at Ernie Pyle Middle School (EPMS) for eight years has been an enlightening experience. I have encountered many remarkable children with great character. Unfortunately, a good personality is not enough for them to survive in this world. Ernie Pyle has notably the lowest test scores in the entire state of New Mexico. We are located in an extremely low socioeconomic area of Albuquerque, and about 85% of our 980 students are receiving free or reduced lunch. Our population is 94% Hispanic, and 67% of our students are bilingual. Our daily attendance is around 87%, and we have a stability rate (students who remain at EPMS for 6th, 7th, and 8th grade) of only 63%. Most of our youngsters live in non-traditional families, so many do not have the support needed to focus on a good education. Therefore, most of our students are well below grade level in their reading achievement and their basic math skills.

Ernie Pyle has been researching many schools in other districts and states which are similar to ours in various aspects such as population, economics, family style, and test scores. Three years ago we were on a traditional schedule of eight classes per day, 42 minutes for each class. Two years ago we tried something new: block scheduling. We had four classes per day for 70 minutes and we saw the kids every other day. Because our reading scores are so low, the language arts / literature teachers saw the children every day, still for 70 minutes per day. We also have a 45 minute reading class every day for every student. All teachers are involved in this reading program in which we have 13 - 17 students per class.

Ernie Pyle has focused on reading for many years; we now feel it is time to begin focusing on mathematics. This coming year we will again try something new for our students and teachers. We will keep the block scheduling with language arts and literature daily, but now we also try mathematics every day for the 70 minute block.

Class Setting

Ernie Pyle seventh grade math students are functioning at an average of about a 3rd or 4th grade level. About 40% of the students entering my class have forgotten how to subtract. After a few weeks I can usually narrow that down to about 15%. About 65% of the students entering my class do not know their basic multiplication tables. An amazing 50% are unable to do two digit multiplication, and are they unable to do division. These same students do not do any homework and generally complete only half of the class work assigned. These students have not developed problem solving skills and consequently need assistance with every step of any situation. Other students are very capable, but only occasionally do their class or homework due to lack of motivation and lack of parental involvement.

The 70 minute classes make it very difficult for the students to focus on only one topic so; I separate each of my class periods into two or three sections. Every class begins with a journal assignment. The first-nine weeks the students have six minutes

each day to complete four multiplication problems. They need the practice! The kids grade each other's paper using a grading scale of 15 points for each problem tried, plus ten points for each problem correct. I stress to the children that they get 60% just for trying. The second nine weeks I give them eight minutes to do two multiplication problems and two division problems with the same grading scale.

Beginning in January, because state testing is done in March, I give the students ten minutes to do two word problems using the content area currently being studied. I also have the kids write, using words, how they solved the problem and why they chose that method. The students still grade each other's paper using a scale of 30 points for each problem tried, 20 points for each correct problem and 10 extra credit points for each problem if the explanation actually matches the work. The fourth nine weeks I mix and match. Every three weeks I record an average grade. I have the children calculate the *mean* and then I check over their grade.

After the journal, the rest of the class period is spent on the main curriculum. I try to leave the last five or ten minutes of class for review or discussion of various upcoming events. We also use this time for practicing times tables, trying logic puzzles, and other fun quick activities.

Goals and Objectives

By the end of this unit students will be able to:

- convert decimals to fractions
- reduce and simplify fractions to lowest terms
- use divisibility patterns and tests
- list factors for numbers
- find the greatest common factor
- make equivalent fractions
- compare and order fractions
- add and subtract fractions
- find the least common multiple / least common denominator
- add and subtract mixed numbers
- change improper fractions to mixed numbers
- create, interpret and compare line graphs and bar graphs
- multiply fractions and mixed numbers
- divide fractions and mixed numbers
- change mixed numbers to improper fractions
- round fractions

This unit can be used with decimals instead of fractions, and is designed with flexibility for the grade level intended.

Strategies

Goals and objectives will be met through the use of whole class examples, small group work, self discovery, manipulatives, hands-on research, and paper practice. Whole class examples will consist of the teacher and the class working on a sample of what will be done in small groups. Small group work will be used for the majority of the project. I prefer groups to consist of three students. I have found that groups with four students gossip more than they concentrate on the project, and groups of two seem to not focus, they get more confused and they do not ask questions. Self discovery will be done through posing questions to the small groups and letting them find the answers before I give them any direction. We will use Marilyn Burns manipulatives: fraction kits, cover-up, and uncover. Paper practice will be the "pencil and paper" part of using the textbook for daily practice.

Context and Background

Rationale

For several years I, like many of my coworkers, tried to teach the students their basic skills; we all know how important these skills are to further mathematics study. The children have the whining attitude of, "Why do we have to learn this *again*?" You can just hear the *attitude*! Last year my assistant principal, who used to teach math, suggested to me that perhaps it's time to stop re-teaching something they do not want to learn and move on to something different. My theory is that if we move on they will see how important their basic skills are and finally learn them. This unit will focus on the four basic operations of fractions and decimals and some graphs using the stock market as a real life example. Money is a motivator. Kids love money. So let's begin with the satock market.

Student Background

Students should already know how to do the four basic operations with whole numbers. Even though they may not, we are still moving ahead. In a previous activity done with the students, my kids learned how to convert fractions to decimals by using the fraction bar as a division sign. They have also been introduced to the four basic operations using decimals, although they probably are not yet confident. They worked with bar graphs in the same activity.

Subject Background

To understand the stock market, one must first know what stock is and why companies issue stock. There are three major types of business organizations: sole proprietorship, partnership, and corporation. A sole proprietorship is owned by one person. No special legal requirements must be met in order to start this type of business. In a sole proprietorship the owner receives any profits, endures any losses, and is personally liable for all debts of the business. A partnership is owned by two or more people, and has no special legal requirements; however, there must be some type of agreement or contract between the partners. A certificate must be filed with the county clerk stating the intention to conduct a business as partners and a small fee will be paid. In the partnership, the contract will define the division of the net income, or net loss, and each partner has unlimited personal liability for the debts of the business.

A corporation is a separate legal entity distinct from its owners. Upon the establishment of a new company, one must have the finances to begin that company. These finances are called capital. Capital consists of all the company's assets or items to assist

in the creation of wealth. If the company does not have enough capital it has two choices: one is to borrow the money, the other is to sell part of the company. Borrowing the money constitutes a liability that must be paid back usually with interest; selling part of the corporation keeps equity within the company. This sale is done by issuing stock. The equity is divided into shares of stock, and the owners of the stock are called shareholders or stockholders. One advantage to issuing stock is that a company can raise more capital than it can borrow.

To a shareholder, buying stock is more attractive than investing in a partnership because the stockholder has no liability for the debts of the corporation, and the shares are readily and freely transferable they can be transferred without the permission of other stockholders. Stockholders have advantages in buying stock because they may receive a share of the profits (called dividends), and if the company grows then the price of the stock may also increase. The executives of the corporation must share ownership with stockholders who have a voice in the policies that affect the operations of the company. Stockholders who are not officers or managers of the corporation do not have the authority to involve the corporation in any business. The stockholders participate in the affairs of the corporation only by voting in the stockholders' meetings. Stockholders who do not attend meetings must be given an opportunity to delegate their voting rights to an agent. A stockholder does this by signing a document, called a proxy, giving designated agent the right to vote the stock.

