

The **Stock Market Game™** Program

Correlation to **NCTM Principles & Standards** for School Mathematics

SMG CORRELATIONS TO THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS STANDARDS & PRINCIPLES DRAFT 2

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SMG Correlations to the National Council of Teachers of Mathematics Standards & Principles Draft

Introduction

SMG WORLDWIDE, The Stock Market Game™ is an educational program of the Securities Industry Foundation for Economic Education, an affiliate of the Securities Industry Association. In the SMG WORLDWIDE program, actual market prices are used for simulated purchase and sale of stocks. The SMG WORLDWIDE program affords classroom teachers an interesting and real life example to broaden and develop student mathematical skills and understanding. It also offers teachers an opportunity to infuse mathematics within the language arts and social studies disciplines. The SMG WORLDWIDE program also imparts computer and Internet skills in a practical and meaningful manner.

The SMG WORLDWIDE program is a national economic education program distributed locally by state economic education councils, universities, newspapers and other partner organizations. The program offers a professional looking stock trading simulation and a variety of curriculum resources. Participants begin their simulated trading session with a hypothetical \$100,000 dollars. This money is invested in diverse stocks through the course of the trading session as participants gain a clearer understanding of the markets and the American economic system. For information on joining the SMG WORLDWIDE program in your area, please visit www.smgww.org.

The National Council of Teachers of Mathematics (NCTM) Standards used in this correlation were drawn from the *NCTM Principles and Standards for School Mathematics Discussion Draft (October 1998)*.

Mathematics Standards for Grades 3-5:

“Although number and operation continue to be cornerstones of the curriculum in grades 3-5, each of the content standards ... is essential for building student knowledge at this level... A major goal within the Number and Operation standard at this grade band is the development of computational fluency....In grades 3-5, extending understanding from whole numbers to fractions and decimals is a key dimension of the mathematics curriculum.....what fractions and decimals represent, how they are related to each other, and how they are different from whole numbers.”¹

SMG WORLDWIDE supports the “cornerstones” of number and operation in the grades 3-5 mathematics curriculum. It fosters the development of computational fluency, as well as supports understanding of fractions and decimals. Operational experience shows that fifth graders are generally ready to handle the mathematical understanding and calculations of the SMG WORLDWIDE program. Mathematically advanced fourth and third graders have successfully participated in the SMG WORLDWIDE program.

Mathematics Standards for Grades 6-8:

“...students in grades 6-8 need to develop a sound understanding of many mathematical ideas, including ratio, proportion, percent, equality (as equivalence)...Students need regular experience with interesting tasks that engage them in mathematical thinking, reasoning, and problem solving....Major instructional attention in the middle grades should be directed toward helping students develop a deep understanding of rational number concepts and reasonable proficiency in rational number computation. As a consequence, students should be able to think flexibly

¹ “Principles and Standards for School Mathematics: Discussion Draft. National Council of Teachers of Mathematics, October 1998, pp. 151-152

about relationships among fractions, decimals, and percents....work with ratios and proportions, percent, similarity, linear equations...and probability.”²

SMG WORLDWIDE supports student development of the mathematical proficiency desired at the middle grades while bringing real-life activities, challenges, and excitement to the middle grades curriculum. It can be utilized in the self-contained classroom or easily adapted to a teaching theme or special learning experience for schools structured around team teaching of the four core disciplines (mathematics, social science, language arts, and science). Students work with large number concepts, ratios, fractions, decimals, proportions, and probability while engaged in problem solving and decision making.

Mathematics Standards for Grades 9-12:

“Students also should develop increased sophistication with mathematical processes, especially problem solving, representation, and reasoning. Connections across content areas and with areas outside of mathematics can become increasingly rich as students’ mathematical knowledge grows. Students should engage with complex problems that call for knowledge drawn from multiple areas of mathematics and to which various solution strategies might apply.”³

High school students participating in SMG WORLDWIDE utilize their foundation of mathematical processes in extensive problem solving and reasoning activity. The SMG WORLDWIDE program infuses the disciplines and provides teachers many opportunities to enrich student mathematical understanding as a key force in everyday life. Information from the SMG WORLDWIDE program makes interesting real life examples for the study of higher level mathematical functions.

