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:

$$\text{percentage change} = \frac{\text{change in price}}{\text{purchase price}} \times 100\%$$

Purchase Price	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 the total transaction value. 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. Including commission, what is the total cost of buying:

a. 390 shares of a stock at a price of $45.92 per share?

b. 90 shares of a stock at a price of $12.38 per share?

c. 786 shares of a stock at a price of $36.00 per share?

d. all three stock purchases in a, b, and c?

2. Suppose you now decide to sell the stocks you bought in Question 1. After you pay a 2% commission for the sale of stock, how much value does your portfolio have when you sell:

a. 390 shares at $45.92 per share?

b. 90 shares at $12.38 per share?

c. 786 shares at $36.00 per share?

d. all three stock sales in a, b, and c?

1. If you know the number of shares you bought and the price per share, how would you calculate the total value of your investment (minus commission)?

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 (minus commission)?

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

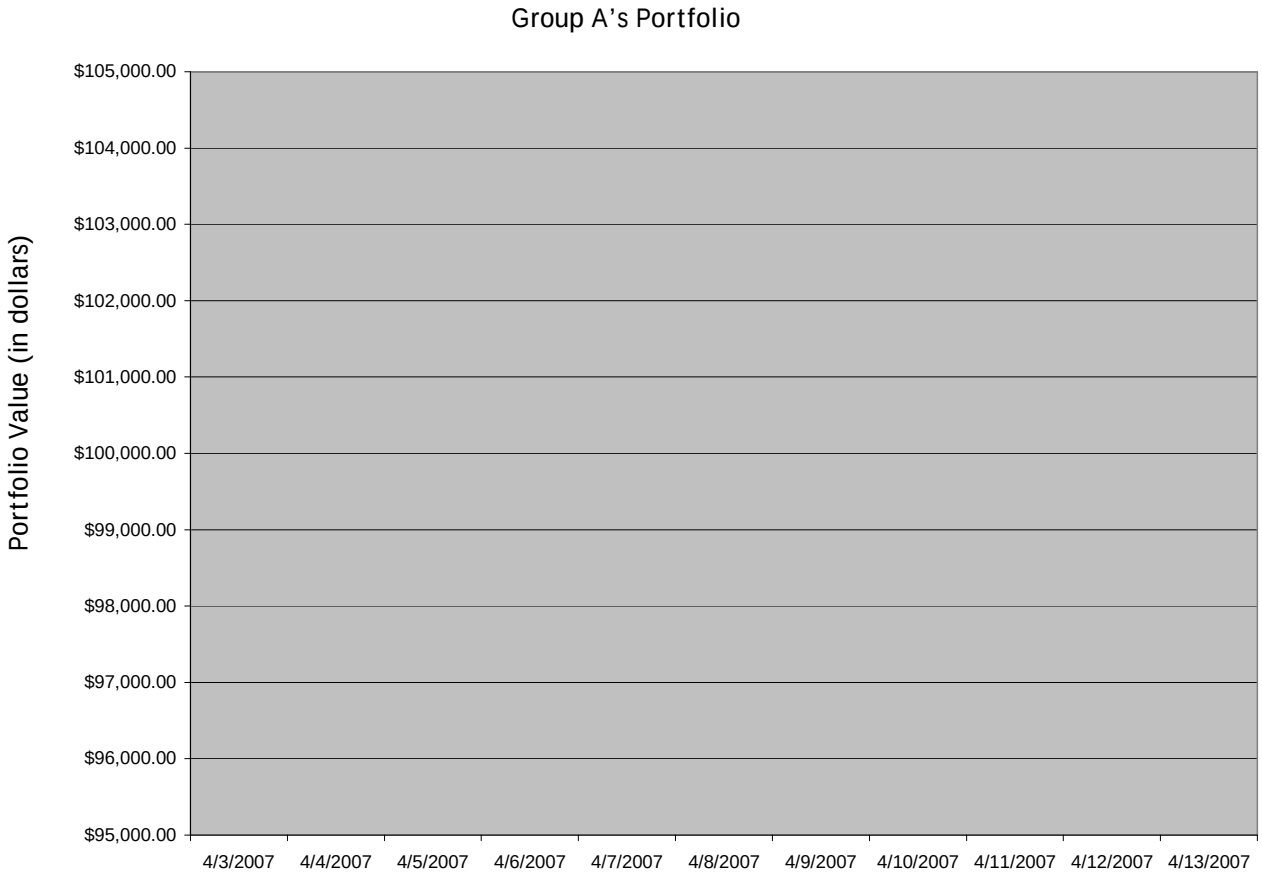
Make a table that shows how much your investment is worth during each of the months listed in the table.

Month	Price	Investment Value

Below is a table showing 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



In each of the three scenarios below, you are presented with two options. Decide in which company you are the greater shareholder by calculating the percentage of the company's stock 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 (TM), which has 1,600,000,000 shares outstanding.