The very first sale of stock to the public is called the initial public offering (IPO). Before issuing this stock, the corporation must file an application, signed by at least three subscribers of the corporation, with the Securities and Exchange Commission (SEC). After twenty days the company releases a prospectus that summarizes the company and includes how many shares are being offered and the price of this stock (par value). After paying the appropriate fees, the corporation must elect a board of directors. The directors are responsible for guiding the company's business activities.

Historical Background

Trading in America goes as far back as our history. In the 1790's brokers would meet at an outdoor marketplace in Philadelphia to buy and sell securities issued by the U.S. government. About that same time in New York City, Alexander Hamilton, the first U.S. Secretary of the Treasury, encouraged the growth of exchanges using U.S. government debt securities. Merchants would meet in front of Trinity Church on Wall Street in East Manhattan. There was no paper money or stock being exchanged. Instead, they bartered; they traded silver for papers saying they owned shares in cargo that was coming in on ships every day. This became America's first formal exchange with membership requirements.

In 1792, twenty-four men signed an agreement that started the New York Stock Exchange (NYSE). They agreed to sell shares or parts of companies between themselves and charge people commission or fees to buy and sell for them. Their first headquarters was at 40 Wall Street. As they grew they moved into what is now known as the New York Stock Exchange Building. By 1829, the trading volume had reached about 50,000 shares per day. In 1842, a rival exchange was formed called the New York Curb Exchange. This "curb trading" was formed because many stocks that were considered not good enough for the NYSE and were forced to be traded outside. This later became known as the American Stock Exchange (AMEX).

In 1882 Charles Dow and Edward Jones started Dow Jones and company, which is today a very large firm. They created an index measuring the activity of the NYSE. By 1886 the trading volume boomed to an amazing 1,000,000 shares per day! Ten years later, in 1896, the Dow Jones company began publishing a daily paper called the *Wall Street Journal*.

With the turn of the century came the Industrial Revolution and the NYSE boomed. The 1920's were called the "Roaring

Twenties" with good reason.

The government expanded the money supply and credit supply which caused interest rates to decrease, and stock prices to rapidly rise. It has been estimated that the Federal Reserve increased the money supply by more than 60% from mid-1921 to mid-1929. The growth of the economy excelled; wages increased, accompanied by an increase in consumer spending.

Many business people had invested their life savings, they had mortgaged their homes, and they had cashed in safer investments in order to join in the rising stock market. Many banks, in order to increase profits enthusiastically, began investing dangerously with their finances as well. Billions of dollars were invested in the stock market as people began pondering the rising stock prices. According to *The Economist* "People see patterns, where there are none, all the time – in clouds, in lotteries....When many traders think they see the same pattern they may respond in the same way. They may thus, collectively, create a real pattern....The more orderly a market appears the less stable it is."

There was a remarkably unequal relationship of wealth; money was highly distributed between the rich and the middle-class; This imbalance of wealth created an unstable economy. If the Federal Reserve had been more careful with releasing the money supply it might have prevented the unnaturally elevated stock market prices. The tremendous amount of unsecured consumer debt created by this left the stock market extremely off balance. As the economy soared, business costs rose, and profits were lost. By early 1929 the Federal Reserve cut the money supply and interest rates began to rise. Lawrence Reed said, "This deflation following the inflation wrenched the economy from tremendous boom to colossal bust."

"What goes up usually must come down. Is the U.S. dollar an exception to the rule?" Black Monday, October 24, 1929, ended the "Roaring Twenties" and began a 12 year stretch of The Great Depression. At the close of that day, the New York Stock Exchange had lost \$4 billion dollars. Thousands of people were in financial ruin and this upheaval resulted in total hysteria. Many banks were completely exhausted of their finances. Each ruined bank, factory, business, and investor contributed to the descent that began The Great Depression. By the end of the year stock values had dropped by \$15 billion.

Between the Crash of 1929 and 1933 production in factories, mines, and utilities fell by more than half. People's real disposable incomes dropped 28%. Stock prices collapsed to one-tenth of their pre-crash height. The unemployment rate of Americans rose from 3.2% (1.6 million) to 25% (12.8 million). Of course, The Great Depression was fostered by the start of World War II, especially when the U.S. entered in 1941. By the end of the war the stock markets were finally beginning to recover.

It was in 1934 that Congress passed the Securities and Exchange Act. This Act formed the Securities and Exchange Commission. Among other duties, the SEC oversees the daily actions of exchanges and how they trade the securities offered.

Amazingly, in 1943 the first women began working on the trading floor. The market had been fairly quiet, so it was closed for the day of November 22, 1963 to prevent panic selling when John F. Kennedy was assassinated. In the mid to late 1960's the National Association of Securities Dealers Automated Quotation (NASDAQ) was formed to handle the over-the-counter securities market that deals with around the world trading by phone and computer. By the early 1970's the volume of trade increased from 1 million shares a day to about 15 million shares a day.

On October 19, 1987, which is also known as Black Monday, the Dow dropped 22.6%, nearly double the 1929 crash. This was a loss of 508 points. Traders generally begin to worry if there is a drop of over 50 points - this was 1000% greater! According

to Michael Forman, a reporter, there were many contributions to the crash of 1987, but it was mostly "a reaction to the rampant greed that defined what was being called the 'Go-Go Eighties.'" Another cause was that the market became unbalanced. There were too many sellers and not enough buyers. Forman also stated that the media was forbidden to use the word "crash," they were asked to use "correction." He responded with "Yeah...just like the iceberg corrected the course of the Titanic." The stock market crash was not as devastating or as lengthy as the crash of 1929, but it caused many scares, and much discomfort. The impact of this crash was very limited; the market recovered fairly quickly. On October 21, two days after the initial crash, the Dow average began its rise. By 1990, the market was reaching record highs.

In 1994, Aufhauser Securities, now Ameritrade Holding Corp., created the first internet trading system. By mid-1999 there were 9.7 million online trading accounts, which is almost three times the number of online accounts in 1997. The volume of trades grew from 100,000 trades per day in mid-1996 to over 500,000 in mid-1999. It is estimated by Ameritrade that by 2003 online trading will increase by more than sevenfold and reach \$3 trillion. In January 2001, the New York Stock Exchange converted the reports from fractions to decimals because changes were occurring in smaller amounts and because it is believed that consumers understand decimals (money) better than fractions.

Implementation

New Mexico Standards (Grades 5 - 8)

1 - Student will understand and use mathematics in problem solving.

B. Formulate problems from community mathematical situations.

D. Verify and interpret results with respect to the original problem situation.

E. Use manipulatives, calculators, and computers, and other tools, as appropriate, in order to strengthen mathematical thinking, understanding, and power to build upon foundation concepts.