² “Principles and Standards for School Mathematics: Discussion Draft. National Council of Teachers of Mathematics, October 1998, pp. 211-213.

³ “Principles and Standards for School Mathematics: Discussion Draft. National Council of Teachers of Mathematics, October 1998, p. 271.

Standard 1: Number and Operation

Mathematics instructional programs should foster the development of number and operation sense so that all students---

understand numbers, ways of representing numbers, relationships among numbers, and number systems;

understand the meaning of operations and how they relate to each other;

use computational tools and strategies fluently and estimate appropriately.

SMG WORLDWIDE Connection

Grades 3-5:

1) Student understanding of the

- a) base ten number system
- b) decimal placements
- c) fractions
- d) percent equivalents
- e) magnitude of numbers

is strengthened as students invest their \$100,000, convert stock prices quoted in whole numbers and fractions to dollars and cents, calculate broker fees of two percent, calculate number of shares to purchase/sell, calculate total transactions, and more.

2) Student understanding of multiplication and division operations is strengthened as students determine number of shares they may purchase at a given price or anticipate gain if x number of shares is sold at x price, calculate total costs/gains of buys and sells, calculate gain per share, and more.

3) Students work with whole number computations, study fractional relationship to a whole, calculate fractions, study and calculate decimal placement, convert percents and fractions to decimals as they learn stock price listings, convert the whole numbers and fractional price listings to dollars and cents, compute broker fees, calculate total buys/sells, and more.

Grades 6-12:

Students:

1) use large numbers, fractions, percents and ratios as they buy and sell shares of common stock.

2) work with equivalent representations such as converting whole number and fractional prices to dollars and cents.

3) convert percents to decimals when calculating broker fees and the reverse, decimals to percents, when calculating yields.

4) study of trading volumes and values of stocks traded brings practice with large numbers. Examples of team trading volume and class trading volume promote understanding of proportionality.

5) develop and practice proportional reasoning skills as they determine which stocks are better buys, which stocks in their portfolio have been most profitable and brought the highest yield, or determine whether a high or low price earnings ratio is a better investment.

- 6) build on basic computational skills of addition, subtraction, multiplication, and division with integers as they increase the same computational skill with fractions, percents, and decimals.
- 7) use estimation skills in their decision making processes of which stocks to trade.

Lessons:

Personal Finance Economics, 3-5: “Smart Spending and Saving” lessons 2, 3, 7, 8
Personal Decision Making, “Focus on Economics” lessons 6, 7
Learning from the Market lessons 1, 6, 7, 8, 9, 11, 13, 15, 16, 18, 21, 22
Personal Finance Economics, 6-8: “Money in the Middle” lessons 2, 3, 4, 5, 6, 7
The Stock Market Game Guide, lessons 1, 3, 5, 6, 8, 9, 11, 15, 18
Personal Finance Economics, 9-12: “Wallet Wisdom” lessons 2, 5, 6, 7, 9, 10

Standard 2: Patterns, Functions, and Algebra

Mathematics instructional programs should include attention to patterns, functions, symbols, and models so that all students---

- understand various types of patterns and functional relationships;
- use symbolic forms to represent and analyze mathematical situations and structures;
- use mathematical models and analyze change in both real and abstract contexts.

SMG WORLDWIDE Connection

Grades 3-5:

- 1) Through a given starting quantity of money students can determine how a change in one variable, an expenditure or receipt, relates to a change in the given quantity.
- 2) Students may graph or chart such activity as the changing value of their portfolio, changing price of stock(s), total buys/sells of the class.
- 3) Students may examine relationships such as between the price of a stock and the amount paid in broker fees; the price of a stock and value it must increase in order to sell at a profit.

Grades 6-12:

Students may examine:

- 1) relationships of stock price to number of points in price increase for profitability to occur; of broker fees to the price of a stock and the profitability; buying and holding versus churning stocks; interest rates to stock prices.
- 2) how a change of \$10 in price of a stock would change the costs of broker services
- 3) the use of a flat broker fee compared to a percentage broker fee
- 4) using stock prices and trades in writing symbolic algebraic equations and working with equivalence, commutative, association, and distributive properties.
- 5) change and co-variation:
 - a) change in broker fee impacts total cost of transaction
 - b) change in interest rate impacts margin buying
- 6) charts of volume, highs, lows, and trading patterns to determine trends.

