What is a Company?

Lesson Summary

What is a Company? uses the Hershey Chocolate Company to help students discover advantages and entrepreneurial gains by establishing a corporation that will develop, produce and sell a new product.

Lesson Objectives

- Identify and describe the terms: company, partnership and corporation.
- Explain the characteristics, advantages and disadvantages of various types of companies.
- Explain how companies are formed.
- Describe the benefits of forming a business to sell a product.

NCTM Standards

No matches for these activities

Mathematical Strands

	Thinking Algebraically	Students use information from a chart to evaluate investment decisions. Students will explain their thinking.	
	Interpreting Statistics	Students evaluate profits and profit trends presented in a table to make decisions about potential investments.	
	Communicating Quantitative Information	Students analyze and synthesize large amounts of information organized in charts into a coherent, persuasive presentation.	
	Tackling Complex Problems	Students work with large numbers and solve problems presented in paragraph format. The representations of large numbers have been purposively mixed to give students practice interpreting numbers in different representations.	

Companies need money to expand and grow. "Going public," selling shares of stock to investors is one way to raise money. Borrowing money from a bank is another way for companies to pay for expansion and growth.

This is a list of interest rates from the past seven years:

2000	2001	2002	2003	2004	2005	2006
8.5%	9.5%	4.75%	4.25%	4.00%	5.25%	7.25%

1. Is better to have a higher interest rate when a company borrows money or to have a lower interest rate? Why?

2. In which years would it have cost companies more to borrow money? In which years would it have cost less? How do you know?

3. Write a formula that expresses the interest, *i*, that a company will pay on a one-year loan at a specified interest rate, *r*.

Below are the profiles of three companies that are thinking of going public. Each company sells high-end fashion accessories. Based on the information provided, give reasons why an investor might be interested in the company.

	Company A	Company B	Company C
Profits 2002	$635,000	-	$1,199,000
Profits 2003	$654,000	-	$1,103,000
Profits 2004	$719,000	-	$1,048,000
Profits 2005	$848,000	-	$1,017,000
Profits 2006	$992,000	$2,881,000	$1,220,000
Company founded in:	Dec 2000	Nov 2005	May 1988

1. Who had greatest profits in 2006?

2. Describe the trend in profits for Company A.

3. Describe the trend in profits for Company C.

4. Why can't you describe the trend in profits for Company B?

5. Based on the information you took from the profit table above, in which company would you invest? Why?

Dayton Superior Corporation based in Dayton, OH was trying to decide whether to go public in 2006. Pretend you were a junior sales analyst at the company and invited to give your opinion about what the company should do. Write a memo or prepare a Powerpoint presentation to your boss, the company's CEO, explaining why you think the company should or should not go public.

HINT: Your CEO is very busy, so keep your memo or presentation short and to the point. Use the statistics you think are the most persuasive. Not every piece of information needs to be included. If you choose to use graphs, make sure they are easy to read.

In order to make your recommendations, make notes next to each chart. State what information is presented and how this information helps your boss make the decision to go public or remain private.

Dayton Superior Corporation Profile
The Dayton Superior Corporation makes metal accessories and forms for keeping concrete and masonry structures in place while under construction. Dayton Superior's products include concrete accessories (anchoring and bracing for walls, positioning steel reinforcing bars, and supporting bridge framework), masonry products (wire support for masonry walls), welded dowel assemblies (metal dowels), paving products, and corrosive-preventing epoxy coatings and other chemicals. The company also provides rents concrete forming and shoring systems to other companies. (source: Hoover's, 2007)

Basic Information

Fiscal Year-End	December
2005 Sales (mil.)	$419.0
1-Year Sales Growth	0.1%
2005 Net Income (mil.)	($114.7)
2005 Employees	1,800

Annual Income (in millions)

Year	Revenue	Gross Profit	Operating Income	Total Net Income
Dec 05	**419.0**	**98.6**	**(66.2)**	**(114.7)**
Dec 04	**418.6**	**107.7**	**15.0**	**(48.4)**
Dec 03	**377.9**	**104.3**	**14.0**	**(17.1)**

Dayton Superior's Top Competitors

	Dayton Superior	**Commercial Metals**	**Insteel**	**MMI Products**
Annual Sales	419.0	7,555.9	329.5	721.4
Employees	1,800	--	--	2,500
Market Cap ($ mil.)	0.0	3,065.3	311.1	0.0

Hoover's. (2007). Universal Power Group's financial statements. *Lastest Pricings* Retrieved January 18, 2007, from http://www.hoovers.com/universal-power-group/--ID__153621,ticker__--/free-co-fin-factsheet.xhtml

Based on the notes your analysis of each chart, what is your recommendation to your boss? Choose the three most important pieces of information that you would use to persuade your boss.

1. Company A has decided to go public, hoping to raise $3 million in capital. In the initial public offering there will be 250,000 shares offered. If all the shares are sold, at what price per share would the company raise its $3,000,000? At what price would the company raise 110% of its goal?

2. Company C needs to generate $80,000,000 by going public and having an initial public offering of 1.5 million shares. If all the shares are sold, at what price would the company meet its capital goal?

3. Company B has decided that go public because they would like to raise $158,000,000 in capital. They think that an initial public offering of stock would be traded at $45. At this price, how many shares do they need to offer and sell in order to raise the $158,000,000?

4. Corporation X has decided to go public, hoping that it will raise at least $1.25 million dollars. There were 80,000 shares in the initial public offering. Assuming that they were all sold, write an algebraic expression that defines the price per share with which the corporation would be happy.

What is a Stock?

Lesson Summary

What is a Stock? discusses the many facets of stock in detail and uses two leading chocolate companies to explain the difference between a public and private company.

Lesson Objectives

- Define stock, investor, public company, private company, earnings and dividends.
- Make group decisions on the benefits and risks of investing in stocks.
- Calculate gain and loss of sample stock sales.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1B - Understand meanings of operations and how they relate to one another.
1C - Compute fluently and make reasonable estimates
5C - Develop and evaluate inferences and predictions that are based on data.
6B - Solve problems that arise in mathematics and in other contexts.
6C - Apply and adapt a variety of appropriate strategies to solve problems.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
9A - Recognize and use connections among mathematical ideas.

Mathematical Strands

	Thinking Algebraically	Students calculate the value of stocks and the portfolio as a whole.	
	Interpreting Statistics	Students will practice calculating the value of their portfolio, given the changing price of the stock.	
	Communicating Quantitative Information	Students will practice graphing the value of a portfolio over time.	
	Tackling Complex Problems	Students review percentages and fractions. They practice translating what they know about owning stock to realizing how much (or how little!) of a company they own.	

Calculate the gain or loss for each stock. Remember the percentage change in price can be calculated using the following formula:

$$\text{percentage change} = \frac{\text{change in price}}{\text{price bought}}$$

Price Bought	Price Sold	Change in price	Percentage Change in Price
$36.13	$37.01		
$12.42	$12.27		
$58.43	$53.48		
$5.39	$6.02		
$44.95	$45.99		
$29.83	$28.75		
$9.48	$15.02		
$22.58	$22.59		

Calculate the commission you will pay for each transaction. The commission is 2% of each transaction. Round your answer to the nearest cent.

Number of Shares	Price per share (bought or sold)	Commission
500	$22.40	
360	$12.72	
70	$95.48	
740	$41.29	
85	$30.57	
1050	$33.85	

1. What is the total cost, including commission of buying:

390 shares at $45.92 per share?

90 shares at 12.38 per share?

786 shares at $36.00 per share?

2. After commission, how much money does your portfolio get back when you sell:

390 shares at $45.92 per share?

90 shares at 12.38 per share?

786 shares at $36.00 per share?

1. If you know the number of shares you've bought and the price per share, how would you calculate the total value of your investment?

2. If you bought **270 shares** of DreamWorks Animation SKG, Inc. (DWA), in March for $26.45 a share, how much did you invest initially?

3. This is a table of closing prices from March to September for DWA stock.

Month	Price
March	$26.45
April	$27.10
May	$25.95
June	$22.90
July	$20.94
August	$21.19
September	$24.91

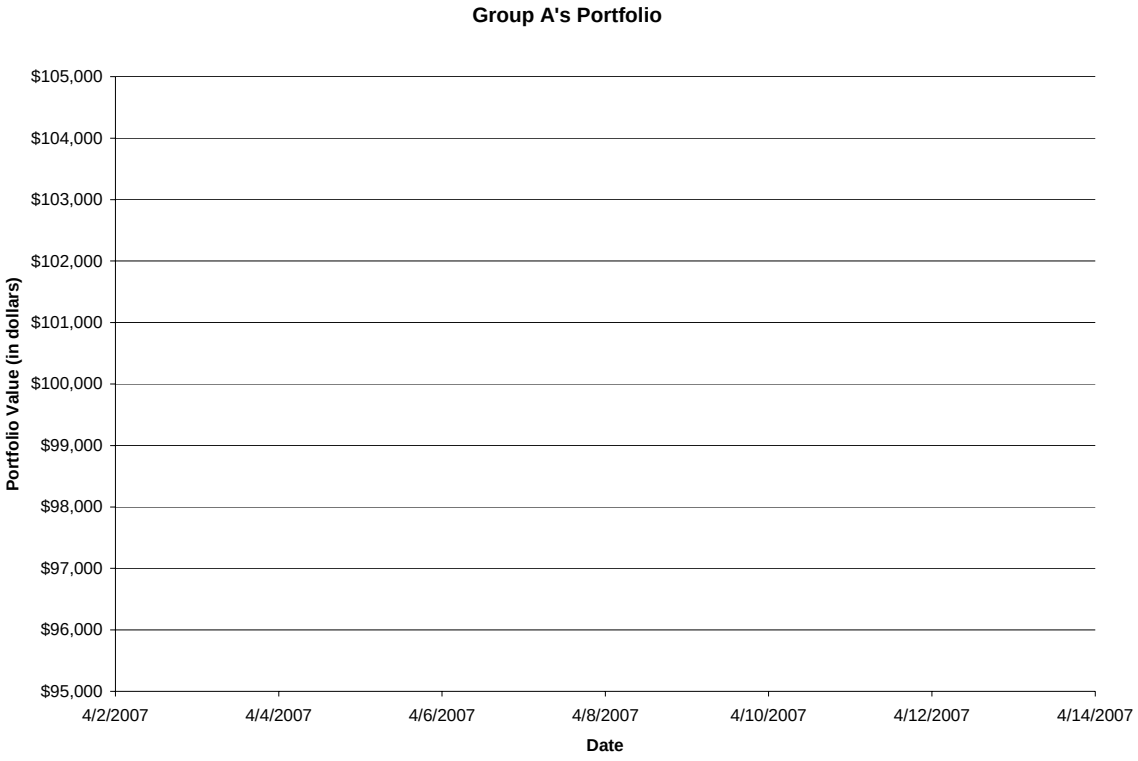
Make a table that shows how much your investment is worth during each of the months listed in the table.

Month	Price	Investment Value

Below is a table of a group's SMG portfolio value over the course of 10 days. Use the graph below to chart the value of the portfolio over time.

Group A

Date	Value
4/3/2007	$100,000
4/4/2007	$102,430
4/5/2007	$101,021
4/6/2007	$99,321
4/9/2007	$97,230
4/10/2007	$98,933
4/11/2007	$99,982
4/12/2007	$101,222
4/13/2007	$102,000



For each scenario, you are presented with two options. Your job is to tell when you own a greater share of the company. Show mathematically in which company you are the greater share holder by calculating the percentage of the company's share you own.

NOTE: In this activity, numbers are presented in different formats for the purpose of exposing you to multiple representations.

You own 10,000 shares of a company that has 100,000 shares outstanding.	You own 50 shares of a company that has 200 shares outstanding.

In which company are you the greater shareholder?

You own 260,000 shares of Toyota Motor Corporation ™, which has 1,600,000,000 shares outstanding.	You own 92,000 shares of Largo Vista Group Ltd, which has 288,830,000 shares outstanding.

In which company are you the greater shareholder?

You own 0.01025% of EMAK Worldwide, Inc. (EMAK).	You own 785 shares of Google Inc. (GOOG), which has 306 million shares outstanding.

In which company are you the greater shareholder?

Let's use your knowledge of percentages to invest your money. For these examples, you can ignore the commission. The stock prices cited below are not current.

1. If you can only invest a third of your SMG portfolio ($100,000) in General Electric Company (GE), which is selling shares for $36.95. How many shares can you buy?

2. Your team has decided that it wants to invest its money ($100,000) evenly between 5 industries initially. Within each industry, it will choose four companies. One of those companies is International Business Machines Corporation (IBM), whose current share price is $96.17. How many shares can you buy for this price?

3. Your team wants 40% of its initial portfolio ($100,000) dedicated to companies that develop renewable energy sources and wants to split that 40% equally between five companies. One member wants to buy SunPower Corporation (SPWR), which is selling shares for $42.48. How many shares can your team afford to purchase?

4. You buy 175 shares of Hexcel Corporation (HXL) for $16.91 per share. If you have $97,245 worth of other stocks in your portfolio, what percentage of your portfolio do you have invested in Hexcel? (Assume the entire SMG portfolio is invested in stocks.)

Identifying Ticker Symbols and Interpreting Stock Quotes

Lesson Summary

Identifying Ticker Symbols and Interpreting Stock Quotes helps students to understand and locate ticker symbols in order to trade stock.

Lesson Objectives

- Determine how to look up a ticker symbol
- Analyze a stock table to understand important elements such as dividends and P/E ratios
- Gather data from both print and internet sources
- Enter a trade in The Stock Market Game portfolio
- Demonstrate the ability to use each of the following terms: share or stock, dividend, P/E ratio, volume or sales, net change

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6A - Build new mathematical knowledge through problem solving.
6C - Apply and adapt a variety of appropriate strategies to solve problems.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
9C - Recognize and apply mathematics in contexts outside of mathematics.
10A - Create and use representations to organize, record, and communicate mathematical ideas.

Mathematical Strands

	Thinking Algebraically	Students sharpen their estimation skills by estimating the product of large numbers and then checking their answers. Students also round to the nearest cent.	
	Interpreting Statistics	Students interpret graphs and make decisions based on the information presented.	
	Communicating Quantitative Information	Students graph, choose scales, and make informed decisions based on trends and their knowledge of the market.	
	Tackling Complex Problems	Students calculate the value of an sample SMG portfolio, commissions, and track the portfolio values.	

You need to be good at estimating when you are working with stocks because you are working with so many decimals. Let's practice estimating with the buy orders in the tables below.

First write your estimated price per share and then your estimated number of shares. Then write down your best estimate for the total cost. At the end, go back and figure out how close your estimate is to the actual value! (An example is done for you.)

Price per share		# of shares		Estimated Total	Actual Total	What's the difference?
	Estimate		Estimate			
$48.75	*$50*	195	*200*	*$10,000*	$9506.25	$493.75
$21.32		594				
$9.76		10,041				
$14.68		98				
$33.02		4,051				
$103.78		1,978				
$88.97		71				
$48.69		52				
$22.08		395				
$39.42		810				
$28.73		152				
$59.46		214				

Often closing prices of stocks are reported with four decimal places. Though a tenth or a hundredth of cent might not seem like much, if you own millions of stocks, those fractions of a penny really matter! Here is some practice to help you round decimals to the nearest hundredths place.

$32.5219 ≈

$87.5292 ≈

$0.24381 ≈

$35.9961 ≈

$36.5332 ≈

$78.6669 ≈

$14.1222 ≈

$48.3452 ≈

$295.6349 ≈

$65.8486 ≈

$43.4521 ≈

$863.7987 ≈

$27.1658 ≈

$338.8948 ≈

$21.0015 ≈

$99.9949 ≈

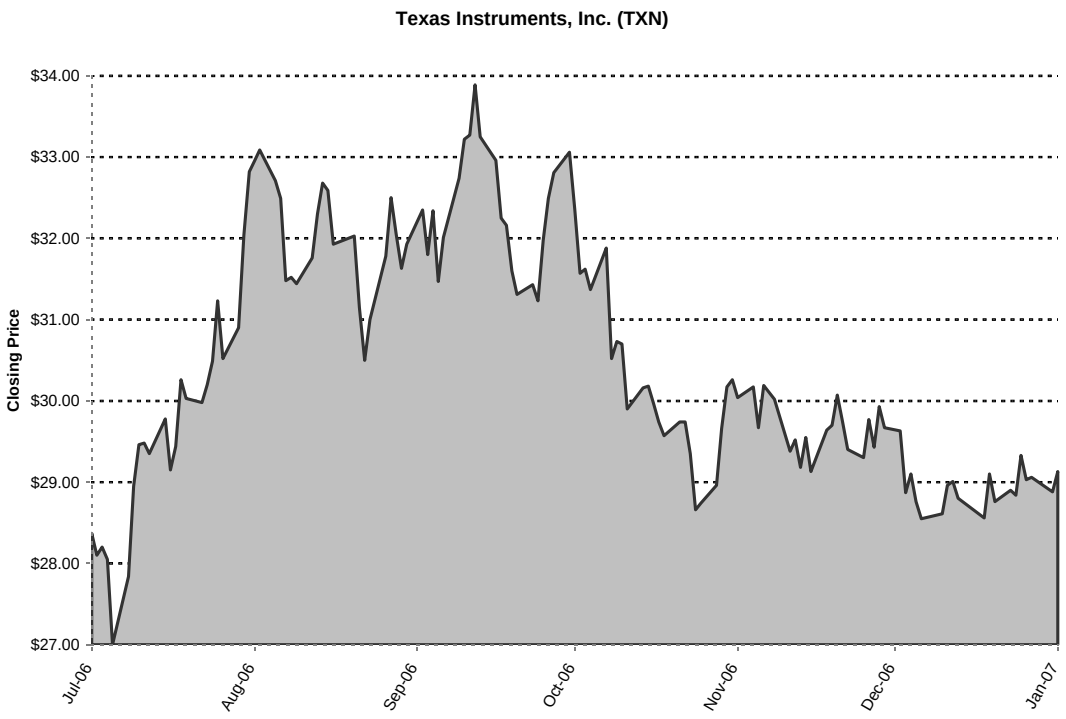
$46.0096 ≈

$56.86089 ≈

$32.5672 ≈

$68.0063 ≈

This is a six-month graph of closing prices of Texas Instruments Corporation stock.