F. Generalize solutions and strategies to new problem situations.

2 - Students will understand and use mathematics in communication.

B. Use drawings, discussion, reading, writing, and listening to access, learn, and communicate mathematical ideas.

A. Create and use a variety of media and methods to communicate mathematical concepts, thoughts, and problem solutions including charts, slides, graphs, maps, drawings, pictures sound recordings, video, e-mail, and others.

B. Represent mathematical ideas through the use of learning tools such as manipulatives, calculators, and computers.

4 - Students will understand and use mathematical connections.

B. Describe how mathematics is integrated throughout the school and surrounding environment.

A. Use mathematical foundations as a basis for more complex mathematics.

E. Describe the role of mathematics in our culture and society.

5 - Students will understand and use numbers and number relationships.

A. Represent and use numbers in a variety of equivalent forms including integers, fractions, decimals, percents, exponents,

and scientific notation.

B. Apply the relationships among fractions, decimals, and percents to ratios and proportion.

D. Represent numerical relationships in one- and two- dimensional graphs.

6 - Students will understand and use number systems and number theory.

A. Explain why other sets of numbers are needed in addition to whole numbers.

B. Use order relations for whole numbers, fractions, decimals, integers, and rational numbers.

C. Extend basic arithmetic operations to fractions, decimals, integers, and rational numbers and demonstrate the relationships among them.

D. Apply number theory concepts such as primes, factors, and multiples in mathematical problem situations inside and outside the school environment.

7 - Students will understand and use computation and estimation.

A. Solve problems through computation with whole numbers, fractions, decimals, rational and irrational numbers.

C. Select and use an appropriate method for computing from various processes

including mental arithmetic, paper and pencil, calculators, and technology.

10 - Students will use and understand statistics.

B. Construct, read, and interpret tables, charts, and graphs.

Lesson Plans

Lesson 1

Purpose: To learn vocabulary and to assess students' prior knowledge of the subject.

Materials: Paper, pencil

Procedure:

1. Students will separate into groups of three. Groups will remain the same for the entire project.
2. They will be given a pretest consisting of vocabulary and evaluating problems.
3. Each student will have his/her own paper, work, and answers, but they will work as a group to formulate their answers.
4. Pretests will not be collected, but will be kept by the individual student to make corrections as we go through the unit.

Pretest:

A: *Define the following:*

1. Fraction (7) Partnership
2. Decimal (8) Corporation
3. Barter (9) Stock
4. Trade(10) Dividend
5. Money(11) Wall Street (not *Journal*)
6. Sole Proprietorship(12) Investment

B: Solve the following: (I generally write the problems on the board going *across* to make sure the students know how to line them up properly; it also saves room.)

1. $3/5 = \text{decimal}$ (7) $6.84 \times 4.9 = (13)$ $7/8 - 3/4 =$
 - (2) $.25 = \text{fraction}$ (8) $\$48.36 \div 13 = (14)$ $4 \frac{5}{6} - 2 \frac{1}{3} =$
 - (3) $.875 = \text{fraction}$ (9) $32.4 \div 2.3 = (15)$ $5 \times \frac{1}{4} =$
 - (4) $27.4 + 36 + 7.67 = (10)$ $\frac{3}{5} + \frac{1}{5} = (16)$ $\frac{2}{3} \times \frac{1}{4} =$
 - (5) $\$49.58 - \$29.79 = (11)$ $\frac{3}{4} + \frac{2}{3} = (17)$ $2 \frac{1}{2} \times 4 \frac{3}{4} =$
 - (6) $\$457 - \$87.39 = (12)$ $7 \frac{3}{4} + 1 \frac{2}{3} = (18)$ $\frac{7}{8} \div \frac{3}{4} =$
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Lesson 2

Purpose: To learn background information and to learn about one source of media.

Materials: Paper, pencil, *Albuquerque Journal* newspaper

Procedure:

1. Students will be given a brief background about the three types of business organizations: Sole proprietorship, Partnership, Corporation. They will be asked to review their *pretest* and to take some notes so they are familiar with the main differences.
2. Students will be given a history of the stock market. They will be informed about how the stock market was started, what stocks are, and why people invest in the stock market. They will be asked to review their *pretest* and take some notes.
3. Students will be informed that this project is for them to gain a better understanding of money and investments and be able to implement this into their environment when they begin earning and investing. (After graduating, anyone making over \$5,000 by investing in the stock market has to find his/her teacher and give a yearly 10% gift as an appreciation for your education! Ha ha)
4. Within their small groups, students will be introduced to the stock market section of the *Albuquerque Journal*. This

paper includes closing prices from the previous day's market for the NYSE (New York Stock Exchange), NASDAQ (National Association of Securities Dealers Automated Quotation), and AMEX (American Stock Exchange).

- Students will take notes about how to read stock listings in the Albuquerque Journal. These will be taken directly from the Journal:

Stock - an abbreviation issued for each stock

Footnotes - spaces after stock name are for footnotes like *n* = new issue

Div. - dividend - the payment the company is expected to pay stockholders

PE - price-to-earnings ratio - a stock's price divided by its earnings

Vol. - number of shares, in hundreds, that traded hands

Last - the day's closing price of the stock

Chg. - the change between the closing price and the previous day's closing price

- If a computer is available, the students can go to www.yahoo.com, click on *finance*. They can use the *ticker symbol lookup* for the chosen stock. A great amount of information will be found at this site.

Lesson 3

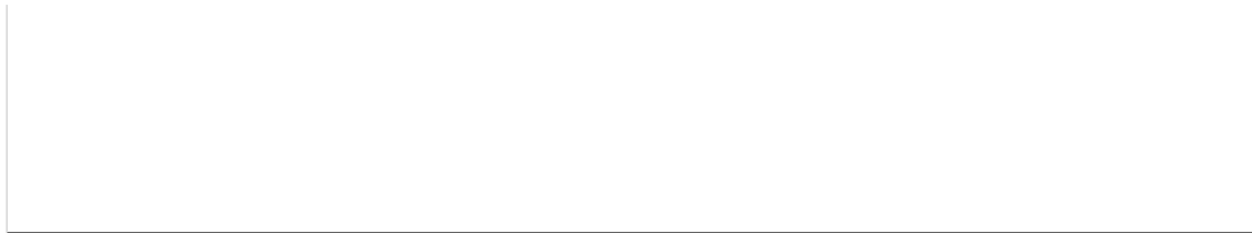
Purpose: To learn converting decimals to fractions, and to learn reducing fractions to lowest terms. Students will begin gathering information for the whole class activity.

Materials: Paper, pencil, each student will receive handout #1:

Stock Name

Albuquerque Journal stock market prices

MARKET		MARKET		DIV.	PE	VOL.	LAST	CHANGE
DAY	DATE							+ or -



Procedure:

1. The whole class will have \$1000 (pretend money) to invest in one stock. Our goal is to make money. We will begin investing in the same company, but will later choose our own company to invest. We will all look at one stock in the *Albuquerque Journal* every day for the next two weeks and copy the information on to handout #1.