You own 92,000 shares of Largo Vista Group, Ltd., (LGOV), 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 initially invest its money ($100,000) evenly between five industries. 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 each. 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 do you have invested in Hexcel? (Assume the entire SMG portfolio is invested in stocks.)

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ANSWER KEY

Please Note: *1. Prices included in lesson are not representative of actual market data and are for instructional purposes only. 2. Discrepancies may occur between student responses and the answer keys as a result of how far calculations were taken past the decimal point. In most instances, numbers were rounded from the thousandth or ten thousandth place.*

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

$$\text{percentage change} = \frac{\text{change in price}}{\text{purchase price}} \text{ X } 100\%$$

Purchase Price	Price Sold	Change in Price	Percentage Change in Price
$36.13	$37.01	*+$0.88*	*+2.44%*
$12.42	$12.27	*-$0.15*	*-1.21%*
$58.43	$53.48	*-$4.95*	*-8.47%*
$5.39	$6.02	*+$0.63*	*+11.69%*
$44.95	$45.99	*+$1.04*	*+2.31%*
$29.83	$28.75	*-$1.08*	*-3.62%*
$9.48	$15.02	*+$5.54*	*+58.44%*
$22.58	$22.59	*+$0.01*	*+0.04%*

Answer: Change in Price = Price Sold – Purchase Price
= $37.01 - $36.13 = +$0.88
Percentage Change = Change in Price ÷ Purchase Price
= $0.88 ÷ $36.13 = 0.024 x .01 = +2.44%

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

Number of Shares	Price per Share (bought or sold)	Commission
500	$22.40	*$224.00*
360	$12.72	*$91.58*
70	$95.48	*$133.67*
740	$41.29	*$611.09*
85	$30.57	*$51.97*
1050	$33.85	*$710.85*

Solution: Commission = # of Shares x Price per Share x 0.02
= 500 x $22.40 x 0.02 = $224.00

1. Including commission, what is the total cost of buying:

a. 390 shares of a stock at a price of $45.92 per share?

Solution: Transaction Value = # of Shares x Price per Share
Commission = Transaction Value x Commission
Total Cost = Transaction Value + Commission, or
Total Cost = (# of Shares x Price per Share) x (1 + Commission)
Answer: (390 x $45.92) + (390 x $45.92 x 0.02) = $17,908.80 + $358.18 =$18,266.98
or: (390 x $45.92) x (1.02) = $17,908.80 x 1.02 = $18,266.98

b. 90 shares of a stock at a price of $12.38 per share?

Answer: Total Cost = (90 x $12.38) + (90 x $12.38 x 0.02) = $1,114.20 + $22.28 = $1,136.48

c. 786 shares of a stock at a price of $36.00 per share?

Answer: Total Cost = (786 x $36.00) + (786 x $36.00 X 0.02) =
$28,296.00 + $565.92 = $28,861.92

d. all three stock purchases in a, b, and c?

Answer: Total Cost = (Transaction Value of $47,319.00) + (Commission of $946.38)
= $48,265.38

2. Suppose you now decide to sell the stocks you bought in Question 1. After you pay a 2% commission for the sale of stock, how much value does your portfolio have when you sell:

a. 390 shares at $45.92 per share?

Solution: Total Portfolio Value = Transaction Value - Commission

Answer: (390 x $45.92) - (390 x $45.92 x 0.02) = $17,908.80 - $358.18 = $17,550.620

b. 90 shares at $12.38 per share?

Answer: = (90 x $12.38) - (90 x $12.38 x 0.02) = $1,114.20 - $22.28 =$1,091.92

c. 786 shares at $36.00 per share?

Answer: = (786 x $36.00) - (786 x $36.00 X 0.02) = $28,296.00 - $565.92 = $27,730.08

d. all three stock sales in a, b, and c?

Answer: = (Transaction Value of $47,319.00) – (Commission of $946.38)
= $46,372.62

ANSWER TO QUESTION #2: It might appear that after selling the shares of stock which you purchased in Question 1 that you would break even. Since you had to pay commission both when you bought the stocks and again when you sold them, you will lose some money if the stocks are sold at the same prices at which they were purchased.

The net change in your income is found by subtracting the total cost of buying the stocks from the portfolio value (less commission) when you sell the stock:
$46,372.62 - $48,265.38 = -$1,892.76.

You will notice that this net loss is the sum of the two commissions incurred from the purchase and sale of the same set of stocks at their unchanged prices.
$946.38 + $946.38 = $1,892.76

1. If you know the number of shares you bought and the price per share, how would you calculate the total value of your investment (minus commission)?

Solution: Total Value of Investment = # of Shares x Price per Share

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 (minus commission)?

Solution: Investment = 270 x $26.45 = $7,141.50

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

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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.