1. If an investor bought the stock in the beginning of August, about how much did they pay?

2. If they sold the stock in the beginning of September, about much did they sell it for?

3. How much profit/loss was incurred between August and September?

4. If they had held onto the stock until the beginning of October, how much would they have sold the stock for?

5. How much profit/loss was incurred between August and October?

This is a list of closing prices for Motorola Inc (MOT) from December 13, 2006 to January 13, 2006.

Date	Closing Price
12-Jan-07	$18.01
11-Jan-07	$18.20
10-Jan-07	$18.16
9-Jan-07	$18.26
8-Jan-07	$18.60
5-Jan-07	$18.94
4-Jan-07	$20.55
3-Jan-07	$20.57
29-Dec-06	$20.56
28-Dec-06	$20.55
27-Dec-06	$20.55
26-Dec-06	$20.48
22-Dec-06	$20.26
21-Dec-06	$20.32
20-Dec-06	$20.41
19-Dec-06	$20.49
18-Dec-06	$20.76
15-Dec-06	$20.71
14-Dec-06	$20.69
13-Dec-06	$20.65

1. Create a graph that displays the one-month trend of the stock's closing price.

2. Write a short description of the trend in closing prices.

3. What is the lowest price shown in the graph? Circle and label this point.

4. What is the highest price shown in the graph? Circle and label this point.

5. Over which two days did the price of the stock grow the most?

Calculate the value of the following portfolios:

Team A

Stocks	Quantity	Price per share	Value
The Coca-Cola Company (KO)	200	$48.26	
Google (GOOG)	52	$489.75	
3M Company (MMM)	100	$79.25	
Ocean Bio-Chem Inc. (OBCI)	6000	$4.40	
InSite Vision Incorporated (ISV)	7000	$1.50	
		Total value of stocks purchased	
		Commission Charged for purchase	
		Cash on hand	
		Current Value of Portfolio	

Team B

Stocks	Quantity	Price per share	Value
Exxon Mobile Corporation (XOM)	400	$73.53	
Apple Incorporated (AAPL)	650	$88.50	
Biogen Idec Incorporated (BIIB)	200	$51.84	
American Express Company (AXP)	115	$58.09	
Tiffany & Co. (TIF)	320	$40.04	
		Total value of stocks purchased	
		Commission Charged for purchase	
		Cash on hand	
		Current Value of Portfolio	

What is Risk?

Lesson Summary

What is Risk? provides students with an understanding that there is some level of risk in all investments.

Lesson Objectives

- Define and illustrate the three major kinds of risk.
- Examine companies and determine the risk involved in investing in these companies.
- Research two stock companies and decide the level of risk their Stock Market Game team would take if they invest in these companies.
- Write a persuasive letter motivating or discouraging an investor from purchasing stocks in a company they researched.
- Solve decimal multiplication problems.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1C - Compute fluently and make reasonable estimates
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
9C - Recognize and apply mathematics in contexts outside of mathematics.

Mathematical Strands

	Thinking Algebraically	Students use differences in the percentage change of the market and the percentage change of a stock to explore what Beta numbers mean	
	Interpreting Statistics	Students calculate Beta numbers, and then match those stocks to the profiles of different investors.	
	Communicating Quantitative Information	Students investigate the connection between volatility (as represented on a graph) and beta numbers.	
	Tackling Complex Problems	*NA*	

A stock's beta number is one of many measures of how volatile its price is compared to the market. Market analysts use sophisticated statistical tools to calculate the beta numbers for each stock, but you can get an idea of what Beta measures by comparing the change in the market to the change in price of a stock.

To better understand beta numbers, calculate the monthly percentage change in each stock and in the S&P 500 in each table, using the following formula:

Percentage change from month **a** to month **b** $= \dfrac{(price\_in\_month\_b) - (price\_in\_month\_a)}{price\_in\_month\_a} \cdot 100\%$

Example:

Expedia Percentage change from **November** to **December** $= \dfrac{20.98 - 18.16}{18.16} \cdot 100\% = 15.53\%$

	Expedia, Inc. (EXPE)		**S & P 500**	
	price	**% change**	**Value**	**% change**
November 2006	$18.16	15.53%	$1,400.63	
December 2006	$20.98		$1,418.30	
February 2007	$21.26		$1,406.82	
March 2007	$23.18		$1,420.86	

	Edison International (EIX)		**S & P 500**	
	price	**% change**	**Value**	**% change**
November 2006	$45.98		$1,400.63	
December 2006	$45.48		$1,418.30	
January 2007	$44.98		$1,438.24	
February 2007	$47.00		$1,406.82	

	Eastman Kodak Company (EK)		**S & P 500**	
	price	**% change**	**Value**	**% change**
December 2006	$25.80		$1,418.30	
January 2007	$25.86		$1,438.24	
February 2007	$23.87		$1,406.82	
March 2007	$22.56		$1,420.86	

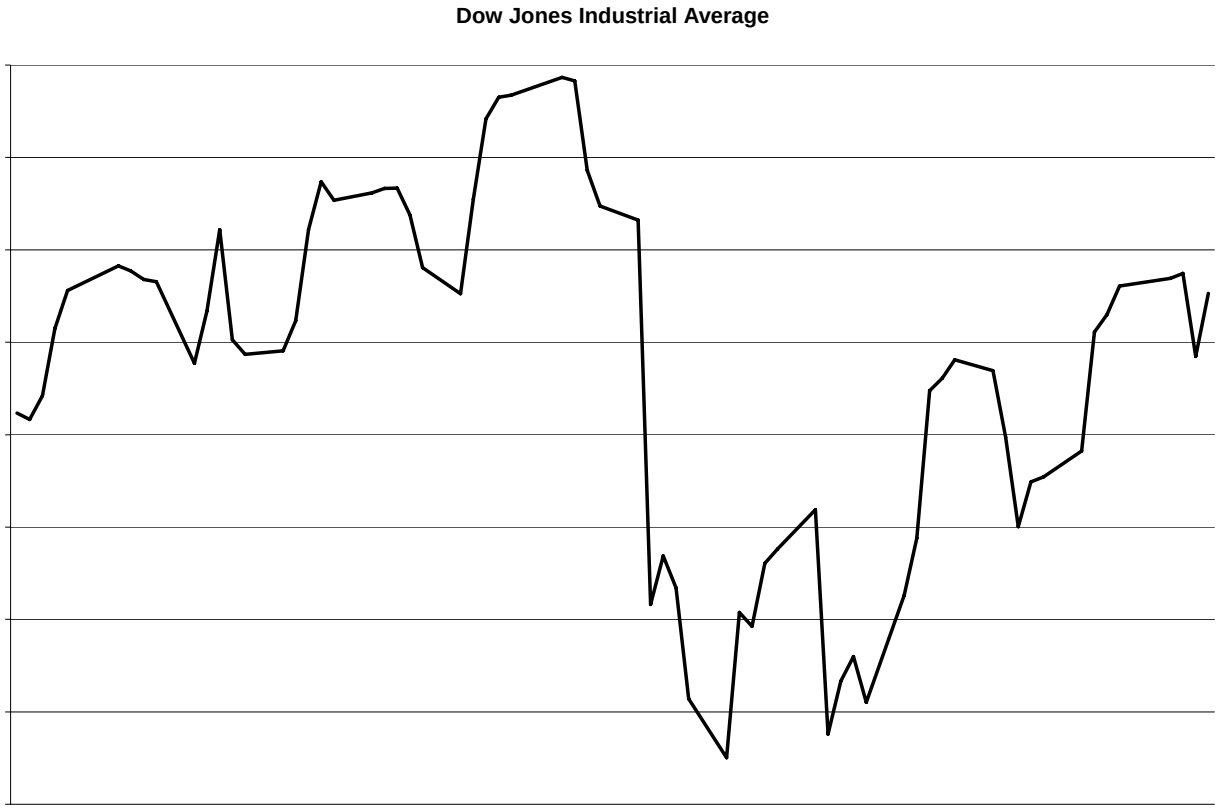
Which of the stocks above had percentage changes that were very different from the market? What do you think this means about its Beta number?

If you are a financial advisor, you need to understand your clients' tolerance for risk and then use your knowledge of beta numbers to help inform your clients about how risky investments are.

In a meeting, your client who has low risk tolerance says he does not want to invest in a stock because over a 52-week period, the stock's price changed between a high of $120.47 and a low of $75.42. The client describes this change as "wild," and says that he doesn't want to invest in such a risky stock, but you know that this stock has a beta number of 1.01.

1. What is the overall change from the stock's high and low prices?

Assume the chart below is graph of the Dow Jones Industrial Average over the same period.

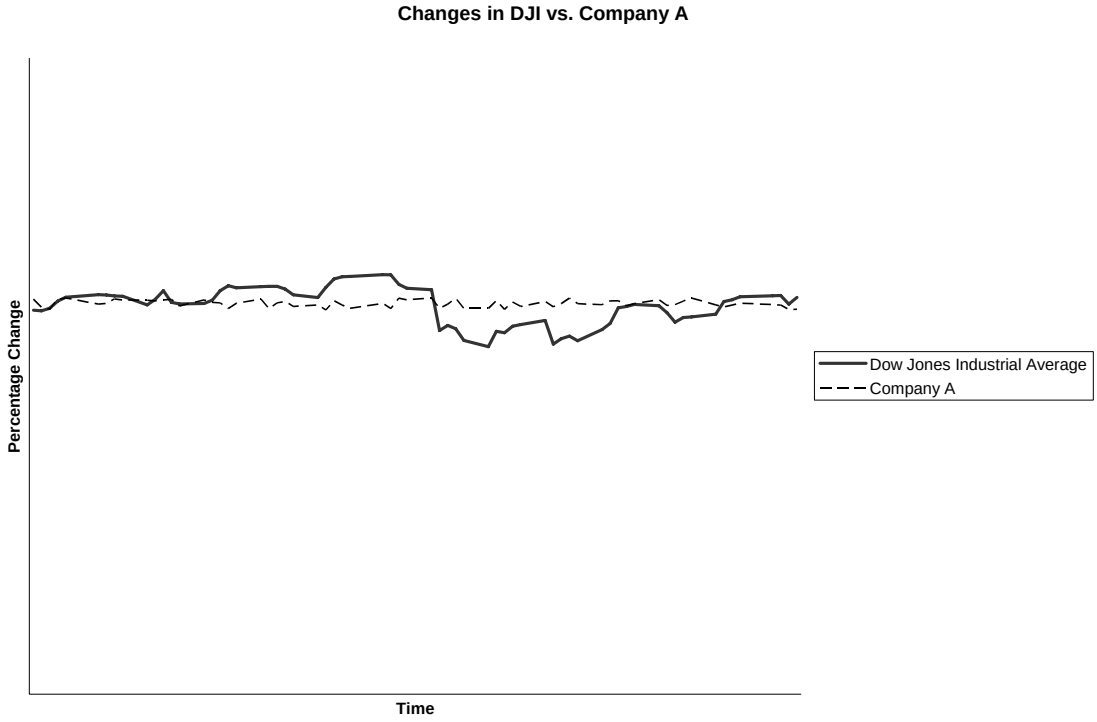


2. How does the chart help explain why the dramatic change occurred, but the stock has a Beta of 1.01?

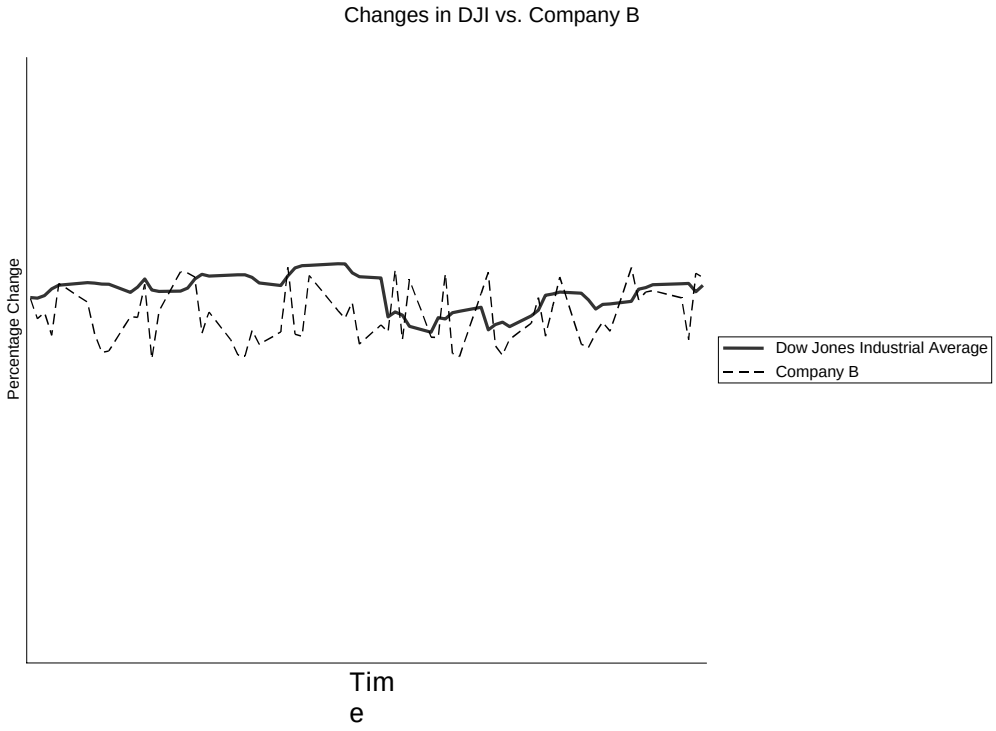
3. Use your knowledge of Beta to explain to your client what may have been going on in the stock market during this same time, and why this fluctuation may not be that "wild" after all.

The following graphs illustrate how the relative performance of stocks with different Beta numbers would perform against the market as a whole.

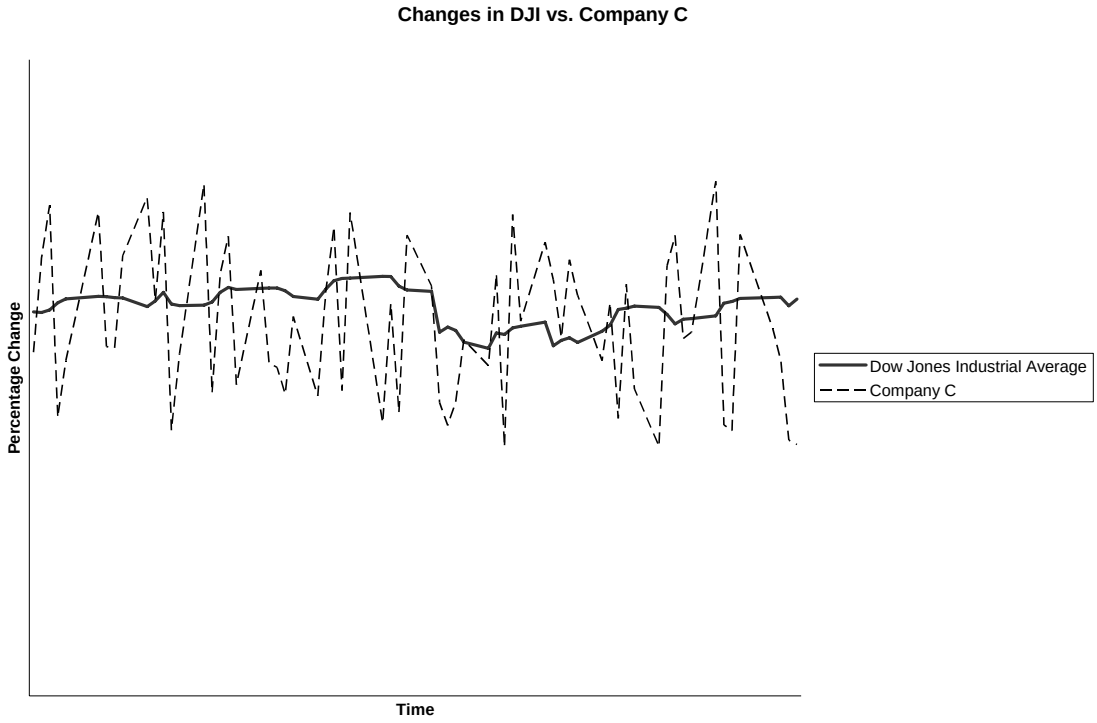
Company A has a Beta of 1.02.