Example:

QuakrOat

Albuquerque Journal stock market prices

MARKET	MARKET	DIV.	PE	VOL.	LAST	CHANGE
DAY	DATE					+ or -
Friday	6/08	1.14	**	**	95.90	**
Monday	6/11	1.14	28	4,555	94.85	-1.05
Tuesday	6/12	1.14	28	5,770	95.00	+0.15
Wednesday	6/13	1.14	28	7,656	94.82	-0.18
Thursday	6/14	1.14	28	8,539	94.08	-0.74
Friday	6/15	1.14	28	9,796	93.70	-0.38
Monday	6/18	1.14	28	6,387	93.20	-0.50

Tuesday	6/19	1.14	27	37,123	90.55	-2.65
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2. Students will be in their small groups chosen the first day. We will learn converting decimals to fractions. They will be given the example $.25 = 1/4$ and asked about $.50$ and $.75$. The students are generally familiar with these three conversions because of money. They will be asked to formulate an algorithm (in their words, figure out how) to convert $.60$ and $.33$ using the first three discussed.
 1. The entire class will discuss the process on how it can be done. We will also discuss converting whole numbers with decimals to mixed numbers. Practice.
 2. The students will be informed of the importance of this because we will begin looking at a specific stock using both decimals and fractions.
 4. After practicing converting decimals to fractions, students will need to learn how to reduce fractions to lowest terms. They will be given examples: $2/8 = 1/4$, $4/6 = 2/3$, and $50/100 = 1/2$. They will be asked to formulate an algorithm to find $4/12$, $3/9$, and $15/65$ using the first three discussed.
 1. The entire class will discuss the process of how it can be done. They will be given an assignment from the text book to practice converting decimals to fractions and reducing fractions to lowest terms.
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Lesson 4

Purpose: To make project folders, and to make Marilyn Burns fraction kits.

Materials: Each student will need 1 1/2 sheets of construction paper (use a different color per class), five 3 x 18 strips of different colored construction paper, scissors, stapler, pencil, markers

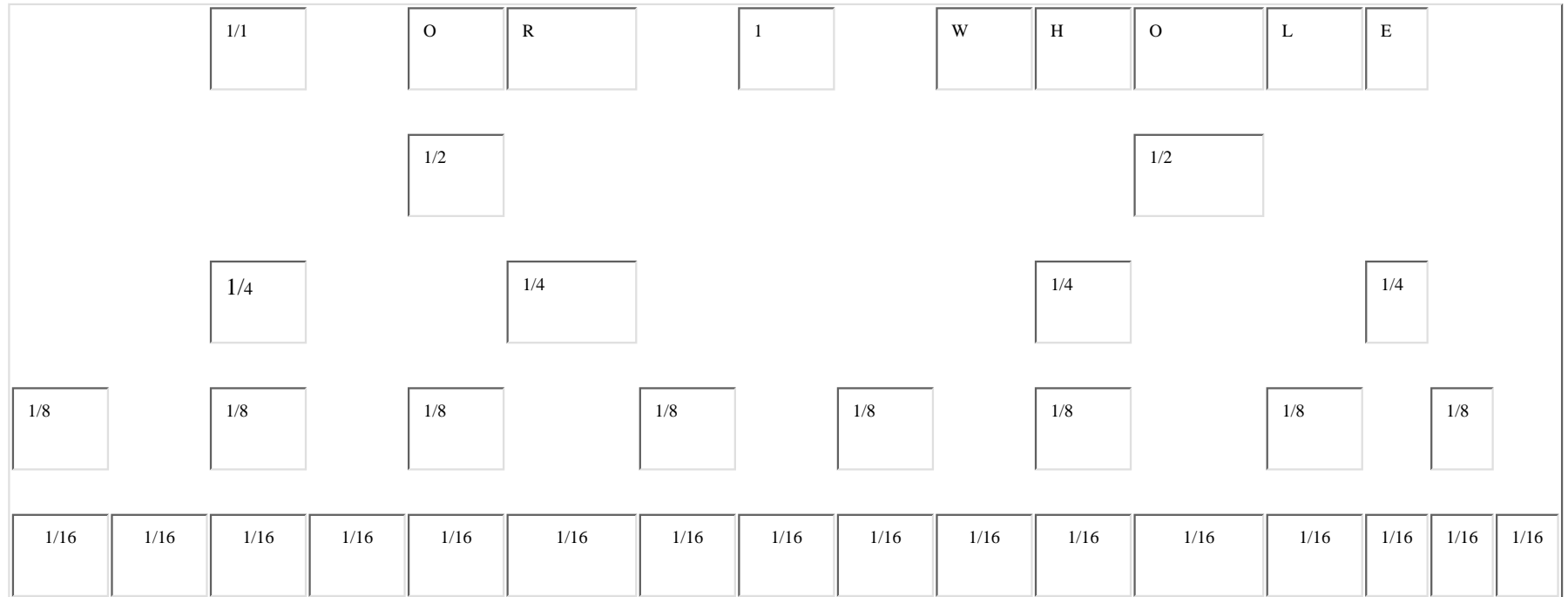
Procedure:

1. Class will look up the chosen stock and record the information (day 2).
2. Previous day's assignment will be graded and collected.
3. Each student will take the full sheet of construction paper and fold it in half creasing the edge. **One side** of the paper will be stapled together leaving the other side and the top open to be used for inserting **all project papers and notes**. Students will label with their first and last name, "Investment Folder," and teacher's name and room number (in case it becomes misplaced).
4. Each student will take the 1/2 sheet of construction paper and fold it in half creasing the edge. **Each side** of the paper will be stapled together leaving the top open to be used as an envelope (Marilyn Burns suggests each student have a #10 envelope, but I like the colorful ones). Students will label with their first and last name and period number.
5. (a) All students use the same color strip, fold it in half, and cut along the crease.

Direct the kids into discovering that we had one whole and cut it into two

equal pieces thus each piece is labeled $1/2$.

- b. Then have the students get another color strip, fold it in half, and in half again. Cut the creases and label each piece $1/4$, of course discussing why.
- a. The third color strip will be cut into eighths, labeling each as they cut.
- b. The fourth color strip will be cut into sixteenths, labeling each as they cut.
- c. Students will leave the fifth color strip to be used as one whole and label accordingly.



(Burns)

Lesson 5

Purpose: To learn divisibility patterns.

Materials: Investment folder, paper, pencil

Procedure:

1. Class will look up the chosen stock and record the information (day 3).
2. Students will be given notes about divisibility patterns / tests.
3. They will be instructed that this will make it easier to reduce larger fractions. They will be given several examples: $27/36 = 3/4$. Which is easier to comprehend?
4. They will be given an assignment to practice what they learned.

Lesson 6

Purpose: To learn listing factors and finding the *greatest common factor* (GCF).