Lessons:

Personal Finance Economics, 3-5: “Smart Spending and Saving” lessons 1, 9
Personal Decision Making, lessons 6, 14
Learning from the Market, lessons 2, 6, 7, 8, 9, 11, 13, 16, 18, 23
Personal Finance Economics, 9-12: “Wallet Wisdom” lessons 2, 5, 6, 8

Standard 3: Geometry and Spatial Sense

Mathematics instructional programs should include attention to geometry and spatial sense so that all students---

analyze characteristics and properties of two- and three-dimensional geometric objects;
select and use different representational systems, including coordinate geometry and graph theory;
recognize the usefulness of transformations and symmetry in analyzing mathematical situations;
use visualization and spatial reasoning to solve problems both within and outside of mathematics.

Standard 4: Measurement

Mathematics instructional programs should include attention to measurement so that all students-

understand attributes, units, and systems of measurement;
apply a variety of techniques, tools, and formulas for determining measurements.

SMG WORLDWIDE Connection

Grades 3-5:

Students use time, price, and money as units of measurement in the SMG WORLDWIDE program. They examine price changes from day to day or week to week and measure gains and losses in the value of their investments.

Grades 6-12:

SMG WORLDWIDE introduces new types of measurements to students: yield, rate of return, risk, interest rates, overpriced/underpriced, and more.

Lessons:

Learning from the Market, lessons 7, 8, 16, 18
Personal Finance Economics, 9-12: “Wallet Wisdom” lessons 4, 5

Standard 5: Data Analysis, Statistics, and Probability

Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students--

pose questions and collect, organize, and represent data to answer those questions;
interpret data using methods of exploratory data analysis;
develop and evaluate inferences, predictions, and arguments that are based on data;
understand and apply basic notions of chance and probability.

SMG WORLDWIDE Connection

Grades 3-5:

The SMG WORLDWIDE program provides many opportunities for students to collect, analyze, and represent data.

- 1) Through team work, students identify companies in which they wish to invest. Prior to the investment of their hypothetical funds, students should collect and analyze information about the identified companies. Individual and team collections of data about companies is completed prior to the team's final purchase decisions.
- 2) Students may compare the stock of individual companies from different industries, stock of companies within an industry, or stock of infant companies versus established/blue chip companies.
- 3) Graphing skills are a natural fit for the SMG WORLDWIDE program. Such things as stock prices, number of trades, gains and losses may be graphed, line or bar, by the students.
- 4) Mean, mode, and median may be calculated for individual stocks, team portfolios, or class investments.

Grades 6-12:

- 1) Students have many opportunities to graph/chart data related to the SMG WORLDWIDE program as well as analyze existing charts.
- 2) Students can calculate and analyze means, modes and medians by team, by individual stock, or for the entire class. They can track stock prices of companies within an industry and identify the outliers, the mean, mode and median.
- 3) Through the understanding of relationships such as the inverse of interest rates and stock prices, students can project probable stock price movements and investment trends.

Lessons:

Personal Finance Economics, 3-5: "\$mart \$pending and \$aving" lessons 10
Personal Decision Making, lessons 7, 14
Learning from the Market, lessons 3, 6, 7, 8, 10, 11, 15, 16, 18, 19, 21, 22, 23, 24
Personal Finance Economics, 6-8: "Money in the Middle" lessons 8
The Stock Market Game Guide lessons 7, 8, 9, 11, 12, 13, 14, 15, 17
Personal Finance Economics, 9-12: "Wallet Wisdom" lessons 2, 3, 5, 6, 10
Focus High School Economics, lesson 8

Standard 6: Problem Solving

Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students---

build new mathematical knowledge through their work with problems;
develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics;
apply a wide variety of strategies to solve problems and adapt the strategies to new situations;
monitor and reflect on their mathematical thinking in solving problems.