Company B has a Beta of 2.3



Company C has a Beta of 5.8



1. Which of the graphs shows a stock whose performance most closely resembles the trend of the Dow Jones Industrial Average?

2. Which of the graphs shows a stock whose performance showed more dramatic changes than the Dow Jones Industrial Average?

3. What is different about the graph of a stock's relative performance when it has a Beta close to 1 compared when a stock has a Beta close to 5?

How Does Money Grow Over Time?

Lesson Summary

How Does Money Grow Over Time? explores the effect of compound interest on investing. Students will learn how investments grow in relationship to interest and time (compound interest).

Lesson Objectives

- Define compound interest and explain the effects
- Investigate various investment and saving opportunities.
- Define and demonstrate comprehension of the following terms: saving, investing, rule of 72, compound interest, and diversification.
- Compute compound interest

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1B - Understand meanings of operations and how they relate to one another.
1C - Compute fluently and make reasonable estimates
2A - Understand patterns, relations and functions.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6A - Build new mathematical knowledge through problem solving.
6B - Solve problems that arise in mathematics and in other contexts.
6D - Monitor and reflect on the process of mathematical problem solving.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
9C - Recognize and apply mathematics in contexts outside of mathematics.

Mathematical Strands

	Thinking Algebraically	Students practice using the rule of 72 and calculate the value of an investment by determining interest and adding it to principal. Students also use distributive property in a quick algebra proof.	
	Interpreting Statistics	Students calculate the percentage returns from investment in the stock market and then compare those rates of the return to the interest rates money could have been earning in banks.	
	Communicating Quantitative Information	Students calculate compounded interest and graph the results. Students also pretend to be a financial analyst preparing for a meeting with clients who will be investing money that will compound annually.	
	Tackling Complex Problems	Students are introduced to the concept of exponential growth by calculating compound interest over time. Students also match different investment accounts to potential investors based on their profiles.	

Because of the properties of compounding rate of return, financial professionals use the rule of 72 to determine quickly about how many years it will take for an investment to double.

To use the rule of seventy-two, take the rate of return and divide it into 72. The answer will tell you in how many years your investment will be worth about twice your initial investment.

Years to double investment = $\frac{72}{Rate\_of\_return}$

Using the rule of 72, estimate the amount of time it will take an investment to double in invested at the specified rate of return.

Rate of Return	Amount of Time	Rate of Return	Amount of Time
3%		9%	
12%		24%	
6%		8%	
2%		10%	
4%		7%	
18%		5%	

Extension: How could you tell how many years it would take for an investment to quadruple?

In this activity you will learn a quick way to calculate the value of an investment.

1. Complete the following table:

Investor	Principal	Annual rate of Return	Money Earned After One Year	Total Equity
Tom	$300	6%		
Sean	$200	3%		
Darryl	$1,300	2%		
Anne	$180	9%		
Suki	$70	7%		
Elena	$1,000	5%		
Nico	$382	4%		
Jennifer	$4,000	8%		
Raul	$X	4%		
Jason	$X	7%		

2. Write a description of the calculation you do each time you want to calculate the total investment.

3. Write a formula to express that calculation you just described.

1. Show that $X + rX = X(1+r)$

2. How is this related to calculating the value of an investment?

Below is a table of the Dow Jones Industrial Average Yearly closing prices from 1997 to 2006. (source: www.djindexes.com)
Calculate the rate of return for each one-year period. Use the following formula:

Rate of return = $\frac{(price) - (price\_year\_before)}{price\_year\_before}$

Trade	Price	Rate of Return
December 1997	$7,908.25	%
December 1998	$9,181.43	%
December 1999	$11,497.12	%
December 2000	$10,787.99	%
December 2001	$10,021.57	%
December 2002	$8,341.63	%
December 2003	$10,453.92	%
December 2004	$10,783.01	%
December 2005	$10,717.50	%
December 2006	$12,463.15	%

This is a table of the federal interest rate for the same years. (Source: www.federalreserve.gov)

Year	Interest Rate
1997	8.44%
1998	8.35%
1999	8.00%
2000	9.23%
2001	6.91%
2002	4.67%
2003	4.12%
2004	4.34%
2005	6.19%
2006	7.96%

1. Use the table above calculate the rate of return of the Dow Jones Industrial Average for each one year period.

2. For which year was the rate of return from the Dow Jones the greatest?

3. For which year was the rate of return from Dow Jones the smallest?

4. For which years would it have been better to invest some money in the stock market rather than all the money in the bank? Why?

When an account says that the interest is compounded, it means that the interest earned will be added to the amount of money you started with, and you will *earn interest on the interest*.

For example, if you invested $100 in a savings account that had a 5% interest rate that was compounded at the end of each year (compounded annually), you could calculate how much money there would be at the end of each year.

In the first year you will earn $100·0.05 = $5 in interest. That means at the beginning of the second year, your account will have $100+$5 = $105 in it. In the second year, you will earn $105·0.05 = $5.25 in interest, and at the beginning of the third year, your account will have $105+$5.25 = $110.25 in it.

1. Complete the following table that will show how much you will earn in an account that has a 5% interest rate compounded annually.

Year	Principal	Interest earned	Money in account
1	$100	$5	$105
2	$105	$5.25	$110.25
3	$110.25		
4			
5			
6			
7			
8			
9			

2. Complete the table below that will show how much is earned in an account that starts with $300 and has a 7% annually compounded interest rate over 5 years.

Year	Principal	Interest earned	Money in account
1	$300.00	$21.00	$321.00
2			
3			
4			
5			

Liz and Dave recently got married. They want to have a baby and have decided they want to set aside money to pay for the baby's schooling. They would like to have a child in two years, and imagine that their child will enroll in college at age 18. They're deciding whether to invest their $15,000 in a 20-year CD with a fixed annual interest rate of 9% or in a savings account with a fixed annual interest rate of 4%.

1. How much money would they have in the CD account after 1 year?

2. How much money would they have in the savings account after 1 year?

3. How much money would they have in the CD after 2 years?

4. How much money would they have in the savings account after 2 years?

Use the following formula to complete the table showing how much money is in each account after each year.

$I = P(1+r)^t$, where I is the value of the initial investment, P, invested over t years with a rate of return of r.

Year	Money in CD (9%)	Money in Savings Account (4%)
0	$15,000.00	$15,000.00
1	$16,350.00	$15,600.00
2	$17,821.50	$16,224.00
3		$16,872.96
4	$21,173.72	$17,547.88
5	$23,079.36	
6	$25,156.50	$18,979.79
7	$27,420.59	$19,738.98
8		$20,528.54
9		$21,349.68
10		$22,203.66
11	$38,706.40	$23,091.81
12	$42,189.97	$24,015.48
13	$45,987.07	
14	$50,125.91	$25,975.15
15	$54,637.24	$27,014.15
16		
17	$17,821.50	
18	$70,756.81	$30,387.25
19	$77,124.92	$31,602.74
20		

1. In which account, does the investment grow at a faster rate?

2. Between what two years does the CD account reach a value of $30,000?

3. Between what two years does the savings account reach the same value?

Pretend you were Liz and Dave's financial advisor. Prepare a brief talk (2-4 minutes) about how their investment would grow in each account. (You may choose to include figures from the table or graph the growth of the initial investment over time.)

Investing early is as important figuring out how much to invest. Because of compound interest, investing early will often make as much money as investing a lot of money in a short period of time.

Consider Rob, a freshman in high school, who sets aside $5 a week to put aside in a savings account at the end of the year. How much money does Rob invest at the end of each year?

Rob's savings account earns 4% interest. The table below shows the value of Rob's investment and it has been started for you.

Year	New value of Investment	Value of investment after deposit	Interest earned
1	$0.00	$260.00	$10.40
2	$270.40	$530.40	$21.22
3	$551.62	$811.62	$32.46
4	$844.08	$1,104.08	$44.16
5	$1,148.24	$1,408.24	$56.33
6	$1,464.57	$1,724.57	$68.98
7	$1,793.56	$2,053.56	$82.14
8	$2,135.70	$2,395.70	$95.83
9	$2,491.53	$2,751.53	$110.06
10	$2,861.59	$3,121.59	$124.86
. . .			
33	$16,954.48	$17,214.48	$688.58
34	$17,903.06	$18,163.06	$726.52
35	$18,889.58	$19,149.58	$765.98
36			
37			
38			
39			
40			

1. Explain how the *Value of the Investment After Deposit* was calculated in year 2.

2. Explain how the *Interest Earned* was calculated in year 2.

3. Explain how the *New Value of the Investment* was calculated in year 3.

4. Using your knowledge of the table, complete the last five rows.

5. How much money will Rob have after 40 years in this account, even if he invests nothing else in the account?

A bank is offering three different types of accounts that clients can invest their money in:

1. A **simple savings** account earns 4% interest annually and the money can be withdrawn at any point without a penalty.

2. A **CD** (certificate of deposit) earns 9% interest annually, but which you must keep your money in for ten years.

3. A **mutual fund** that has not guaranteed rate of return, but has had a 11% return for the past four years. You can sell your shares at any point in time.

Lindsay is a 67-year old retiree, who is looking for someplace to keep her retirement savings.

Carlos is a 24-year old young college-graduate, who wants to start saving for a house.

Melissa is a 30-year old mother, who wants to start a college-find for her new baby.

Which account do you think would appeal most to each of these investors? Why?

Dividends and Earnings

Lesson Summary

Dividends and Earnings examines the ways investors may receive earnings on their investments through dividends and by selling stocks for a profit.

Lesson Objectives

- Draw conclusions as to how to examine a company before making investments.
- Describe the factors that influence investment decisions.
- Calculate dividends paid out to stockholders.
- Calculate net gain/loss for an investor.
- Explain the difference between earnings and dividends.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1B - Understand meanings of operations and how they relate to one another.
1C - Compute fluently and make reasonable estimates
2A - Understand patterns, relations and functions.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6B - Solve problems that arise in mathematics and in other contexts.
6D - Monitor and reflect on the process of mathematical problem solving.
7C - Develop and evaluate mathematical arguments and proofs.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
9B - Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
9C - Recognize and apply mathematics in contexts outside of mathematics.

Mathematical Strands

	Thinking Algebraically	Students use a simple formula for calculating dividend payments to investors.	
	Interpreting Statistics	Students use information presented in a chart to answer questions.	
	Communicating Quantitative Information	Students explain dividends and possible gains from investing in stocks paying out dividends.	
	Tackling Complex Problems	students apply their knowledge of dividends and broker's fees to accurately compute the value of investments over time.	

Use the formula below to determine the answer to each question. (Assume annual dividends, unless stated otherwise.)

Dividend Payment = (Dividend per share)·(Number of shares)

1. Fred has 500 shares of a stock that is paying $0.12 in dividends per share annually. What will his total dividend payment be?

2. Elizabeth owns 850 shares of a stock that is paying a $0.30 dividend annually. What will her total dividend payment be?

3. Tariq has learned that his 1,200 shares of stock will be paying a $0.27 dividend at the end of the month. How much money should Tariq expect to receive in a dividend payment?

4. LeVan owns shares of a company that will pay $0.334 dividends per share. If LeVan owns 350 shares, how much will her dividend payment be?

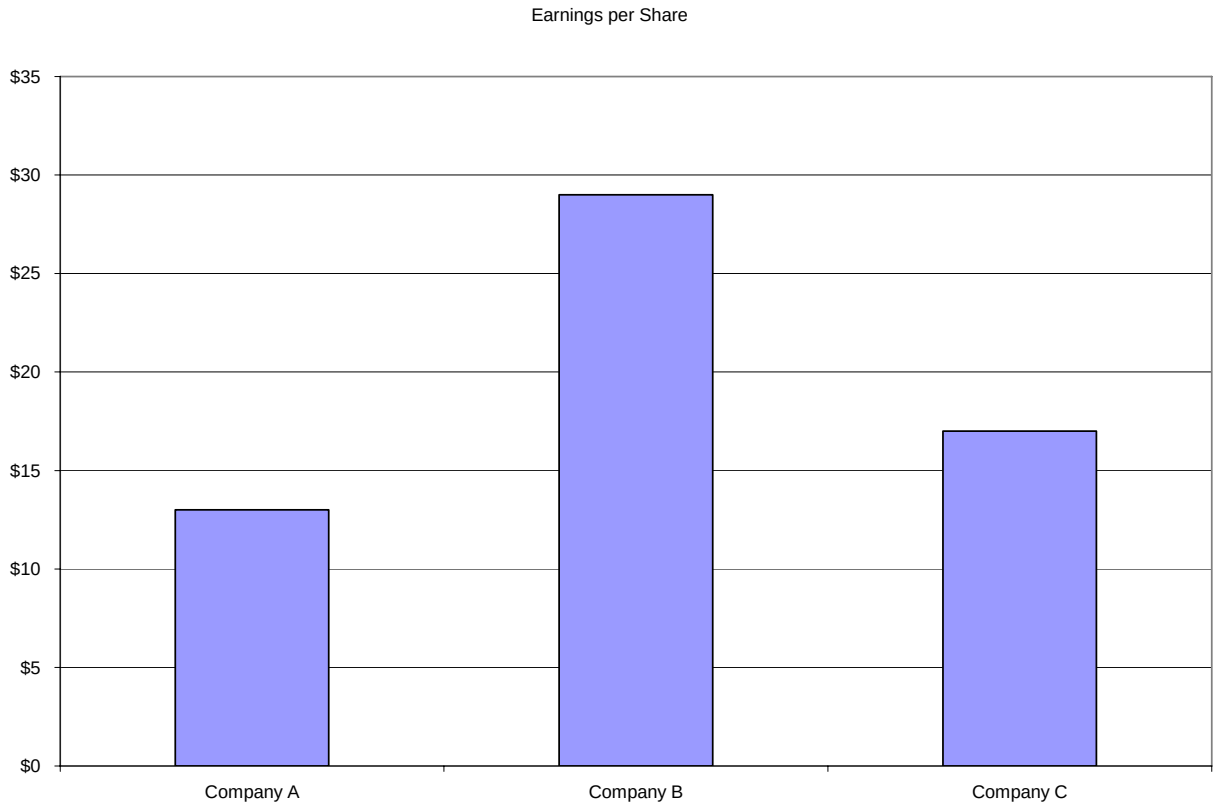
5. Jason owns 430 shares of a stock that will pay $0.22 dividends at the end of the month. His brother, David, owns 510 shares. How much more money in dividend payments will David receive than Jason?

6. Suky bought 3,400 shares of a stock that will pay $0.189 per share in dividends. She wants to use her money to purchase a new computer for $620. Will she have enough money? (You can ignore any commissions.)

7. Eda wants to buy 20 more shares of a stock that are currently valued at $52.13 per share. She hopes to use her upcoming dividend payment for this purchase. If her 1,750 shares of stock will pay a dividend of $0.596 per share, will she have enough money? (You can ignore commission.)

8. Ben received a total dividend payment of $196.08 for the 860 shares of stock he owned. How much was the dividend per share?

Below is a chart that shows the earnings per share for three different companies. Use the information provided in the chart to answer the questions below.



1. Which company shows the greatest earnings per share?

2. Which company shows the least earnings per share?

3. Based on the information above, what stock would you prefer to buy? Why?

You are a financial advisor and your client has come to you confused about which of two stocks to buy with $900.

Stock A	**Stock B**
is a large-cap stock in the consumer goods industry. It costs $45 per share and has a beta of 1.02.	is a large-cap stock in the consumer goods industry. It costs $45 per share and has a beta of 1.02. Stock B also awards quarterly dividends of $1.25.

Your client is confused because he has never heard of a dividend.

1.In what ways are the stocks similar?

2. In what way do the two stocks differ?

3. Write him a short letter explaining how dividends work, and what it would mean if he invested all his money in either stock A or stock B.

4. Do you know for sure which stock is a better investment? Why or why not?

1. On November 30, Susan bought 300 shares of Walt Disney Company (DIS) for $31.89 a share. On December 13, 2006, Disney paid $0.31 dividends per share, and on February 12, 2007 she sold the stock for $33.89 a share.

Ignoring any broker's fees, how much money did she gain or lose on this investment?

2. On January 23, 2007, Daniel bought 4000 shares of Intel Corporation (INTC) at $20.55 a share. He sold half his shares on February 6, for $21.03, one day after Intel Corp. paid a $0.113 dividend. He sold the remaining shares on February 12, 2007 for $20.79.

Ignoring any broker's fees, how much money did he gain or lose on this investment?

3. Tom bought 11,600 shares of United Technologies Corporation (UTX) for $62.87 per share on July 10, 2006. It paid a dividend of $0.265 on August 16, and on August 17, 2006, he sold 2,500 shares for $61.85 each. On November 15, 2006, it paid a dividend again, and Tom sold 5,000 of his shares the next day for $66.76. He sold the remainder of his UTX stock for $68.58 on February 1, 2007.

Ignoring any broker's fee, how much money did he gain or lose on this investment?