Materials: Investment folder, paper, pencil, centimeter cubes or square tiles

Procedure:

1. Class will look up the chosen stock and record the information (day 4).
 2. Previous day's assignment will be graded and collected.
 3. Students will be given 24 cubes per group.
 4. These 24 pieces make up one pound of candy. How many different rectangles can we make to box the candy? I see one row of all 24 pieces. Write down any other way you find.
 5. Discuss as a class. Now let's try 18 pieces. Discuss when done area is the number being factored and the length and width are the factors.
 6. Students will discuss ideas about making it easier to compare the factors; listing them in order.
 7. Students will be given some notes about greatest common factor (GCF).
 8. They will be instructed that this will make it easier to reduce larger fractions.
 9. They will be given an assignment to practice what they learned.
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Lesson 7

Purpose: To learn equivalent fractions.

Materials: Fraction kit, investment folder, paper, pencil

Procedure:

1. Class will look up the chosen stock and record the information (day 5).
2. Discuss as a class that in looking at the "change" in share value, does it seem as if we are making or losing money so far? A reminder of why we are doing this.
3. Previous day's assignment will be graded and collected.
4. Within their groups students will be asked to use the fraction kit to create equivalent fractions and to also write the examples down on paper.
How many 16ths make up $\frac{1}{4}$? We write $\frac{1}{4} = \frac{4}{16}$.
How many 8^{ths} make up $\frac{1}{2}$? We write $\frac{1}{2} = \frac{4}{8}$.
How many 16ths make up $\frac{2}{4}$? How many 16ths make up $\frac{1}{2}$?

Do several until they understand.

5. Students will be given more notes about equivalent fractions.
 6. They will be given an assignment to practice equivalent fractions.
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Lesson 8

Purpose: To learn comparing and ordering fractions.

Materials: Investment folder, fraction kit, paper, pencil, two strips of 3 x 18 construction paper (two colors not already used in the fraction kit), ruler, scissors

Procedure:

1. Class will look up the chosen stock and record the information (day 6).
 2. Previous day's assignment will be graded and collected.
 3. Using the fraction kit students will be asked to order:
 - a. from least to greatest: $\frac{1}{8}$, $\frac{1}{2}$, $\frac{1}{16}$, $\frac{1}{4}$.
 - b. from greatest to least: $\frac{2}{8}$, $\frac{3}{16}$, $\frac{5}{16}$, $\frac{1}{2}$, $\frac{1}{4}$.
 - c. Do several until they understand.
 - d. from least to greatest: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{5}{6}$, $\frac{3}{8}$. Uh, Oh, what will we do without pieces the size of thirds or sixths? Let's make them.
 4. Students will figure out how to cut one color strip into 3rds. They will label appropriately. Students will then do the 6ths, and label appropriately.
 5. Now go back to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{5}{6}$, $\frac{3}{8}$. Discuss.
 6. Let's try $\frac{3}{5}$, $\frac{2}{7}$, $\frac{5}{7}$, $\frac{2}{5}$, $\frac{1}{2}$. Now what? We are out of different color strips, so we can not make more.
 7. Students will be asked to formulate an algorithm to compare and order the fractions.
 8. The entire class will discuss the process of how it can be done. Students will be given some notes about comparing fractions using common denominators.
 9. They will be given an assignment to practice comparing and ordering fractions.
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Lesson 9

Purpose: To practice converting decimals to fractions, and subtracting decimals.

Materials: Investment folder, paper, pencil, handout #2:

Show all organized work on separate paper and staple to this paper.

No Work -- No Credit

Stock Name

MARKET	MARKET	SHARE VALUE	CHANGE	SHARE VALUE	CHANGE
DAY	DATE	DECIMAL	DECIMAL	FRACTION	FRACTION

Procedure:

1. Class will look up the chosen stock and record the information (day 7).
2. Previous day's assignment will be graded and collected.
3. Within their groups, students will transfer the information from handout #1 to handout #2.
4. We will discuss what is meant by each column in handout #2, especially "change".
5. Students will verify the newspaper decimal "change" by doing the subtraction themselves.
6. Students will fill in the information not given: fraction "share value" (by converting decimals to fractions), and fraction "change" (by converting decimals to fractions). They will reduce the fractions to lowest terms in the chart.

Example:

Show all organized work on separate paper and staple to this paper.

No Work -- No Credit

QuakrOat

MARKET	MARKET	SHARE VALUE	CHANGE	SHARE VALUE	CHANGE
DAY	DATE	DECIMAL	DECIMAL	FRACTION	FRACTION
MONDAY	6/11	94.85	- 1.05	94 17/20	- 1 1/20
TUESDAY	6/12	95.00	+ 0.15	95	+ 3/20

WED	6/13	94.82	- 0.18	94 41/50	- 9/50
THURSDAY	6/14	94.08	- 0.74	94 2/25	- 37/50
FRIDAY	6/15	93.70	- 0.38	93 7/10	- 19/50
MONDAY	6/18	93.20	- 0.50	93 1/5	- 1/2
TUESDAY	6/19	90.55	- 2.65	93 11/20	- 2 13/20

Lesson 10

Purpose: To practice equivalent fractions and to learn adding fractions.

Materials: Investment folder, fraction kit, fraction dice (one per group), paper, pencil

Teacher preparation of fraction dice: six sided cubes with faces labeled as follows:

1/2, 1/4, 1/8, 1/8, 1/16, 1/16.

Procedure:

1. Class will look up the chosen stock and record the information on both handouts (#1 and #2) including calculating the fraction columns (day 8).
2. Within their groups, students will play Marilyn Burns "cover-up" using their fraction kit.
 - a. Each player starts with the whole strip. The goal is to be the first person to cover the whole strip completely using other pieces of the fraction kit (*3rds and 6ths will not be used*). No overlapping is allowed.
 - b. Students take turns rolling the fraction cube.
 - c. The fraction face up on the cube tells the person rolling the cube what size piece to place on top of the whole strip.
 - d. When the game nears the end, the student must roll exactly what is needed in order to win.
3. After most groups have completed their first game, all students will record the game on paper. Put several Examples on the board:

1/4	1/4	1/8	1/4	1/8
-----	-----	-----	-----	-----

- a. $1/4 + 1/4 + 1/8 + 1/4 + 1/8 = 1$
- b. Rearrange *like terms*: $1/4 + 1/4 + 1/4 + 1/8 + 1/8 = 1$

c. Guide students to shorten the equation by combining *like denominators*:

$$1/4 + 1/4 + 1/4 = 3/4 \text{ and } 1/8 + 1/8 = 2/8 \text{ so } 3/4 + 2/8 = 1$$

(4) Have the students play two more games and record each player's game.

(5) Now it is time for Marilyn Burns "Uncover."

- a. Each student starts with the whole strip covered by the two $\frac{1}{2}$ pieces. The goal is to be the first person to uncover the strip completely.
 - b. Students take turns rolling the fraction cube.
 - c. The person rolling the cube has three options:
 1. to remove a piece (only if he/she has a piece the size indicated by the fraction on the cube),
 2. to exchange any of the pieces left for equivalent pieces,
 3. to do nothing and to pass the cube to the next player.
 - d. A player may not remove a piece and trade in the same turn.
 - a. It is important for the children to check that each other trades correctly.
-

Lesson 11

Purpose: To learn adding and subtracting fractions and to learn *least common multiple* (LCM) / *least common denominator* (LCD).