Solution: Value = (# of Shares) x (Price per Share) = 270 x $26.45 = $7,141.50

Month	Price	Investment Value
March	*$26.45*	*$7,141.50*
April	*$27.10*	*$7,317.00*
May	*$25.95*	*$7,006.50*
June	*$22.90*	*$6,183.00*
July	*$20.94*	*$5,653.80*
August	*$21.19*	*$5,721.30*
September	*$24.91*	*$6,725.70*

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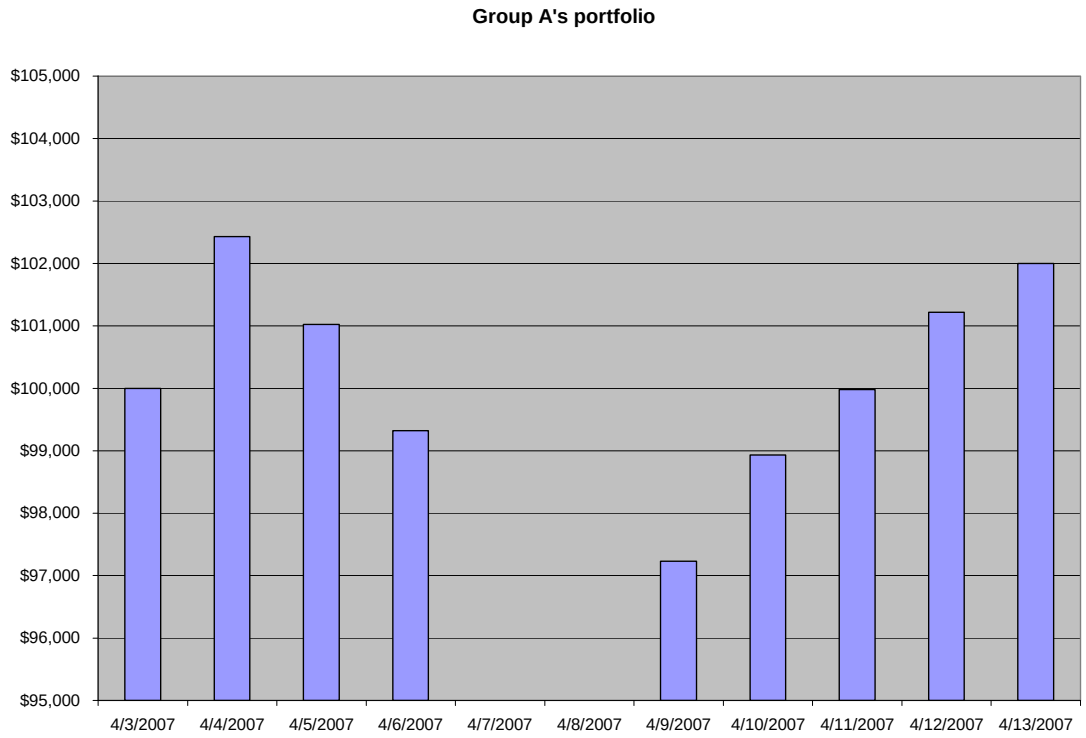
4/11/2007	$ 99,982
4/12/2007	$101,222
4/13/2007	$102,000



In each of the three scenarios below, you are presented with two options. Decide in which company you are the greater shareholder by calculating the percentage of the company's stock 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?

Answer: 10,000 ÷ 100,000 = 0.10 x 100 = 10%

50 ÷ 200 = 0.25 x 100 = 25% (greater shareholder)

You own 260,000 shares of Toyota Motor Corporation (TM), which has 1,600,000,000 shares outstanding.

You own 92,000 shares of Largo Vista Group, Ltd., (LGOV), which has 288,830,000 shares outstanding.

In which company are you the greater shareholder?

Answer: 260,000 ÷ 1,600,000,000 = 0.00016 x 100 = 0.016%

92,000 ÷ 288,830,000 = 0.000319 x 100 = 0.032% (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?

Answer: EMAK = 0.01025% (greater shareholder)

GOOG = 785 ÷ 306,000,000 = .00000256 x 100 = 0.00026%

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?

Answer: Available funds = $100,000.00 ÷ 3 = $33,333.33
# of shares = $33,333.33 ÷ $36.95 = 902.12 => 902 shares

2. Your team has decided that it wants to initially invest its money ($100,000) evenly between five industries. 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?

Answer: Funds per industry = $100,000.00 ÷ 5 = $20,000.00
Funds per company = $20,000.00 ÷ 4 = $5,000.00
# of shares of IBM stock = $5,000.00 ÷ $96.17 = 51.99 shares

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 each. How many shares can your team afford to purchase?

Answer: 40% of portfolio = 0.40 x $100,000.00 = $40,000.00
Funds per company = $40,000.00 ÷ 5 = $8,000.00
# of shares of SPWR stock = $8,000.00 ÷ $42.48 = 188.3 shares.

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 do you have invested in Hexcel? (Assume the entire SMG portfolio is invested in stocks.)

Answer: Value of HXL stock = 175 x $16.91 = $2,959.25
Value of entire portfolio = $2,959.25 + $97,245.00 = $100,204.25
HXL's percentage of portfolio = ($2,959.25 ÷ $100,204.25) x 100 = 2.95%