4. On May 30, 2006, Camille bought 25,800 shares of Caterpillar Incorporated (CAT) stock for $72.16. It paid three dividends each worth $0.30 over the time she held all the stock. She sold the stock on January 30, 2007 for $62.88.

If Camille pays a 2% broker's fee on every transaction (except collecting dividends), how much money did she gain or lose on this investment?

What is an Exchange/Market?

Lesson Summary

What Is an Exchange/Market? focuses on the functions of the various stock exchanges.

Lesson Objectives

- Explain the role of exchanges in shaping the market place.
- Compare and contrast standard listing requirements for each exchange.
- Understand the advantages and disadvantage of listing with the NYSE, NASDAQ, and AMEX.
- Describe the differences between a dealers market and an auction market.
- Draw conclusions as to whether the exchange on which a stock is listed should impact the choices made by SMG teams.
- Draw conclusions as to the role technology has played in changing the work and impact of the stock market.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
9C - Recognize and apply mathematics in contexts outside of mathematics.

Mathematical Strands

	Thinking Algebraically	Students practice using currency conversion tables to achieve fluency. Students should have had a small review of proportions before they get started.	
	Interpreting Statistics	Students identify trends in data in a chart of historical exchange rates of the US dollar and the Euro. Students then look at how the price of the buying power of the dollar changed in the European market in 2006.	
	Communicating Quantitative Information	Students create a brief analysis of where the most economical place to travel would be based on the exchange rate information provided.	
	Tackling Complex Problems	Students follow the transactions of a foreign investor and are asked to explain how the fluctuation in exchange rates caused the investor to lose money, despite the stock's price rising over the time.	

Currency	U.S. $	¥en	Euro	Can $	U.K. £	AU $	Swiss Franc
1 U.S. $ =	1	121.8500	0.7688	1.1714	0.5036	1.2877	1.2475
1 ¥en =	0.008207	1	0.006309	0.009613	0.004133	0.010568	0.010238
1 Euro =	1.3007	158.4962	1	1.5237	0.6551	1.6750	1.6227
1 Can $ =	0.8537	104.0208	0.6563	1	0.4299	1.0993	1.0650
1 U.K. £ =	1.9856	241.9488	1.5265	2.3260	1	2.5570	2.4771
1 AU $ =	0.7765	94.6226	0.5970	0.9096	0.3911	1	0.9687
1 Swiss Franc =	0.8016	97.6754	0.6163	0.9390	0.4037	1.0323	1

Use the table above to covert the currency below into the appropriate denomination.

1. 1 US dollars = _____ Yen

2. 1 euro = _____Canadian $

3. 1 £ = _____ US $

4. 50 ¥ = _____ Swiss Francs

5. 9,005 Australian dollars = _____ $ (US)

6. $100,000 (Australian) = _____ euro

7. 6,000 £ = _____ Yen

8. 450,000 Canadian Dollars = _____ $ (Australian)

9. 74,969.60 Canadian Dollars = _____ $ (US)

10. 13,738,500 £ = _____ euro

Below is a table of monthly averages of the value of the Euro (€, the currency used in European Union nations) against the US dollar (USD).

Month	USD per 1 Euro
January	1.21032 USD
February	1.19393 USD
March	1.20284 USD
April	1.22733 USD
May	1.27662 USD
June	1.26606 USD
July	1.26806 USD
August	1.28105 USD
September	1.27274 USD
October	1.26164 USD
November	1.28895 USD
December	1.32013 USD

1. Describe the trend you see in the data above? Did the dollar get weaker against the Euro over one year or stronger? How can you tell?

2. How much was a $100,000 worth in euros in October?

3. How much was $100,000 worth in euros in November?

4. How much was $100,000 worth in euros in December?

5. If you had stock worth 68,430€ in February, how much is that worth in US dollars?

6. If you had an investment valued at 12,045€ in March, how much was that worth in USD?

7. If you had 100,000€ in April, how much US currency could you buy?

Below is a table displaying the exchange rates for US dollars on February 19, 2007. Use this information to answer the questions below.

US Dollar Exchange Rates							
Currency Last Trade	U.S. $	¥en	Euro	Can $	U.K. £	AU $	Swiss Franc
1 U.S. $ =	1	121.8500	0.7688	1.1714	0.5036	1.2877	1.2475

1. How many Euros (€) could you buy with 1 US dollar?

2. How many Canadian dollars could you buy with 1 US dollar?

3. How many Australian dollars could you buy with 20 US dollars?

4. How many Japanese Yen (¥) could you buy with $100 US dollars?

5. How many Swiss Francs could you buy with 0.80 US dollars?

Below is a table that shows the currency conversions between major world currencies.

Major Currency Cross Rates							
Currency Last Trade	U.S. $	¥en	Euro	Can $	U.K. £	AU $	Swiss Franc
1 U.S. $ =	1	121.8500	0.7688	1.1714	0.5036	1.2877	1.2475
1 ¥en =	0.008207	1	0.006309	0.009613	0.004133	0.010568	0.010238
1 Euro =	1.3007	158.4962	1	1.5237	0.6551	1.6750	1.6227
1 Can $ =	0.8537	104.0208	0.6563	1	0.4299	1.0993	1.0650
1 U.K. £ =	1.9856	241.9488	1.5265	2.3260	1	2.5570	2.4771
1 AU $ =	0.7765	94.6226	0.5970	0.9096	0.3911	1	0.9687
1 Swiss Franc =	0.8016	97.6754	0.6163	0.9390	0.4037	1.0323	1

(Source: http://finance.yahoo.com/currency, February 11, 2007)

6. How many Canadian dollars can you buy with 1 Euro?

7. How many Australian dollars can you buy with 1 Yen?

8. How many Swiss Francs can you buy with 20 Canadian dollars?

9. How many British Pounds (£) can you buy with 4,000 Euros (€)?

10. How many US dollars can you buy with 1 Euro?

A Japanese investor bought 10,000 shares of Micron Technology, Inc. (MU), at $16.55 a share.

1. How much did she pay in US dollars?

2. Given the exchange rate below, how much did she pay in Japanese Yen?

US Dollar ($)	Japanese Yen (¥)
1	117.15

3. About two months later, she decided to sell all her Micron Technology stock, when it was valued at $15.97 a share. How much was her investment worth in US dollars when she sold it?

4. In American dollars, should the investor have made a profit or taken a loss?

5. Given the exchange shown below for the date on which she sold her stock, how much is the investor's investment worth in Japanese Yen?

US Dollar ($)	Japanese Yen (¥)
1	121.59

6. Was this a profit or a loss for the investor?

7. Explain what happened.

What is Diversification?

Lesson Summary

What Is Diversification? teaches students the importance of diversification and helps them diversify their own SMG portfolios .

Lesson Objectives

- Create a diversified portfolio selecting stocks.
- Conduct Internet research on different investment options.
- Interpret company and industry charts to determine which investments to make with their SMG teams.
- Define diversification, risk tolerance, industry, index.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1B - Understand meanings of operations and how they relate to one another.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6B - Solve problems that arise in mathematics and in other contexts.
6C - Apply and adapt a variety of appropriate strategies to solve problems.
7B - Make and investigate mathematical conjectures.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
8C - Analyze and evaluate the mathematical thinking and strategies of others.
8D - Use the language of mathematics to express mathematical ideas precisely.
9C - Recognize and apply mathematics in contexts outside of mathematics.

Mathematical Strands

	Thinking Algebraically	Students calculate percentages to determine sectors in a diverse portfolio.	
	Interpreting Statistics	Students determine which sectors an investor is most and least invested in, and to identify which portfolios are diversified based on profiles of investor's portfolios, with investments disaggregated by industry sector.	
	Communicating Quantitative Information	Students create bar charts, pie charts and other graphical representations of information on diversification.	
	Tackling Complex Problems	Students are given a sample SMG portfolio of stocks to analyze for diversification in terms of cap size.	

To calculate percentages, take amount of money in a category (for example, all the money invested in small-cap firms), divide it by the total amount of money in the portfolio, and multiply by 100%.

$$\%\text{ of portfolio invested in a sector} = \frac{money\_invested\_in\_a\_sector}{total\_value\_of\_investment} \cdot 100\%$$

Company	Size	Sector	Value
A	Small	Telecommunications	$1,500
B	Large	Industrial goods	$31,000
C	Small	Health	$15,500
D	Mid	Energy	$5,000
E	Large	Energy	$27,000
F	mid	Utilities	$19,000

1. What is the total value of the investment portfolio above?

2. Using the portfolio above calculate the percentage of the investment in each sector.

3. Calculate the percentage of the investment in each size company.

Below is the profile of a portfolio's holdings (displayed within industry sectors).

Sector	% holdings
Utilities	0.00
Business services	15.64
Financials	19.74
Telecommunications	4.71
Media	0.00
Consumer goods	8.71
Energy	2.33
Hardware	13.04
Health	5.18
Software	0.00
Consumer services	10.16
Industrial materials	20.48

1. What three sectors does the investor have the most money invested in?

2. Of the sectors in which the investor has money invested, what three sectors does the investor have the least money invested in?

3. Would you say that this is a well-diversified portfolio or not well diversified? Why?

Below is the profile of another portfolio's holdings (displayed within industry sectors).

Sector	% holdings
Utilities	0.00
Business services	0.00
Financials	95.57
Telecommunications	0.00
Media	0.00
Consumer goods	0.00
Energy	0.00
Hardware	0.00
Health	0.00
Software	0.00
Consumer services	0.00
Industrial materials	4.43

1. What sectors does the investor have the most money invested in?

2. Of the sectors in which the investor has money invested, what sectors does the investor have the least money invested in?

3. Would you say that this is a well-diversified portfolio or not well diversified? Why?

Below is the profile of a third portfolio's holdings (displayed within industry sectors).

Sector	% holdings
Utilities	0.00
Business services	19.75
Financials	2.13
Telecommunications	0.00
Media	4.81
Consumer goods	7.38
Energy	0.00
Hardware	4.98
Health	0.84
Software	58.39
Consumer services	1.72
Industrial materials	0.00

1. What sectors does the investor have the most money invested in?

2. Of the sectors in which the investor has money invested, what sectors does the investor have the least money invested in?

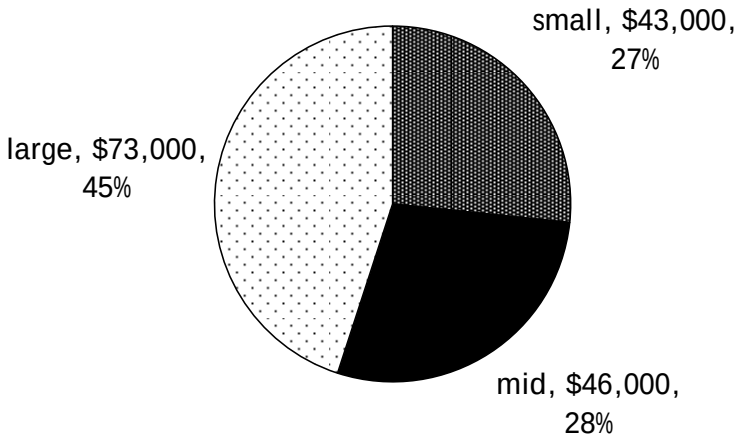
3. Would you say that this is a well-diversified portfolio or not well diversified? Why?

4. For what type of investor would you recommend the first portfolio? What about the second portfolio? What about the third?

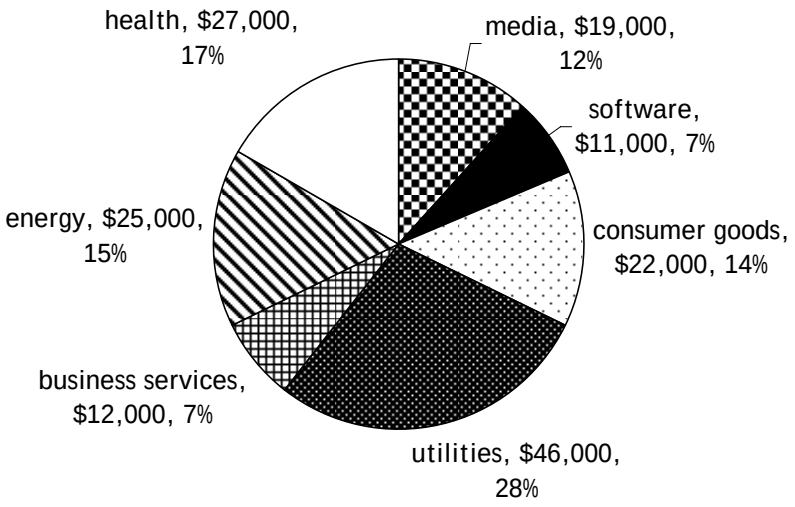
There are many ways to represent a diversified portfolio. There are also different ways to determine if an investment portfolio is diversified or not.

Company	Cap	Sector	Investment Value
A	Small	Media	$6,000
B	Mid	Software	$11,000
C	Mid	Consumer goods	$10,000
D	Small	Consumer goods	$7,500
E	Large	Utilities	$36,000
F	Small	Business services	$12,000
G	Large	Utilities	$10,000
H	Small	Consumer goods	$4,500
I	Mid	Energy	$25,000
J	Large	Health	$27,000
K	small	media	$13,000

The following graphs present the information above in different ways. Next to each graph write a brief description of what information each graph presents.



Description



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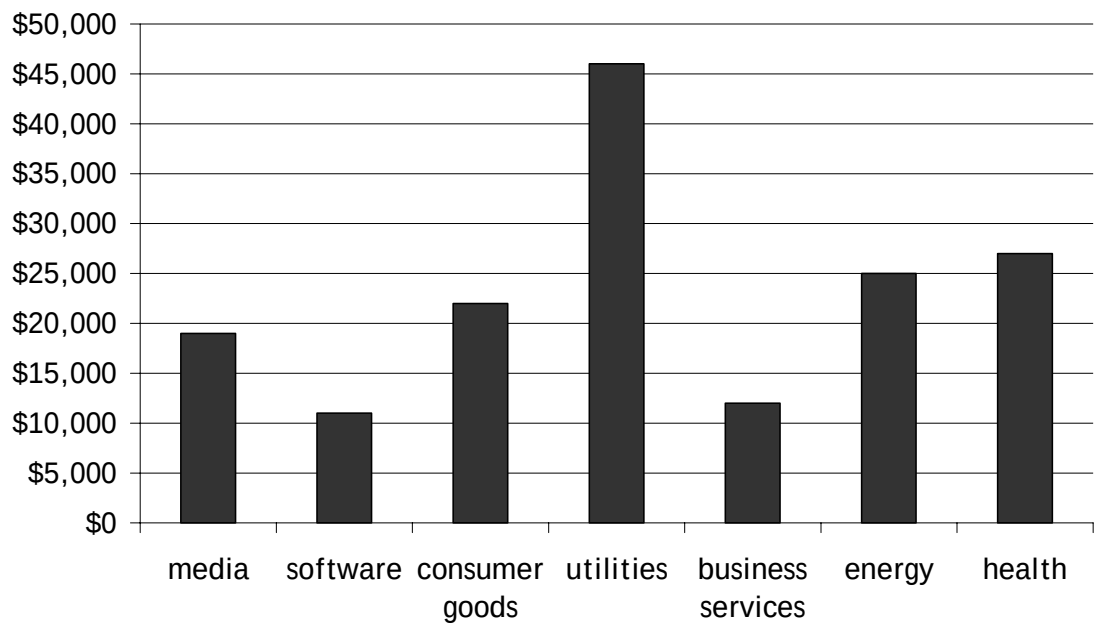

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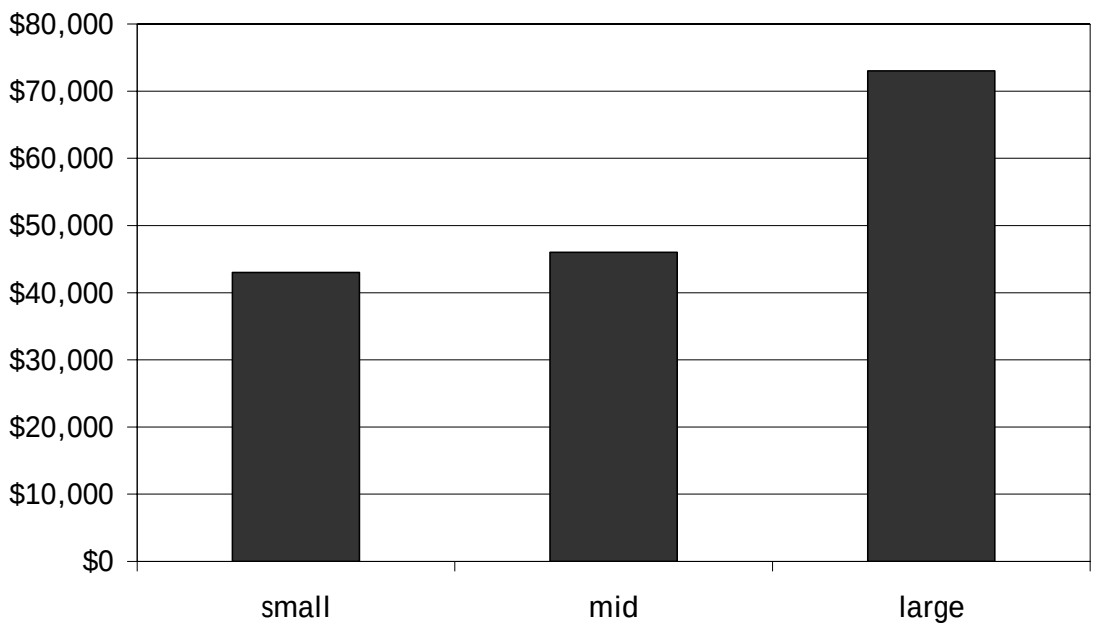