Materials: Investment folder, fraction kit, paper, pencil

Procedure:

1. Class will look up the chosen stock and record the information on both handouts (day 9).
2. Referring to the previous lesson $3/4 + 2/8 = 1$, the students will be asked to formulate an algorithm to solve equations with different denominators. They may use their fraction kits to try to figure out why and how $2/4 + 4/16 + 2/8 = 1$.
3. The entire class will discuss the process on how it can be done.
4. Some notes will be given about least common multiple/least common denominator.
5. Groups will then discuss how $1/2 - 1/8 = 3/8$ and form an algorithm.
6. The entire class will discuss the process on how it can be done.
7. Several problems for addition and subtraction of fractions should be practiced.
8. They will be given an assignment from the text book to practice adding and subtraction fractions and least common multiple / least common denominator.

Lesson 12

Purpose: To learn adding and subtracting mixed numbers and to learn changing improper fractions to mixed numbers.

Materials: Investment folder, fraction kit, pencil, paper

Procedure:

1. Class will look up the chosen stock and record the information on both handouts (day 10).
 2. Previous day's assignment will be graded and collected.
 3. Combining the groups fraction kits students will solve and record:
 - a. $2 \frac{1}{4} + \frac{3}{16} =$
 - b. $1 \frac{3}{4} + \frac{7}{8} =$
 - c. Do several until they understand.
 4. The entire class will discuss the process on how it can be done.
 5. We will also discuss changing improper fractions to mixed numbers.
 6. Combining the groups fraction kits students will solve and record:
 - a. $2 \frac{3}{4} - \frac{3}{16} =$
 - b. $3 \frac{3}{4} - 1 \frac{7}{8} =$
 - c. Discuss **exchanging** one whole for $\frac{8}{8} +$ the original $\frac{6}{8} = \frac{14}{8}$.
 - d. Do several until they understand.
 7. They will be given an assignment from the text book to practice adding and subtracting mixed numbers and changing improper fractions to mixed numbers.
-

Lesson 13

Purpose: To learn multiplying whole numbers with fractions, to practice rounding fractions, and to create line graphs and bar graphs.

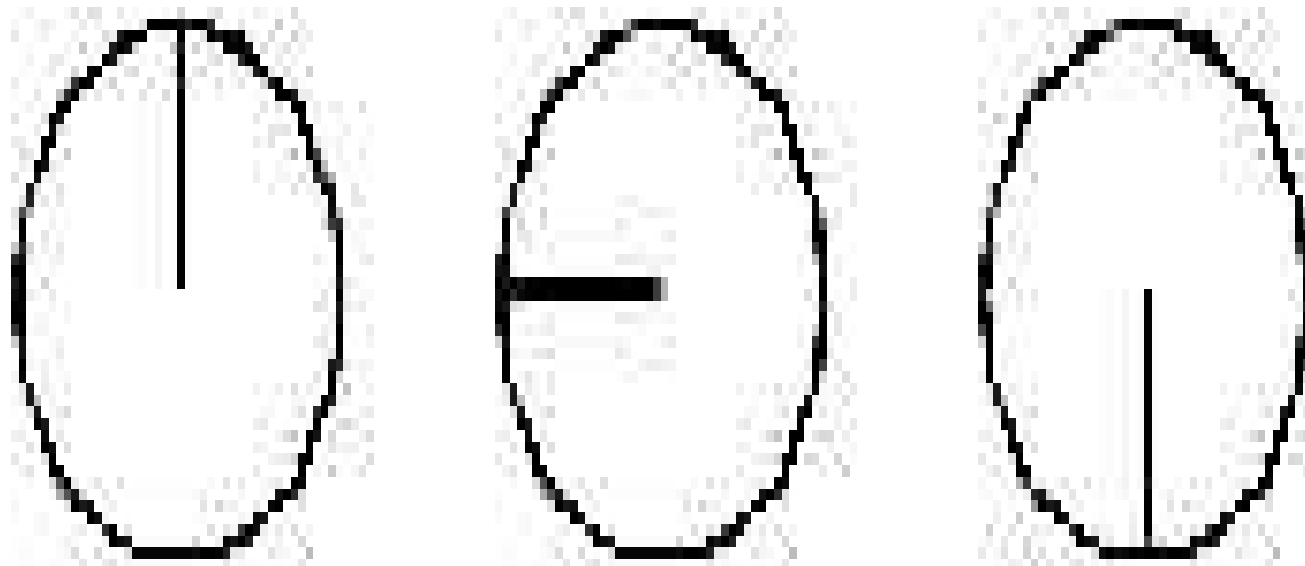
Materials: Investment folder, paper, pencil, two sheets of graph paper for each group, ruler, colored pencils

Procedure:

1. Class will look up the stock and record the information on both handouts (day 11).
2. Previous day's assignment will be graded and collected.