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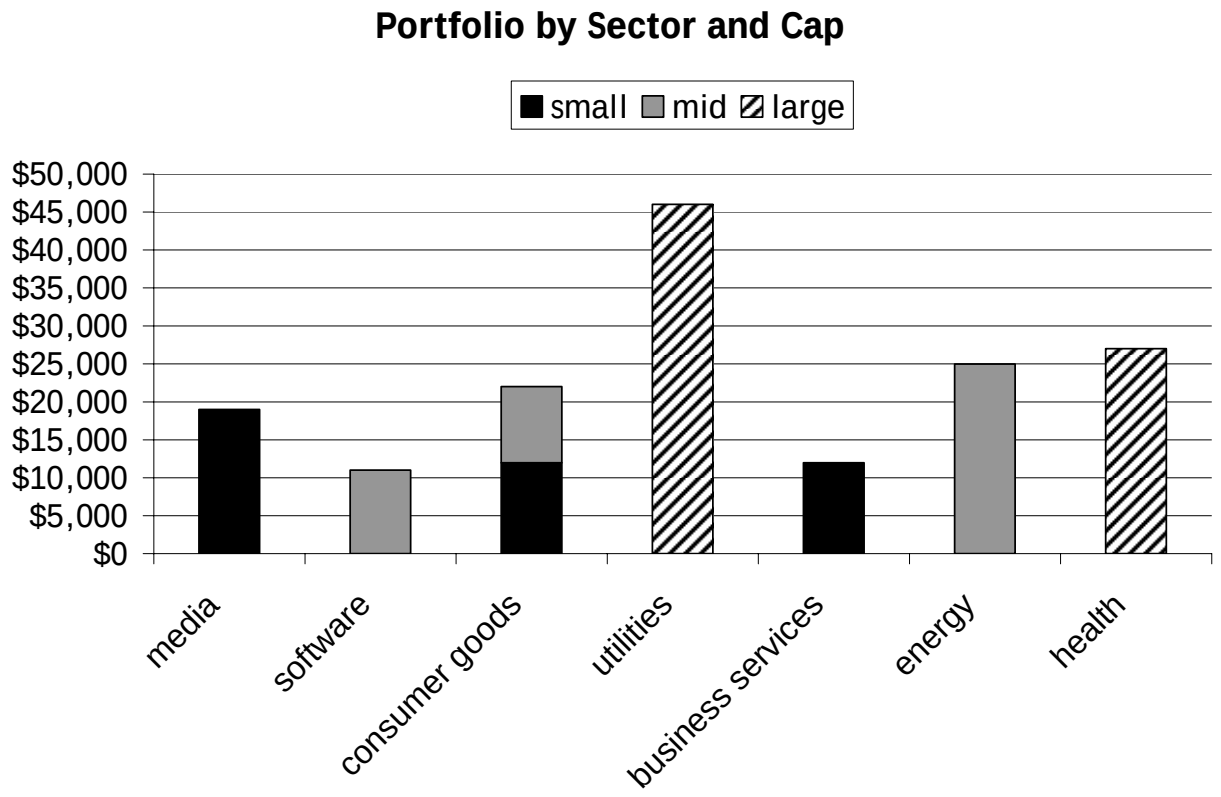


Description

Below is a practice portfolio. The stocks listed include information on the size of the company, the industry it operates within, and the value of the investment.

Company	Cap size	Sector	Investment Value
A	Mid	Consumer services	$9,500
B	Mid	Software	$30,000
C	Small	Software	$13,500
D	Large	Media	$20,000
E	Mid	Telecommunications	$15,000
F	Large	Software	$12,000

1. On a separate sheet of paper use the information above to create two graphical representations that show the diversification (in terms of both cap size and sector) of the portfolio.

2. On a separate sheet of paper, represent graphically the diversification of your own group's portfolio.

Below is a list of a team's portfolio. They claim that their portfolio is diversified because they have an equal number of stocks from each company. Do you agree?

Stock	Price per Share	Number of Shares	Cap Size
British Airways PLC (BAB)	$98.74	150	Large
Eddie Bauer Holdings Inc. (EBHI)	$11.54	150	Small
Handleman Company (HDL)	$7.14	150	Small
Krispy Kreme Doughnuts Inc.(KKD)	$10.36	150	Small
Scholastic Corporation (SCHL)	$31.16	150	Mid
Sunpower Corporation (SPWR)	$46.81	150	Mid
Symantec Corporation (SYMC)	$17.04	150	Large
The Stanley Works (SWK)	$55.81	150	Mid
United Health Group Inc. (UNH)	$53.73	150	Large

1. What is the total value of their portfolio?

2. How much money is invested in:
   - Small cap stocks?
   - Mid cap stocks?
   - Large cap stocks

3. What percentage of their investment is in
   - Small cap stocks?
   - Mid cap stocks?
   - Large cap stocks

4. Would you advise them to rediversify? Why or why not?

✯ Can you make recommendations about what stocks they might buy more of and which they might sell?

What is a Mutual Fund?

Lesson Summary

What Is a Mutual Fund? teaches students how to use newspapers and the Internet to find and research various mutual funds.

Lesson Objectives

- Define and identify the characteristics of a mutual fund
- Use the newspaper and Internet to research mutual funds.
- Use their research on mutual funds to help determine team investments for the Stock Market Game.
- Create and deliver a presentation on mutual funds, their risk and performance

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
1B - Understand meanings of operations and how they relate to one another.
1C - Compute fluently and make reasonable estimates
2A - Understand patterns, relations and functions.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6B - Solve problems that arise in mathematics and in other contexts.
6D - Monitor and reflect on the process of mathematical problem solving.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
8C - Analyze and evaluate the mathematical thinking and strategies of others.
9A - Recognize and use connections among mathematical ideas.
9C - Recognize and apply mathematics in contexts outside of mathematics.
10A - Create and use representations to organize, record, and communicate mathematical ideas.
10C - Use representations to model and interpret physical, social, and mathematical phenomena.

Mathematical Strands

	Thinking Algebraically	Students calculate percentages as a result of analyzing mutual funds.	
	Interpreting Statistics	Students interpret information on mutual funds' assets by calculating percentages from pie charts.	
	Communicating Quantitative Information	Students construct an ownership zone graph using information on different companies.	
	Tackling Complex Problems	Students hypothesize on the type of mutual fund that would best suit an investor based on information from a profile. Students also sketch a histogram demonstrating the allocation of assets.	

Percentages are a very important part of analyzing financial information. In this exercise, you will find the percentage of the total mutual fund's worth invested in different stock types.

Remember,

$$\frac{part\_of\_investment}{total\_investment} \cdot 100\% = \text{percent of mutual fund's worth}$$

1. Mutual Fund A

$50 million invested in growth stocks	_____% invested in growth stocks
$15 million invested in value stocks	_____% invested in value stocks
$35 million invested in blend stocks	_____% invested in blend stocks

2. Mutual Fund B

$36 million invested in small cap stocks	_____% invested in small cap
$9 million invested in madcap stocks	_____% invested in mid cap
$5 million invested in large cap stocks	_____% invested in large cap

3. Mutual Fund C

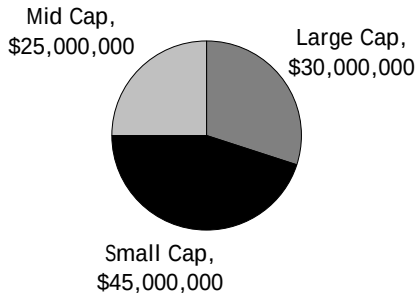
$46 million invested in utilities	_____% invested in utilities
$81 million invested in services	_____% invested in services
$52 million invested in consumer goods	_____% invested in consumer goods
$21 million invested in basic materials	_____% invested in basic materials

4. Mutual Fund D

$120 million invested in health care	_____% invested in health care
$57 million invested in technology	_____% invested in technology
$12 million invested in financial services	_____% invested in financial services
$38 million invested in consumer goods	_____% invested in consumer good

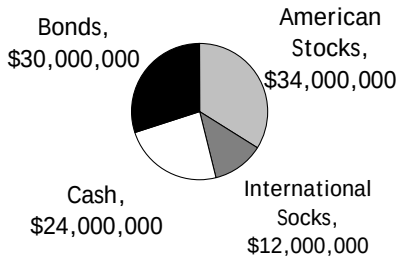
Investors often turn to graphs for a depiction of the kinds of stocks that comprise a specific mutual fund. The following pie charts represent the assets of different mutual funds. For each mutual fund, calculate what percentage of assets is invested in each category presented in the pie chart.

Mutual Fund A



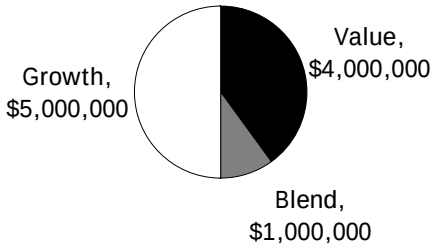
1.

Mutual Fund B

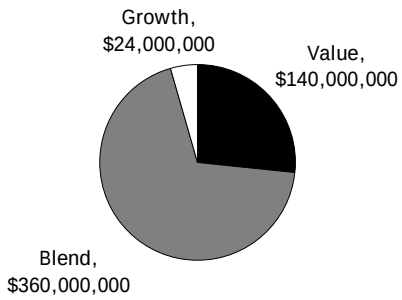


2.

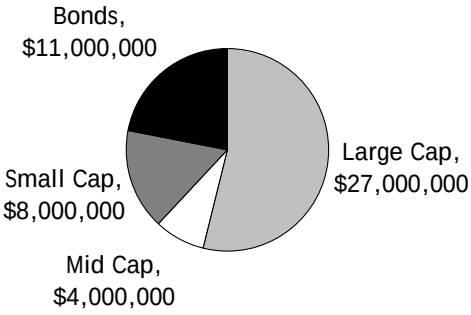
Mutual Fund C



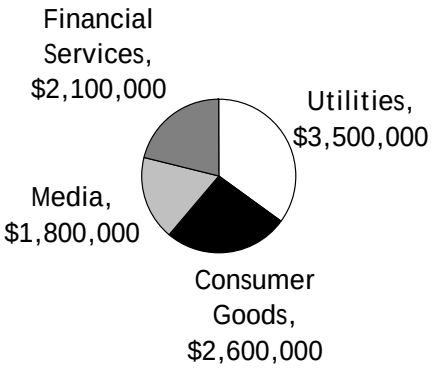
3.


Mutual Fund D
Growth, $24,000,000
Value, $140,000,000
Blend, $360,000,000

4.

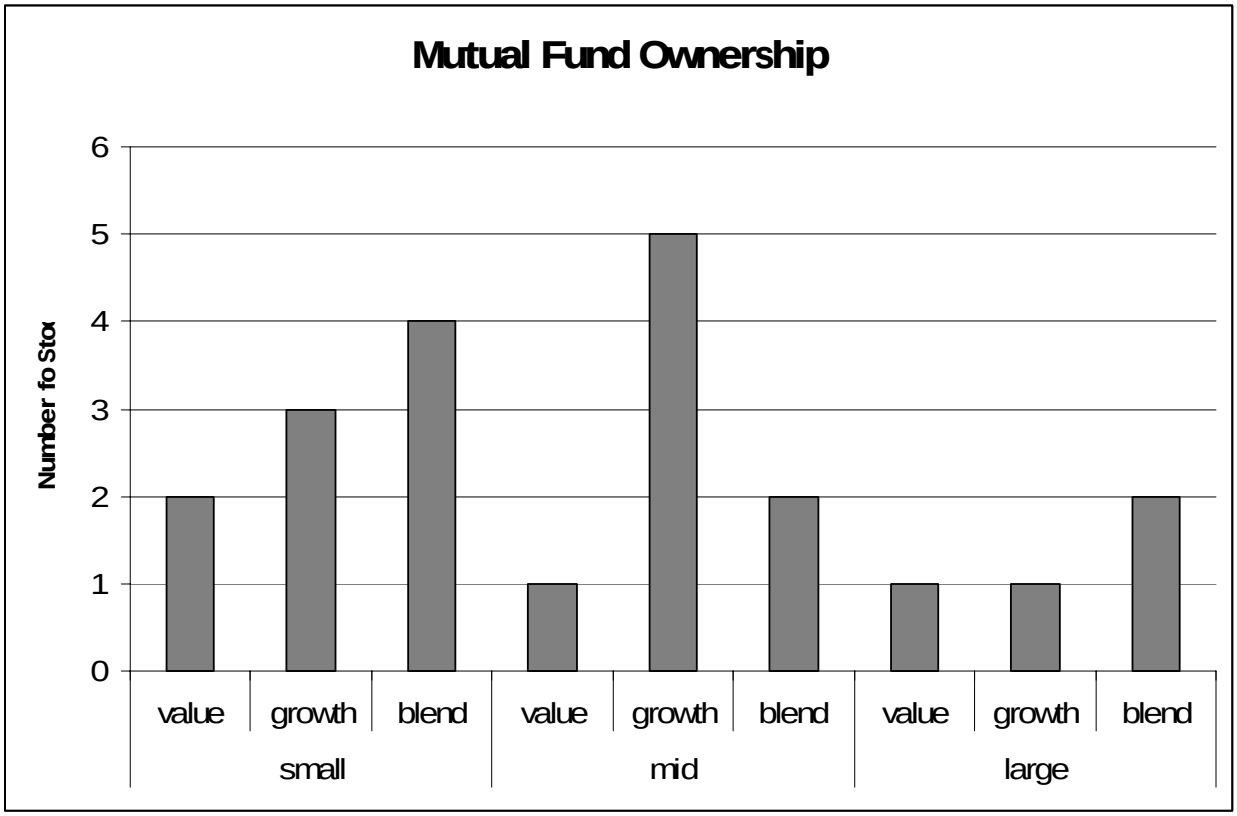

Mutual Fund E
Bonds, $11,000,000
Large Cap, $27,000,000
Small Cap, $8,000,000
Mid Cap, $4,000,000

5.


Mutual Fund F
Financial Services, $2,100,000
Utilities, $3,500,000
Media, $1,800,000
Consumer Goods, $2,600,000

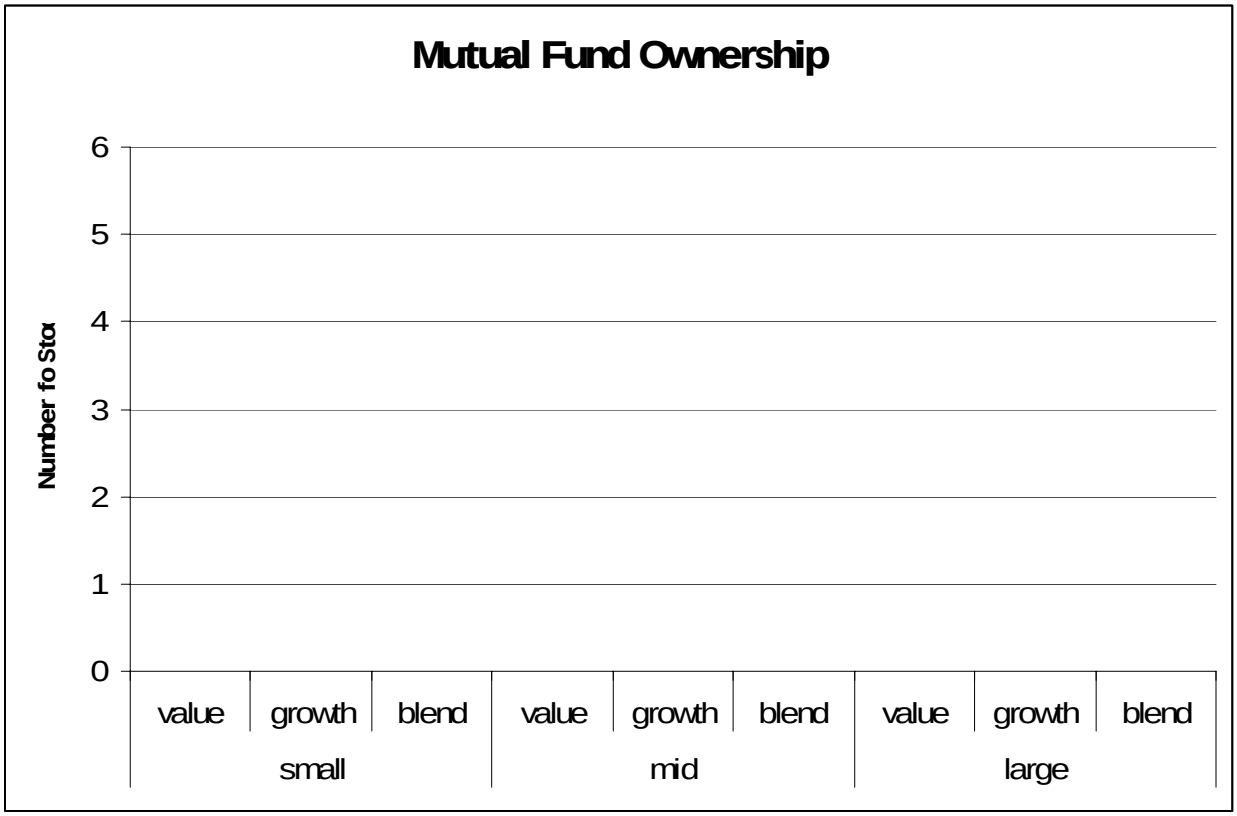
5.

One way to show how a mutual fund is invested is to use a histogram, as shown below.



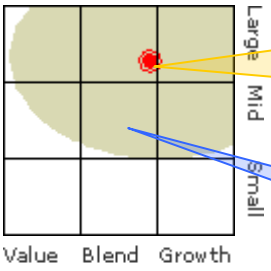
To construct a histogram, add one unit to the appropriate column for each company listed. Use the companies' profiles below.

Company	Growth Rating	Cap	Company	Growth Rating	Cap
1	Value	Small	11	Blend	Mid
2	Blend	Small	12	Blend	Large
3	Growth	Mid	13	Growth	Small
4	Value	Small	14	Growth	Large
5	Blend	Large	15	Blend	Large
6	Growth	Mid	16	Growth	Large
7	Value	Large	17	Blend	Mid
8	Value	Mid	18	Growth	Mid
9	Value	Mid	19	Growth	Mid
10	Growth	Mid	20	Blend	Small



On average, what type of stocks does this mutual fund invest in?

One way to show how diversified your portfolio is to use an Ownership Graph, as shown below.



This red dot shows us the average type of company that the mutual fund holds. So we know that, on average, the stocks in this mutual fund come from large cap companies. It also tells us that, on average, the companies that this mutual fund invests in are a mix of high growth companies and companies that are projected to grow slowly over time . . .

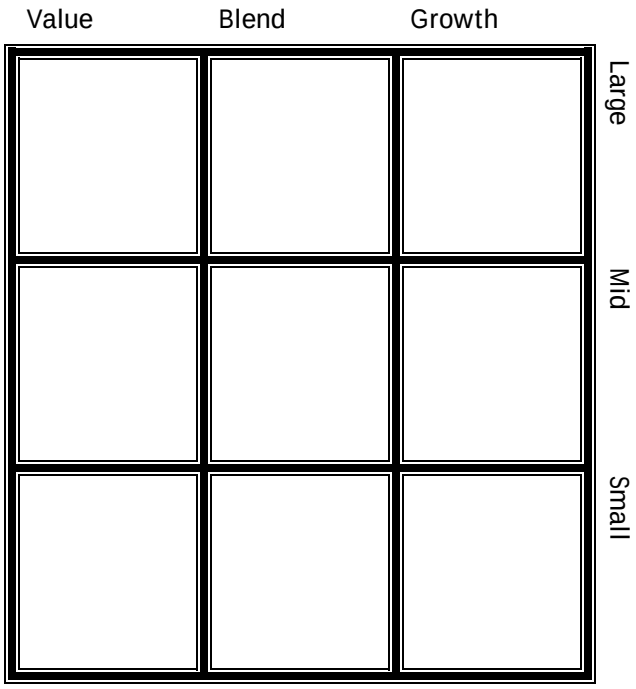
This shaded gray area represents three quarters of the companies that the mutual fund holds. The position of the gray area tells that there are very few companies in the mutual fund's portfolio that are small caps *and* characterized as value stocks.

To construct an ownership graph, plot one point for each company listed.[1]

[1] This is a simplified version of an ownership graph. Usually ownership zone graphs incorporation information on how much money is invested in each company stock, and weighted averages are used to calculate the centroid of the data.

Use the companies' profiles below to create an ownership graph.

Company	Growth Rating	Cap	Company	Growth Rating	Cap
1	Value	Small	16	Growth	Large
2	Blend	Small	17	Blend	Mid
3	Growth	Mid	18	Growth	Mid
4	Value	Small	19	Growth	Mid
5	Blend	Large	20	Blend	Small
6	Growth	Mid	21	Growth	Large
7	Value	Large	22	Blend	Large
8	Value	Mid	23	Blend	Mid
9	Value	Mid	24	Blend	Large
10	Growth	Mid	25	Blend	Mid
12	Blend	Mid	26	Growth	Large
12	Blend	Large	27	Growth	Mid
13	Growth	Small	28	Blend	Large
14	Growth	Large	29	Value	Large
15	Blend	Large			

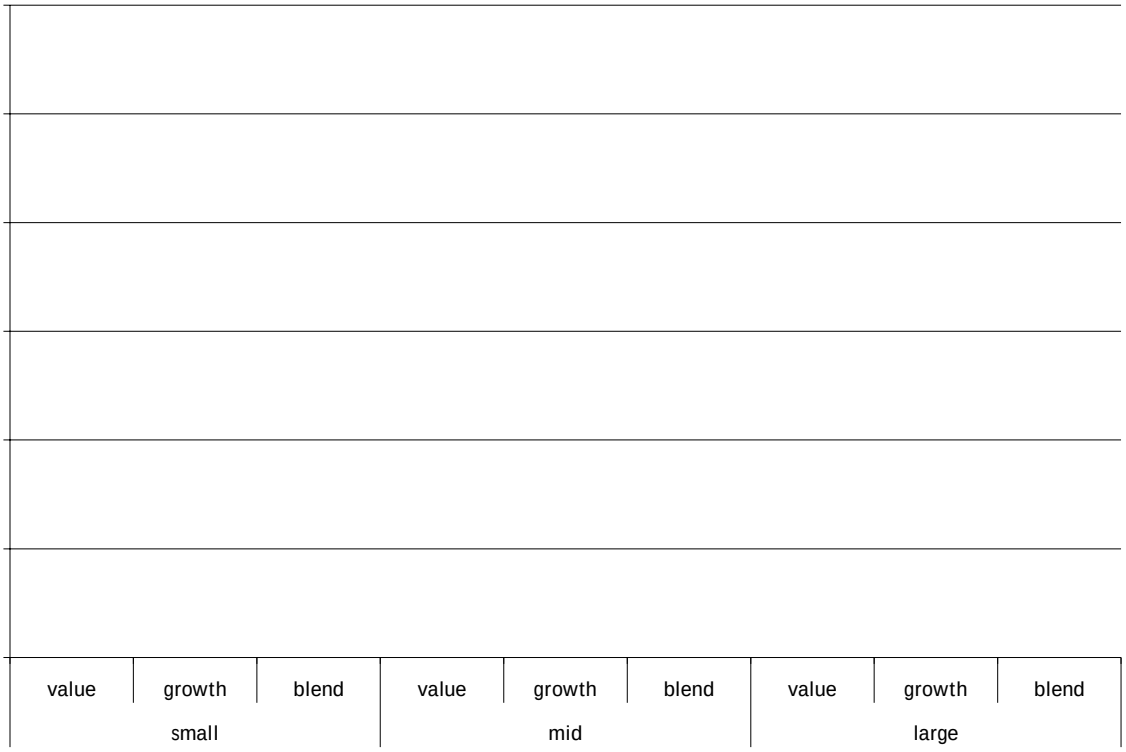


On average, what type of stocks does this mutual fund invest in?

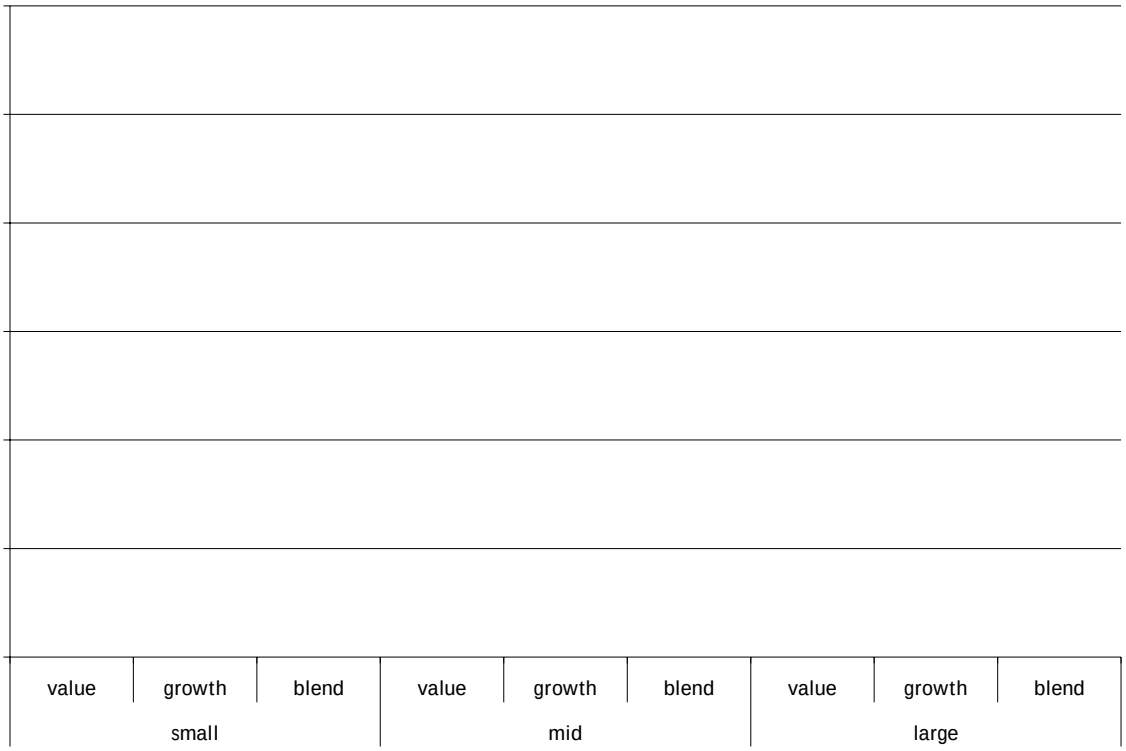
As you have been learning, different investors have different priorities, and as such, they need different investment strategies. Some investors can chase volatile stocks, while others should be invested in stable, small growth companies for the long term.

Given the profiles of the investors below, think of the type of mutual fund that would best fit each investor. State what kind of investor you think each person is, then graph what the asset allocation of that mutual fund might look like.

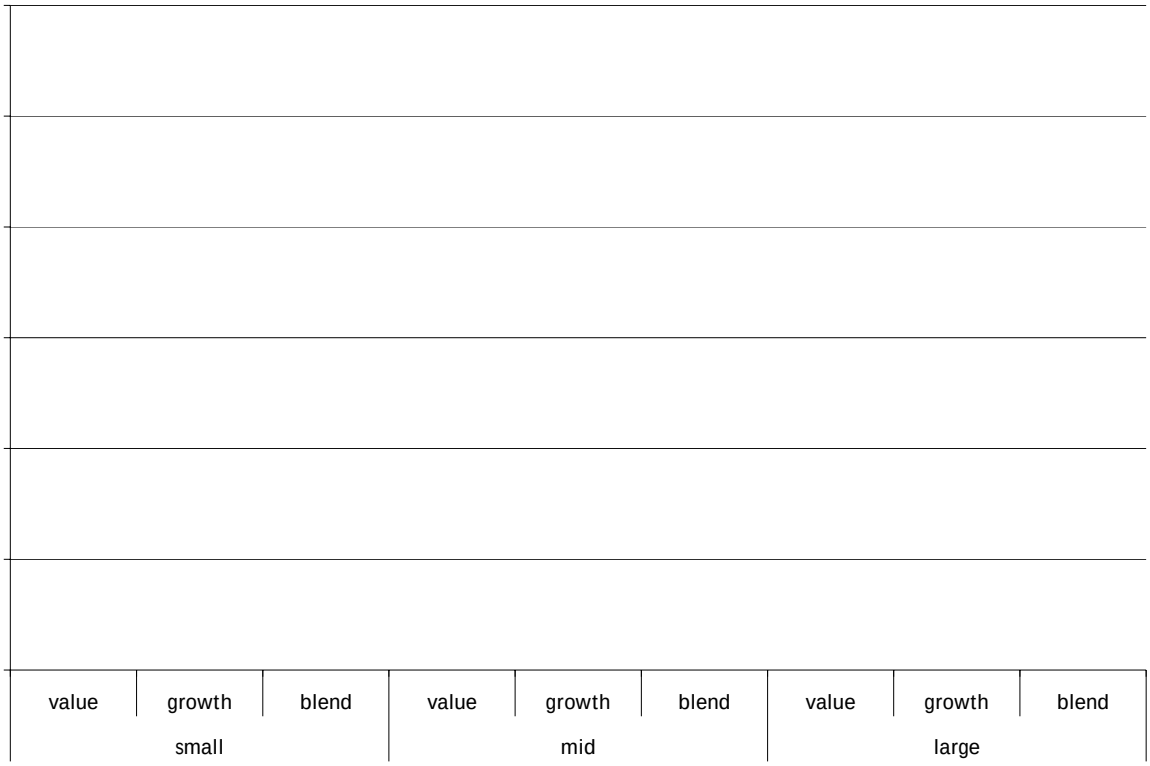
1. Elena hopes to protect her retirement savings and hopes to invest some of this morning in a mutual fund that would provide small gains. She knows hat she will only be invested for a few more years, so she wants to avoid funds that could go up or down quickly. She prefers to invest in larger companies.



2. Juan is a shrewd investor who has extensive experience trading stocks and acting as a financial advisor to other people. He has enough money that his portfolio can with some volatility; in fact, he is looking to invest in risky stocks in hopes that they will provide big payoffs.



3. Xu has been investing money for a few years. She knows some things about the stock market, but she knows she still has a lot more to learn. She can tolerate some risk in her portfolio, but not much. She is much more interested having a broad, diversified portfolio that represents many different types of companies.



What Causes Stock Prices to Change?

Lesson Summary

What Causes Stock Prices to Change? explores the influences that affect stock prices.

Lesson Objectives

- Analyze and interpret market indices, which influence change in the price of stock.
- Discuss the various ways stock prices are influenced.
- Evaluate the ways investors can be affected by the change in market prices when choosing to buy, sell or hold.
- Interpret charts and graphs to better understand the growth and change in stock prices.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
7B - Make and investigate mathematical conjectures.
7C - Develop and evaluate mathematical arguments and proofs.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
8C - Analyze and evaluate the mathematical thinking and strategies of others.
9C - Recognize and apply mathematics in contexts outside of mathematics.
10A - Create and use representations to organize, record, and communicate mathematical ideas.

Mathematical Strands

	Thinking Algebraically	Students calculate Price/Earnings Ratios.
	Interpreting Statistics	Students examine the trajectories of two stocks after Hurricane Katrina, write about the information presented, and hypothesize why certain sectors did poorly after this event, while others gained.
	Communicating Quantitative Information	Students use a stock's trend line to write a brief description of events that might impact a company's performance.
	Tackling Complex Problems	Students predict market activity using announcements from the Federal Reserve.

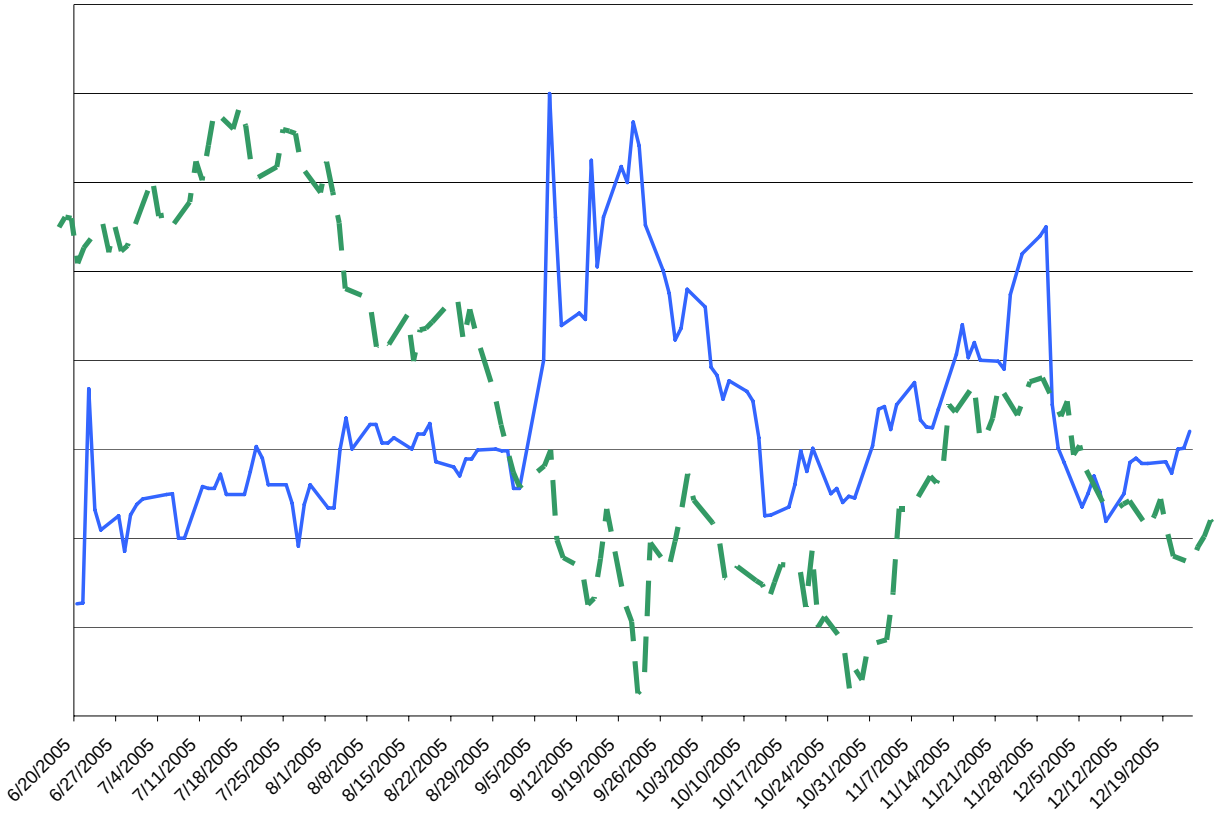
To calculate a P/E ratio, simply divide the price per share by the earnings per share. This number tells you about how much investors will pay for $1 of earnings from a company.