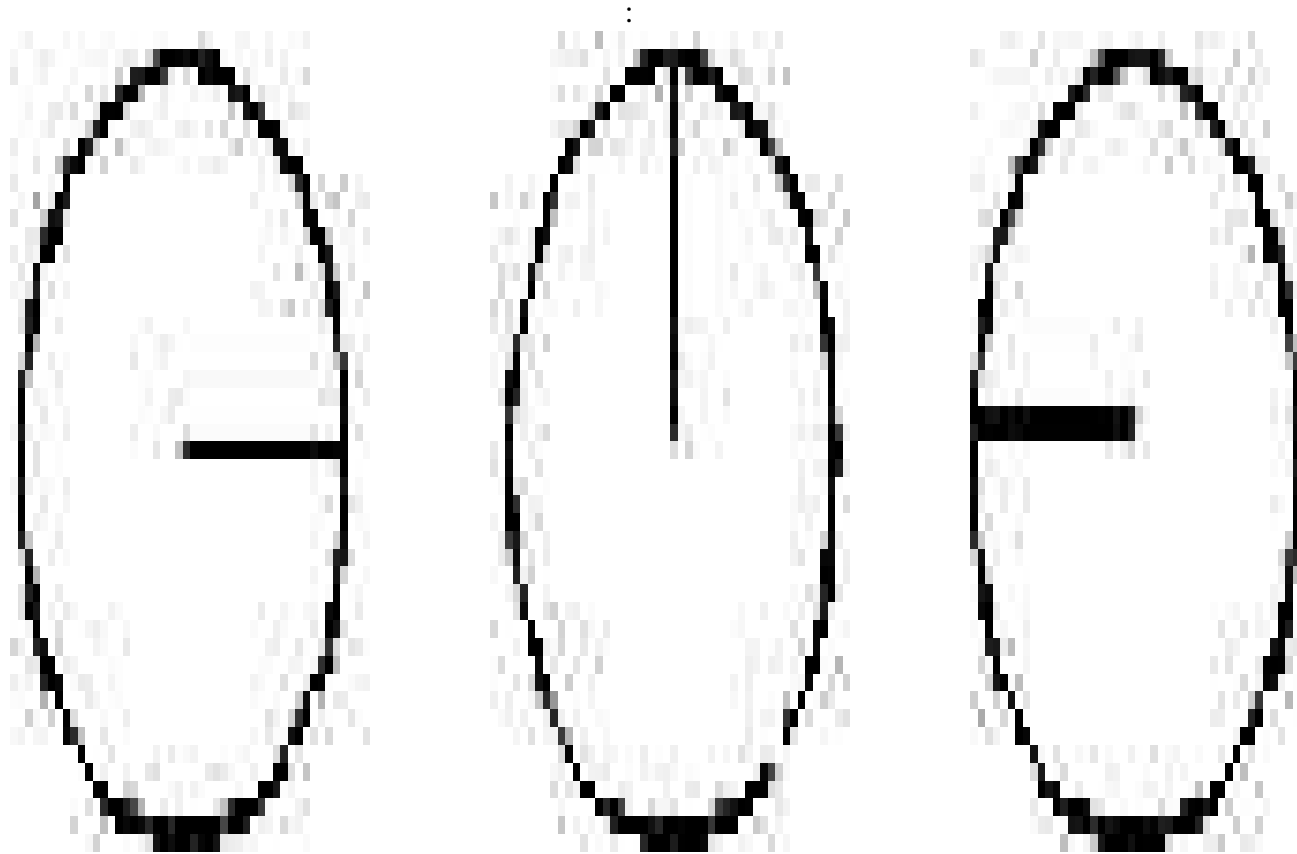
3. Students will graph the *change* in stock value. They will have to round and compare the decimal to the closest .25, .50, .75, or 1 whole. They will also have to round and compare the fraction to the closest $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or 1 whole. (This can also be done with thirds.)
 - a. In lesson 8 the students learned to compare fractions by using common denominators. They can use multiplication for these comparisons.
 - b. Is $\frac{9}{14}$ closer to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 whole? What is $\frac{1}{2}$ of 14? Students should already know this. Now ask them to find $\frac{1}{4}$ of 14 and $\frac{3}{4}$ of 14. Hint: "of" means times. $\frac{1}{4}$ of 14 means $\frac{1}{4} \times 14 = 3\frac{1}{2}$, and $\frac{3}{4} \times 14 = 10\frac{1}{2}$ and $14 \times 1 = 14$. So, 9 is closer to $10\frac{1}{2}$ than to 7, therefore, $\frac{9}{14}$ is closest to $9\frac{3}{4}$.
 - c. Students should be given several practice problems.
4. For the line graph, students should set up the x and y axis on the graph paper. Use the x axis for the date, the y axis for the change in share value using fractions and then graph the change closest to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or 1 whole. (Note: the "change" being graphed is a change from the prior day, not from the first day.)

Example:



5. For the bar graph, students should set up the x and y axis on the graph paper. The x axis is for the date, the y axis is for the share value in decimals, and graph to the closest .25, .50, .75 or 1 whole.

Example



6. Have students interpret what each graph depicts and the differences and similarities between the two graphs.
7. This will be a big discussion about whether the stock made or lost money; how can we tell? Would we like to continue investing with this company? If we sell, we sell at a loss. How much money was lost?
8. Log onto the computer, www.yahoo.com, *finance*, use the ticker symbol, and review the history of the stock looking for any trends. This will help in the decision of holding the stock or selling the stock and investing in something different.

Lesson 14

Purpose: To begin group project and to practice adding and subtracting fractions and mixed numbers, reducing to lowest terms, and adding and subtracting decimals.

Materials: Investment folder, paper, pencil, *Albuquerque Journal*, handout #3 (same as handout #2):

Show all work on separate paper and staple to this paper.

No Work -- No Credit

Stock Name

MARKET	MARKET	SHARE VAL	CHANGE	SHARE VALUE	CHANGE
DAY	DATE	DECIMAL	DECIMAL	FRACTION	FRACTION

Procedure:

1. Each group will have \$1000 (pretend money) to purchase shares of one stock.
2. Groups will choose which stock they would like to invest for the next two weeks.
3. They will organize their information by filling in **only** the following columns of handout #3: *Market day, Market date, Share value decimal (not change)*.
4. (a) Students will find the decimal "change" by subtracting the previous day's share value with today's share value.
(b) They will find the fraction "share value" by converting decimals to fractions.
(c) They will find the fraction "change" by subtracting the previous days share value fraction with today's share value fraction.
5. Discuss how we know if it is a negative or a positive change.
6. We will practice adding and subtracting fractions and mixed numbers, reducing to lowest terms, and adding and subtracting decimals.

Lesson 15

Purpose: To learn multiplying fractions and mixed numbers, and to learn changing mixed numbers to improper fractions.

Materials: Investment folder, paper, pencil

Procedure:

1. Previous day's assignment will be graded and collected.
2. Group will look up their chosen stock and record the information: *Market day, Market date, Share value decimal* (day 2).
3. Students will work in groups to figure out how many shares of their chosen stock they purchased. They will have 5 minutes.
4. They will be given a more simple problem to try: Try a share value of \$5 per share.
5. The entire class will discuss their findings of $\$1000 \div \$5 = 200$ shares.
6. Try \$5.50, we will have to round to the hundredths place. $\$1000 \div \$5.50 = 181.82$ shares.
7. Let's convert decimals to fractions and try the opposite (multiplication) to *verify* that we have \$1000. First, 200 shares each worth \$5 is $\$5 \times 200 = \1000 .
8. Next problem: 181.82 shares each worth \$5.50. $181.82 = 181 \frac{41}{50}$ and $\$5.50 = 5 \frac{1}{2}$. So, $5 \frac{1}{2} \times 181 \frac{41}{50}$ shares = numbers too large for the first time!

Let's round (we did this in lesson #13). Is $\frac{41}{50}$ closer to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or 1 whole?
 $\frac{1}{4}$ of 50 is $\frac{1}{4} \times 50 = 12 \frac{1}{2}$, $\frac{1}{2} \times 50 = 25$, $\frac{3}{4} \times 50 = 37 \frac{1}{2}$, $1 \times 50 = 50$.
 41 is closer to $37 \frac{1}{2}$ than to 50. So, $\frac{41}{50}$ rounds to $\frac{3}{4}$.