Calculate the P/E ratio for the stocks #1-8.

Stock	P/E Ratio
Stock #1 Share Price = $46.35 Earnings Per Share = $1.70	
Stock #2 Share Price = $33.11 Earnings Per Share = $2.02	
Stock #3 Share Price = $69.85 Earnings Per Share = $1.83	
Stock #4 Share Price = $53.22 Earnings Per Share = $1.50	
Stock #5 Share Price = $31.98 Earnings Per Share = $2.20	
Stock #6 Share Price = $79.10 Earnings Per Share = $1.92	
Stock #7 Share Price = $65.49 Earnings Per Share = $.80	
Stock #8 Share Price = $44.35 Earnings Per Share = $1.00	

Hurricane Katrina, one of the deadliest hurricanes in American history, struck the Gulf Coast in late August 2005. This tragedy impacted the stock market because investors knew that companies would be affected differently by this event.

The graphs below show two different industries' performances over the same time period. One of the trend lines shows the performance of companies that owned lumber businesses, while the other trend line tracks the performance of residential insurance companies.



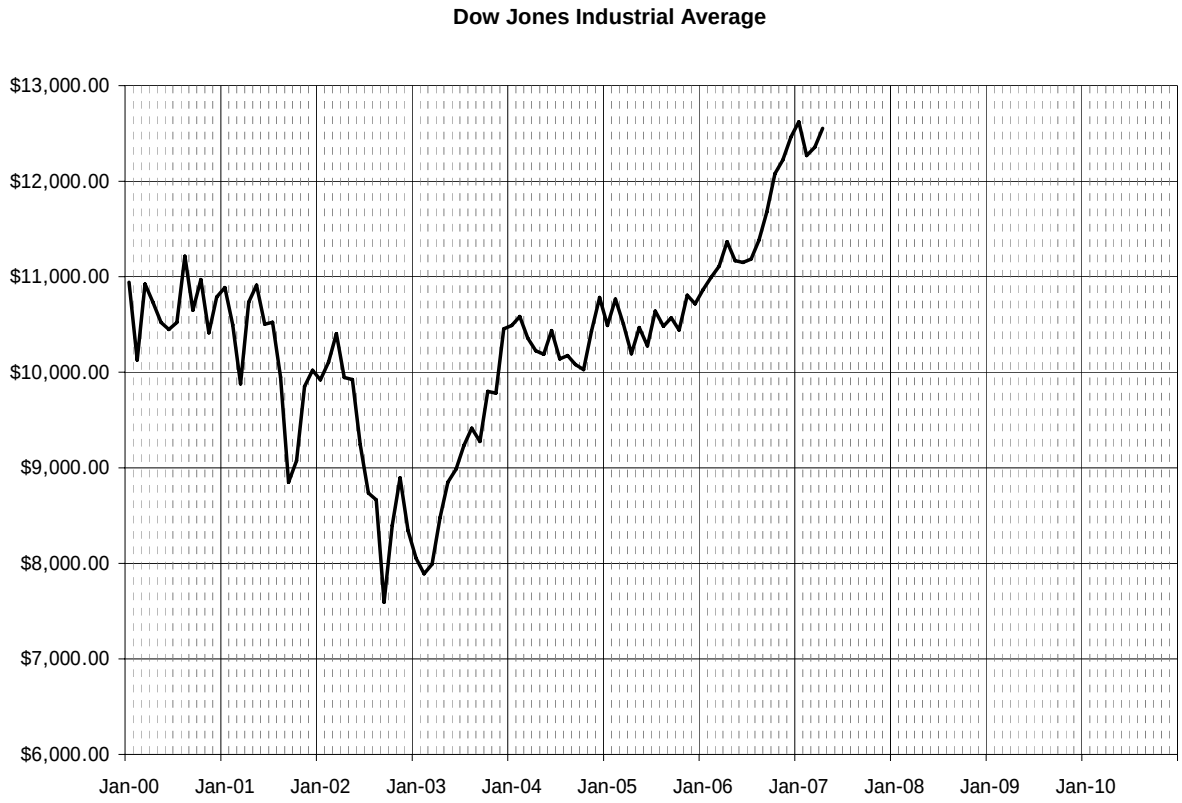
1. Using the chart above, describe the trend of the solid line.

2. Using the chart above, describe the trend of the dotted line.

3. Which trend line, the dotted line or solid line, do you think belongs to the lumber businesses? Why?

4. Which belongs to the residential insurance companies? Why?

Below is a graph of the Dow Jones Industrial Average from January 2000 to April 2007.



1. When was the Dow Jones Industrial Average at its lowest point on the graph above?

2. When was the Dow Jones Industrial Average at its high point on the graph above?

3. In what year did the Dow Jones Industrial average make the greatest gain?

Use the graph to identify where each historical event occurred and what happened to the market.

1. Terrorists attacked the United States in September 2001.

2. President Bush was reelected in November 2004.

Investors listen to the announcements made by the Federal Reserve (Fed) to determine whether the market will rise or fall. If the Fed thinks that the economy is doing well, the market tends to rally. If the Fed thinks that inflation (how much the cost of goods rises over time) is under control, the market also tends to rally.

For two statements below, summarize what the Federal Reserve has said, and then predict how the market might react after each announcement.

What the Fed Said	Recent indicators have suggested somewhat firmer economic growth, and some tentative signs of stabilization have appeared in the housing market. Overall, the economy seems likely to expand at a moderate pace over the coming quarters. (January 31, 2007)
Summary	
How the market may react	

What the Fed Said	Readings on core inflation have improved modestly in recent months, and inflation pressures seem likely to moderate over time. However, the high level of resource utilization has the potential to sustain inflation pressures. (January 31, 2007)
Summary	
How the market may react	

1. The day before the Fed made a positive announcement, a major market index had a value of $11,857, and then day after the announcement the index had a value of $12,010. Was the change in the value of the index?

2. The day before the Fed made an announcement a major market index had a value of $12,422, and after the announcement the index had a value of $11,975. How big was the change in the value of the index?

3. The week before the Fed made a major announcement, a major market index was at a value of $11,386. The day after the announcement, the index had a value of $11,210. Two months later the index had a value of $11,420. How big was the drop in the index? How big was the gain in the index?

Buy, Sell, or Hold?

Lesson Summary

Buy, Sell, or Hold? teaches students to use key resources to help them determine whether to buy, sell or hold a stock.

Lesson Objectives

- Decide whether to buy, hold or sell stock based on group and individual research.
- Compare and contrast companies based upon stock market statistical data.
- Create bar graphs that compare two companies' net income and revenue for a three-year period.
- Use the Internet to obtain annual reports and research companies.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
2A - Understand patterns, relations and functions.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
6C - Apply and adapt a variety of appropriate strategies to solve problems.
6D - Monitor and reflect on the process of mathematical problem solving.
7B - Make and investigate mathematical conjectures.
7C - Develop and evaluate mathematical arguments and proofs.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
8C - Analyze and evaluate the mathematical thinking and strategies of others.
8D - Use the language of mathematics to express mathematical ideas precisely.
9A - Recognize and use connections among mathematical ideas.
9C - Recognize and apply mathematics in contexts outside of mathematics.
10C - Use representations to model and interpret physical, social, and mathematical phenomena.

Mathematical Strands

	Thinking Algebraically	Students calculate dividends, net income, and shares outstanding using formulae. *The numbers in this lesson are purposely expressed in different ways to help students become fluent in understanding different representations of numbers.*	
	Interpreting Statistics	Students examine and compare statistics from two different companies to determine whether a stock should be rated a "buy," "sell," or "hold."	
	Communicating Quantitative Information	Students decide whether to buy, sell, or hold by picking the most relevant information Students also write a short paragraph defending their opinion.	
	Tackling Complex Problems	Students analyze the information provided in each word problem to answer each question.	

Use the formula below to calculate the appropriate answer for each question.

$d = \frac{m}{s}$ where ***d*** is the value of the dividend given out each year
m is the total amount of money a company dedicates to dividends, and
s is the number of outstanding shares of that company.

Calculate the value of the dividend for each company.

1. Company A has dedicated $12,000,000 to dividends to be divided among 27,888,000 shares.

2. Company B will spend a total of $3.6 million to dividends for their 459,750 outstanding shares

3. Company C has decided to use $51.2 million for dividends for the 34,659,000 shares outstanding.

4. Calculate the amount of money each company dedicates to dividends.

5. Company D will pay $0.461 in dividends for each of its 56,333,000 shares outstanding.

6. Company E awards $.072 dividends to each of its 12,000,8000 shares outstanding.

7. Company F has 4.12 million shares outstanding, and it pays $0.975 in dividends annually.

8. Calculate the number of shares outstanding for each company.

9. Company G used $13.85 million to award $0.485 dividends for each share.

10. Company H awarded dividends worth $1.02 dividends, and it spent a total of $41.89 million on all of its shares.

11. Company I awarded $0.10 dividends and spent $1,000,000 in total.

There are many statistics that describe company and stock performance. For each of the statistics below, write a mathematical description of what each tells you. In nonmathematical language, what information does each statistic give you?

1 day price change %

Market Cap

P/E

Div. Yield %

Long-Term Debt to Equity

Use the statistics in Table 1 below to answer the following questions.

TABLE 1 Company C				
1 Day Price Change %	Market Cap	P/E	Div. Yield %	Long-Term Debt to Equity
2.56	3.21B	9.00	3.07	0.69

What was the price to earnings ratio for Company C?

What was the market capitalization for Company C?

How much did the stock price for Company C change?

Use the statistics in Table 2 below to answer the following questions.

TABLE 2 Company D				
1 Day Price Change %	Market Cap	P/E	Div. Yield %	Long-Term Debt to Equity
5.61	185.2M	4.31	2.98	0.24

What was the price to earnings ratio for Company D?

What was the market capitalization for Company D?

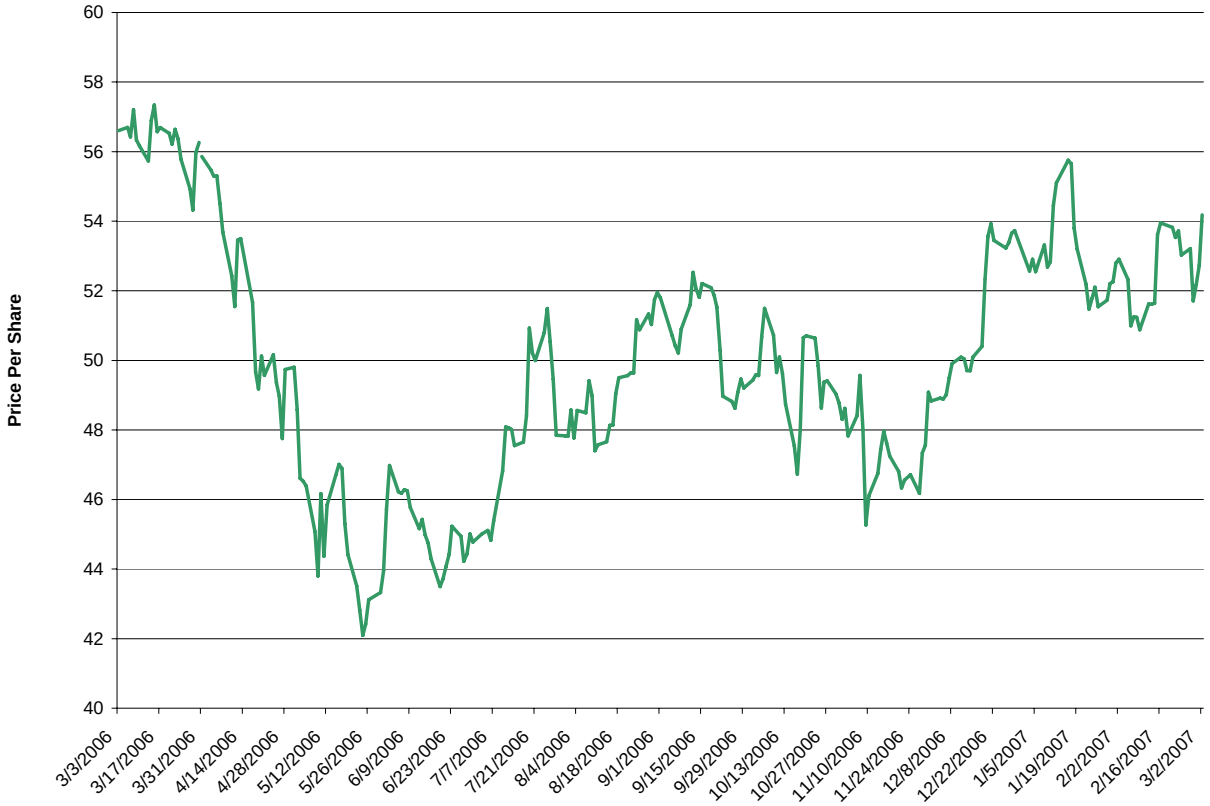
How much did the stock price for Company D change?

For this activity, it is suggested that teachers break students up into groups and give each group a different handout. Each student should analyze the information on their own, and then work with his or her SMG team to determine what information provided is the most important. The teacher will then lead a discussion in which groups defend their decision to buy, sell, or hold the same stock

Convincing Others to Buy

Use the information below to create a convincing argument about why this stock should be bought. Individually, decide which three pieces of information would be the most important presenting your argument. Then, with the rest of your group, be prepared to present the most persuasive evidence to other groups in class.

American Health Company



This company missed its fourth quarter earnings mark. Its P/E ratio is 15.91, which the P/E ratio for the industry is 14.26. Its market cap is only $5.5 billion, while the industry's average market cap is $230.4 billion. The company was started over 75 years ago, and has been publicly traded for the last 68 years. It pays a quarterly dividend of $0.41.

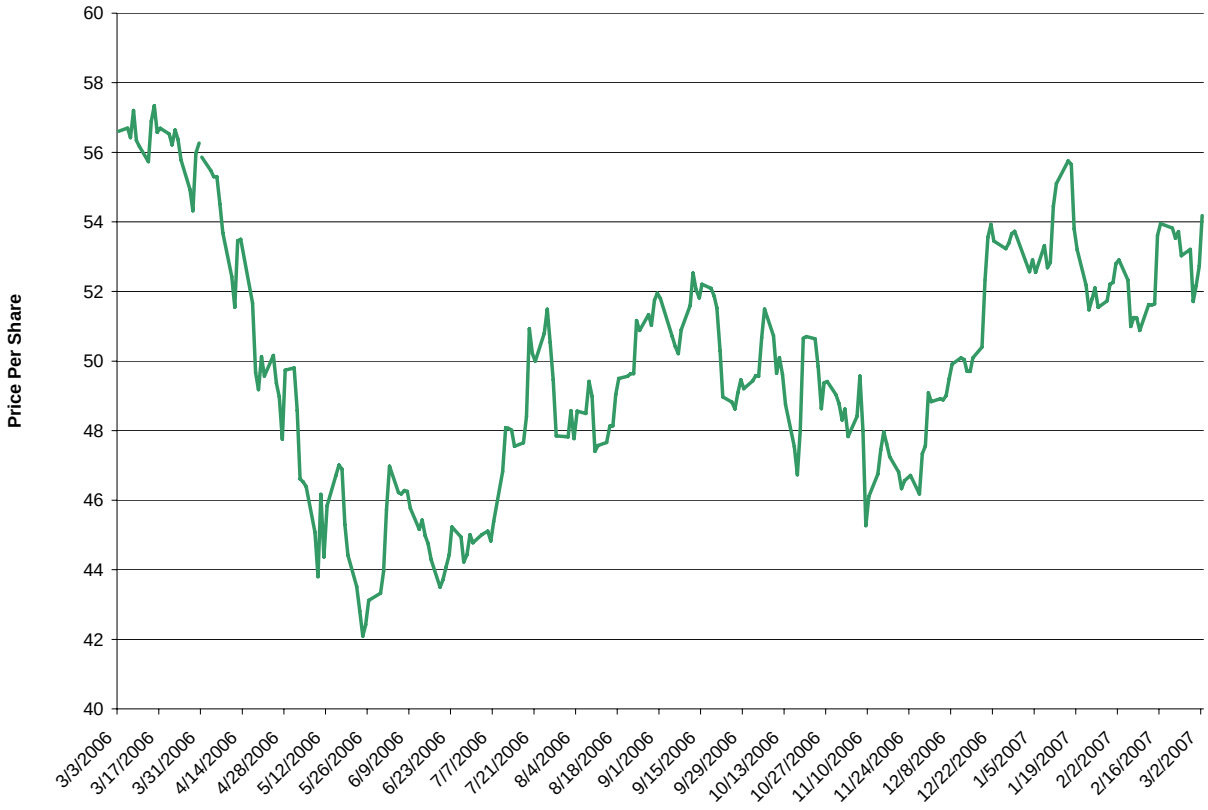
Below are some more statistics you may find helpful.