9. Try again: $5 \frac{1}{2} \times 181 \frac{3}{4} =$ Now is a good time to discuss changing mixed numbers to improper fractions. $11 \frac{1}{2} \times 727 \frac{3}{4} =$ (it's a little easier) $7997 \frac{3}{8} = 999 \frac{5}{8}$ which is very close to \$1000.
10. Let's go back to the whole class example. Then we will try much easier problems.
 - (a) On Friday 6/08 we purchased $\$1000 \div \95.90 per share = 10.43 shares.
 - (b) Convert the decimals to fractions and verify: $95.90 = 95 \frac{9}{10}$ and $10.43 = 10 \frac{43}{100}$ so, $95 \frac{9}{10} \times 10 \frac{43}{100}$ shares = Wow! Let's round!
 - (c) $\frac{9}{10}$ rounds to 1 whole, and $\frac{43}{100}$ rounds to $\frac{1}{2}$, so $95 \times 10 \frac{1}{2} = 95 \frac{1}{2} \times 21 \frac{1}{2} =$ (much easier numbers) $1995 \frac{1}{2} = 997 \frac{1}{2}$. Why is it not \$1000?
11. Let's try easier examples!!!! $5 \frac{1}{3} \times 3 \frac{2}{5} =$ class and groups will do several.
12. They will be given an assignment to practice multiplying fractions and mixed numbers, and changing mixed numbers to improper fractions.

Lesson 16

Purpose: To practice multiplying mixed numbers.

Materials: Investment folder, paper, pencil, 2 of handout #4:

Current Dollar Value

Show all work on separate paper and staple to this paper.

No Work -- No Credit

Stock Name

DATE	ORIGINAL	SHARE	FRACTION	DECIMAL	# SHARES	VALUE	\$ AMOUNT	\$ AMOUNT

Procedure:

1. Previous day's assignment will be graded and collected.
2. Group will look up their chosen stock and record the information: *Market day, Market date, Share value decimal* (day 3).
3. We will begin filling in handout #4:
 - a. "Current Dollar Value" will be used for multiplying the number of shares by the daily share value.
 - b. We will do the first few days of the whole class example; the students will finish the class example and then do their group investment.

Example:

Current Dollar Value

Show all work on separate paper and staple to this paper.

No Work -- No Credit

QuakrOat

DATE	ORIGINAL	SHARE	FRACTION	DECIMAL
	# SHARES	VALUE	\$ AMOUNT	\$ AMOUNT
6/08	10 43/100	95 9/10	1000	1000.00
6/11		94 17/20	989 29/100	989.29
6/12		95	990 17/20	990.85

6/13	94 41/50	988 97/100	988.97
6/14	94 2/25	981 1/4	981.25
6/15	93 7/10	977 29/100	977.29
6/18	93 1/5	972 2/25	972.08

4. They will show all work (multiplication) neatly organized on separate paper.
 5. Discuss in depth what the "Current Dollar Value" means.
 6. They will be given an assignment from the textbook to practice what they learned.
-

Lesson 17

Purpose: To learn dividing fractions and mixed numbers.

Materials: Investment folder, paper, pencil

Procedure:

1. Previous day's assignment will be graded and collected.
 2. Group will look up their chosen stock and record the information: *Market day, Market date, Share value decimal* (day 4).
 3. Purchasing \$1000 of stock means a certain number of shares was purchased. That number of shares does not change; the **value** of each share is what changes.
 4. However, to work division into this project, we will look at the number of shares purchased with the \$1000 "if the purchase day changed."
 5. Example: On Friday, June 8, we purchased $\$1000 \div \95.90 per share = 10.43 shares. If we had purchased the shares on Monday, June 11, we would have $\$1000 \div \$94.85 = 10.54$ shares. On Tuesday, June 12, $\$1000 \div \$95.00 = 10.53$ shares.
 6. Now let's convert decimals to fractions and divide. $\$1000 \div 95 \frac{9}{10} = ?$
 7. Let's try easier examples. What is $\frac{1}{2}$ of 10? So, is $10 \div 2$ the same? What is $\frac{1}{4}$ of \$1.00? So, we have $\$1.00 \div 4$. Groups will discuss what is $\frac{3}{4}$ of \$2.00, and $\frac{2}{3}$ of $5 \frac{1}{2}$? Groups will do several problems to formulate an algorithm for dividing fractions and mixed numbers. Class will discuss.
 8. Several practice problems will be given, example: (a) $3 \div \frac{1}{5} =$, (b) $\frac{5}{9} \div \frac{2}{3} =$, (c) $2 \frac{3}{4} \div \frac{5}{7} =$, (d) $4 \frac{1}{7} \div 3 \frac{2}{5} =$.
 9. They will be given an assignment from the textbook to practice what they learned.
-

Lesson 18

Purpose: To practice division of fractions and mixed numbers.

Materials: Investment folder, paper, pencil, 2 of handout #5:

If Purchased on a Different Day

Show all work on separate paper and staple to this paper.

No Work -- No Credit

Stock Name

DATE	ORIGINAL AMOUNT	SHARE VALUE	# SHARES	ROUNDED

Procedure:

1. Previous day's assignment will be graded and collected.
2. Groups will look up their chosen stock and record the information: *Market day, Market date, Share value decimal* (day 5).
3. We will begin filling in handout #5:
 - a. "If Purchased on a Different Day" will be used for dividing the original amount by the share value.
 - b. We will do the first few days of the whole class example; the students will finish the class example and then do their group investment.

Example:

If Purchased on a Different Day

Show all work on separate paper and staple to this paper.

No Work -- No Credit

QuakrOat

DATE	ORIGINAL	SHARE	# SHARES	ROUNDED
	AMOUNT	VALUE		
6/08	\$1000	95 9/10	10 43/100	10 1/2
6/11		94 17/20	10 27/50	10 1/2
6/12		95	10 53/100	10 1/2
6/13		94 41/50	10 11/20	10 1/2
6/14		94 2/25	10 63/100	10 3/4
6/15		93 7/10	10 67/100	10 3/4
6/18		93 1/5	10 73/100	10 3/4

4. Students will show all work (division) neatly organized on separate paper.
5. They will continue filling in handout # 4 "Current Dollar Value," showing all work.
6. Discuss in depth what the "If Purchased on a Different Day" means.

Lesson 19

Purpose: To begin graphing group investment and to organize the gathered information into a paper.

Materials: Investment folder, paper, pencil, one poster board per group

Procedure:

1. Students will continue gathering daily share stock information for several more days (6,7,8,9,10). They will record all information on handout #3, #4, #5.
2. Students will graph (poster board size) the information for their group investment. They will graph what they feel gives the most information about their investment.
3. Let's see which group earned the most money! (A small prize can be given to the winning group)
4. They will continue practicing all that they learned.
5. Students will log on to the internet to get a history of the company in which they invested.
6. As a group, they will write a one to two page paper based on the history of the company and on the information they gathered. They will conclude the paper with a choice of continuing their investment or deciding to sell their stock and invest in a new company. They will be given ample amount of time to complete.

7. This project may be continued as long as desired.

Assessment

1. Teacher observations.
2. Periodic quizzes will be given to be sure the students are comprehending the material.
3. The Investment folder will be collected looking for the following:
 - a. Notes: All lessons throughout this project.
 - b. Handouts: Completed for both the whole class and the group investment.
 - c. Graphs: Completed for the whole class investment.
4. Group graph (poster board size).
5. Written paper from lesson #19.

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