Stock Price History	
Beta:	0.61
52-Week Change:	-4.28%
S&P500 52-Week Change:	8.52%
52-Week High (09-Mar-06):	57.86
52-Week Low (24-May-06):	41.44

Convincing Others to Hold

Use the information below to create a convincing argument about why this stock should be neither bought nor sold. Individually, decide which three pieces of information would be the most important presenting your argument. Then, with the rest of your group, be prepared to present the most persuasive evidence to other groups in class.

American Health Company



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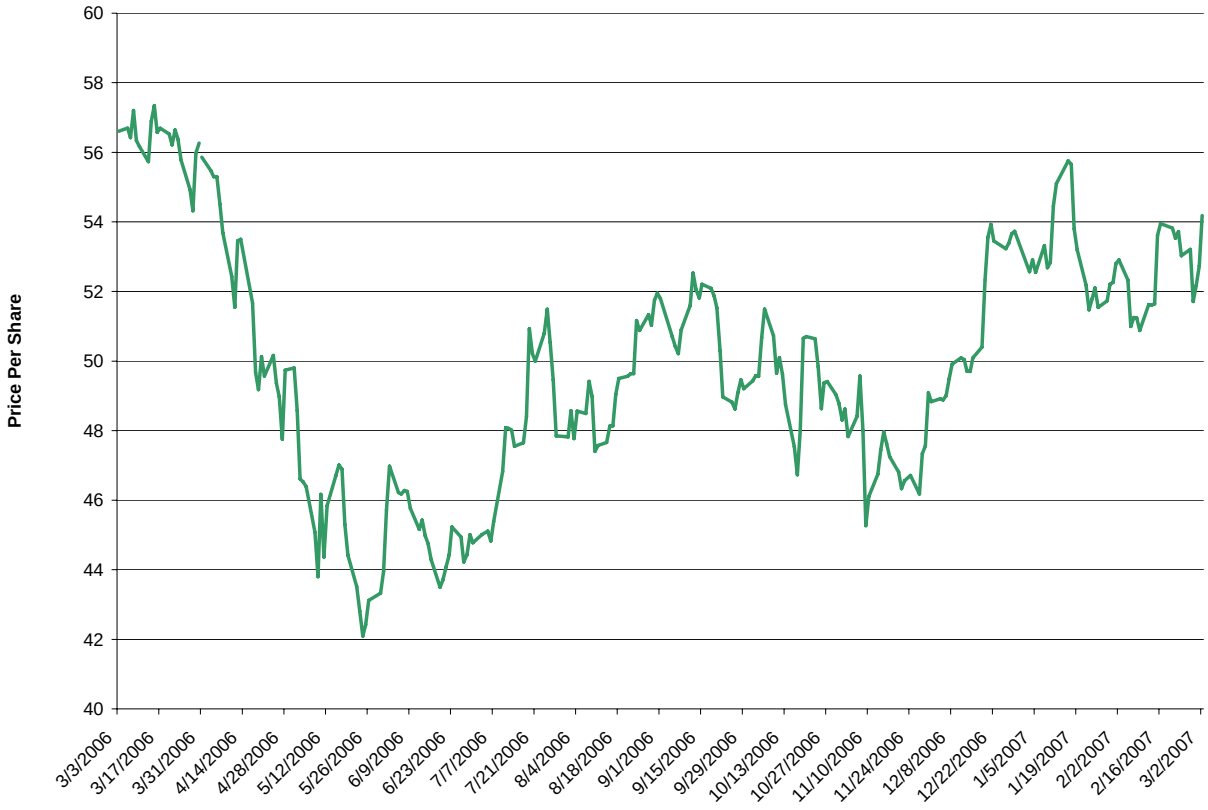
S&P500 52-Week Change:	8.52%
52-Week High (09-Mar-06):	57.86
52-Week Low (24-May-06):	41.44

Convincing Others to Sell

Use the information below to create a convincing argument about why this stock should be sold. Individually, decide which three pieces of information would be the most important presenting your argument. Then, with the rest of your group, be prepared to present the most persuasive evidence to other groups in class.

American Health Company



This company missed its fourth quarter earnings mark. Its P/E ratio is 15.91, which the P/E ratio for the industry is 14.26. Its market cap is only $5.5 billion, while the industry's average market cap is $230.4 billion. The company was started over 75 years ago, and has been publicly traded for the last 68 years. It pays a quarterly dividend of $0.41.

Below are some more statistics you may find helpful.

Stock Price History	
Beta:	0.61
52-Week Change:	-4.28%
S&P500 52-Week Change:	8.52%
52-Week High (09-Mar-06):	57.86
52-Week Low (24-May-06):	41.44

Investors are interested in how much a company will pay in dividends. When a company is deciding how much money it will pay its investors in the form of dividend, it considers its net income, allocates a certain amount of that to reinvestment in the company and uses the rest to pay investors dividends.

Use this information to answer the following problems.

1. Textiles, Incorporated allocated $13.6 million to award an annual dividend for each of its 10,362,550 outstanding shares. How much will each dividend per share be worth?

2. Using the same information from above, how much will each quarterly dividend per share be worth if the dividends are awarded quarterly?

3. If someone buys 350 shares of Textiles, Inc. and receives three quarterly dividend payments for each share, how much money will the investor receive in dividends from Textiles, Incorporated?

4. Wood Products Company has planned to use one fifth of its $267.45 million dollars of net income to pay an annual dividend. If they have 84 million shares outstanding, how much will each annual dividend per share be worth?

5. Using the same information from above, if Wood Products Company decides to award dividends three times a year, how much will each dividend per share be worth?

6. If someone was hoping to earn $750 in dividend earnings over the course of a year from Wood Products Company stock, how many shares do they need to have?

7. Unified Medical Supply, Inc. would like to pay $0.12 per share in dividends per quarter. If they have 2.3 million shares outstanding, how much money will they pay in one quarter in dividends?

8. If the number of shares outstanding remains the same, how much will they pay in dividends for the entire year?

9. If they have a net income of $9.6 million, what percentage of their net income will they have spent on dividend payments?

How Successful Was My Investment Strategy?

Lesson Summary

How Successful Was My Investment Strategy? asks students to reflect on the investment decisions their team made during the course of The Stock Market Game.

Lesson Objectives

- Draw supported conclusions as to whether their strategy in preparing their portfolio was successful and what investment changes they might have made to improve portfolio performance.
- Generate a detailed report including support material.
- Deliver a convincing presentation.
- Give and receive constructive criticism.
- Evaluate the work of other team members and other students.

NCTM Standards

1A - Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
2A - Understand patterns, relations and functions.
5A - Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
5B - Select and use appropriate statistical methods to analyze data.
5C - Develop and evaluate inferences and predictions that are based on data.
5D - Understand and apply basic concepts of probability.
7B - Make and investigate mathematical conjectures.
7C - Develop and evaluate mathematical arguments and proofs.
8A - Organize and consolidate mathematical thinking through communication.
8B - Communicate mathematical thinking coherently and clearly to peers, teachers, and others.
8C - Analyze and evaluate the mathematical thinking and strategies of others.
8D - Use the language of mathematics to express mathematical ideas precisely.
9A - Recognize and use connections among mathematical ideas.
9B - Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
9C - Recognize and apply mathematics in contexts outside of mathematics.
10A - Create and use representations to organize, record, and communicate mathematical ideas.
10C - Use representations to model and interpret physical, social, and mathematical phenomena.

Mathematical Strands

	Thinking Algebraically	Students calculate percentage change in stock price in order to compare the greater gainers/losers in their investment.	
	Interpreting Statistics	Students advise whether to buy, sell, or hold on the stock at specific points in time.	
	Communicating Quantitative Information	Students compare a team's portfolio performance to major indices.	
	Tackling Complex Problems	Students chart the performance of two stocks and compare the performances to that of the previous year.	

For each of the stocks that you had in your portfolio, calculate the % gain/loss per share over the course of time you held the stock.

The formula for calculating percent change is

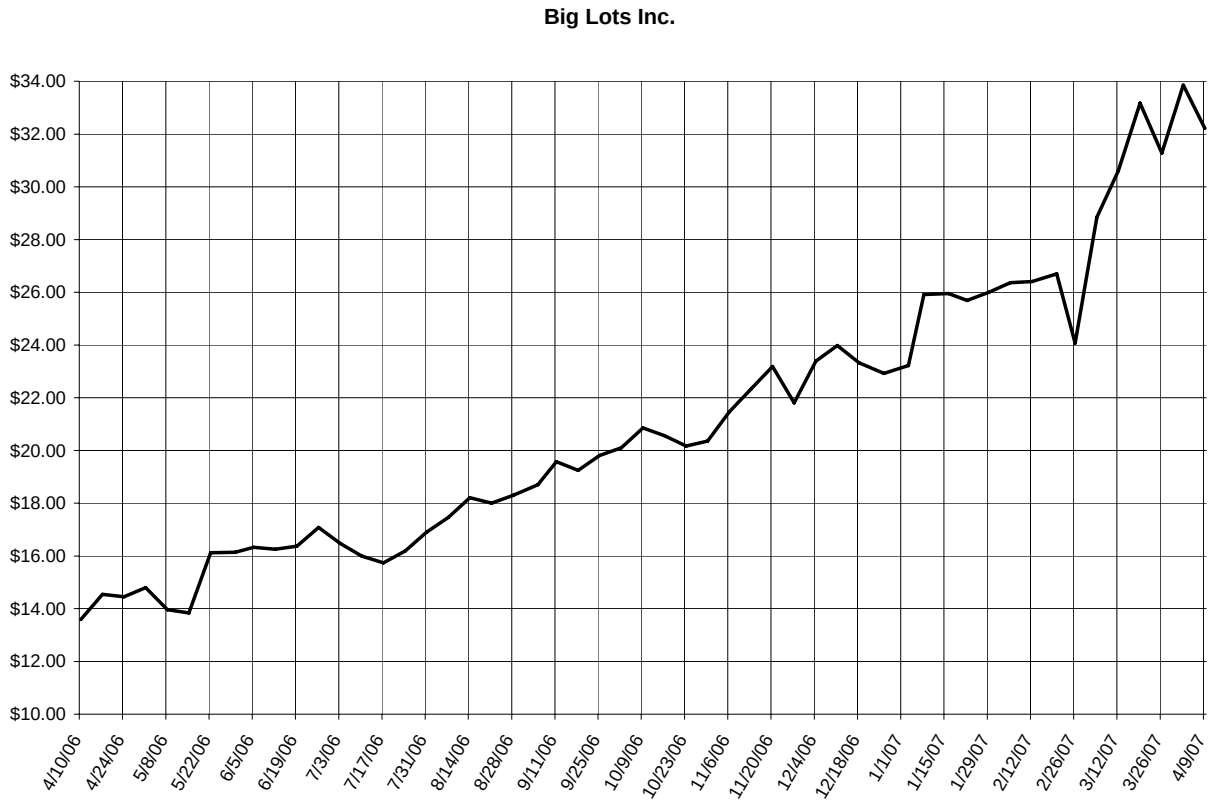
$$\%\ \text{change} = \frac{ending\_price - starting\_price}{starting\_price} \cdot 100\%$$

Stock Name	Starting Price	Ending Price	% change

1. Which stock was the biggest gainer?

2. Which was the biggest loser?

3. Was anything surprising about these results?



A group playing The Stock Market Game™ bought 1000 shares of Big Lots, Inc. stock (BIG) during the first day of the game on January 3, 2007. During the previous year, its stock ranged in price from a low of $12.80 to a high of $30.00.

Show on the graph when the team started the game.

Find and circle the stock's price on the following dates on the graph above:

January 15, 2007

February 12, 2007

February 26, 2007

March 12, 2007

Using the graph above, for each date below, state what your advice to the group would have been (buy, sell, or hold, and why) given how much information you would have had at the time.

January 15, 2007

February 12, 2007

February 26, 2007

March 12, 2007

Many financial advisors encourage investors to invest for the long-term instead of buying and selling over short periods of time. Based on the graph, why do you think they give this advice?

Below are the values of a team's SMG portfolio over a ten week period.

Week	Value
0	$100,000
1	$101,439
2	$103,220
3	$103,422
4	$101,984
5	$106,339
6	$108,220
7	$110,219
8	$112,032
9	$110,420
10	$100,986

At the end of the ten weeks, the team was ranked:

last in their class
ninth out of ten in their grade
and twenty-eighth (out of 31) in their school.

Over the same ten-week period, the Dow Jones Industrial Average increased 0.69%, the S&P 500 increased 0.44%, and the NASDAQ composite decreased by 1.06%.

Several members of the team feel badly about their performance because their investment lost a lot of money in the last week of the game, and they feel that their rankings were very low.

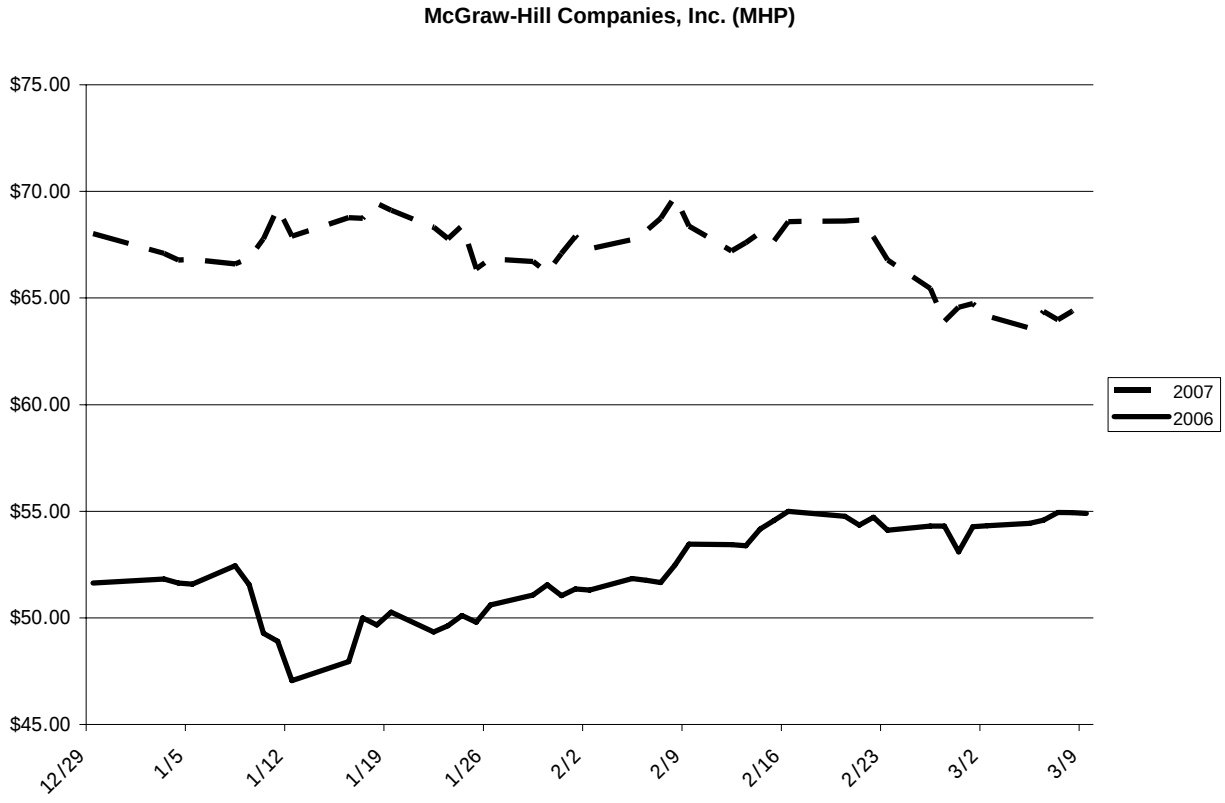
Describe the trend in the value of the investment over the ten week period.

Calculate the overall percentage change in the value of their portfolio from week 1 to week 10.

Write the team a brief letter telling them your honest assessment of their performance. You may want to compare the percentage gain in the portfolio to the rate of return of the indices, and you may also include your own experience with The Stock Market Game

Choose two stocks from your portfolio and graph each of their share prices over the ten weeks.

Use an online financial information to look up the historical prices of those same stocks during the ten-week period last year. Graph the previous history on the same plot for each company. (An example is shown below.)



Given the information, did each stock out perform or underperform their history?