SMG WORLDWIDE Connection

Grades 3-5:

Problem solving and decision making are skills demanded in the SMG WORLDWIDE program. Students must solve such problems as how to apportion the responsibility of investing \$100,000; what stocks have the greatest potential of a return on investment; of the stocks that appear favorable, in which ones do they want to invest; how many shares of each are to be purchased; how much should they diversify and is it by companies or industries; do they buy and hold or buy and sell. Computational skills, graphing and representational skills, and analysis skills must all be integrated into the problem solving and decision making processes.

Grades 6-12:

“There are four aspects of the problem-solving process that are particularly useful for middle school grades students: understanding the problem, devising a plan, carrying out the plan, and looking back.”⁴

The four aspects are present in the SMG WORLDWIDE program. The goals and procedures of the SMG WORLDWIDE program are easy to understand. The problem of growing an investment is easy to understand. Students devise a plan for investing the \$100,000, implement their plan, then examine the results. Since the SMG WORLDWIDE program’s duration is ten weeks students engage in extended problem solving, investigation, and “looking back” at results.

Lessons:

Personal Finance Economics, 3-5: “Smart Spending and Saving” lessons 3, 7

Personal Decision Making, lessons 6,7,14

Learning from the Market, lesson 1, 8, 9, 11, 13, 15, 23, 24

Personal Finance Economics, 6-8: “Money in the Middle” lessons 2, 9

The Stock Market Game Guide, lessons 16, 17

Personal Finance Economics, 9-12: “Wallet Wisdom” lessons 2, 3, 4, 5, 6, 7, 8, 9, 10

Standard 7: Reasoning and Proof

Mathematics instructional programs should focus on learning to reason and construct proofs as part of understanding mathematics so that all students--

recognize reasoning and proof as essential and powerful parts of mathematics;
make and investigate mathematical conjectures;
develop and evaluate mathematical arguments and proofs;
select and use various types of reasoning and methods of proof as appropriate.

SMG WORLDWIDE Connection:

Grades 3-5:

While using the SMG WORLDWIDE program, teachers can use SMG portfolio examples for reasoning and proof problems. For example students may test their knowledge of the commutative property of multiplication for smaller whole numbers on the larger whole numbers, fractions and decimals used in the SMG WORLDWIDE program; or students can make conjectures and then prove whether a three point gain per share on all stocks guarantees a profit when sold.

⁴ “Principles and Standards for School Mathematics: Discussion Draft. National Council of Teachers of Mathematics, October 1998, pp. 245.

Grades 6-12:

Students at these grade levels conduct more in-depth technical and fundamental analysis for projecting price movement. They possess greater ability to examine data, make a conjecture, invest, track results, and analyze the outcome for future argument/proof.

Lessons:

Learning from the Market, lessons 8, 10, 11, 13, 18, 22

Personal Finance Economics, 9-12: "Wallet Wisdom" lessons 10

Standard 8: Communication

Mathematics instructional programs should use communication to foster understanding mathematics so that all students---

organize and consolidate their mathematical thinking to communicate with others;
express mathematical ideas coherently and clearly to peers, teachers, and others;
extend their mathematical knowledge by considering the thinking and strategies of others;
use the language of mathematics as a precise means of mathematical expression.

SMG WORLDWIDE Connection

Grades 3-5:

Working in small teams, opportunities abound for students to communicate their mathematical thinking, reasoning, and questioning about their investment choices, the team's investment decisions and performance, as well as the class's overall performance. The team setting may encourage more active communication by the students who are often less hesitant to speak before the full class as well as provide tutorial communications among team members as they calculate purchases, sells, broker fees, gains/losses, opportune selling prices, and more. Charts, graphs and team presentations can communicate decisions, projections, and performance. The SMG WORLDWIDE program provides many opportunities for teachers to devote classroom time to encouraging student communication of mathematical reasoning and thinking being used in the SMG WORLDWIDE program.

Grades 6-12:

"Distinctive aspects of communication in grades 9-12 arise more from the relative maturity of the students than from changes in the nature of communication itself."⁵

Lessons:

Personal Decision Making, lesson 14

Learning from the Market, lesson 3, 7, 22

Standard 9: Connections

Mathematics instructional programs should emphasize connections to foster understanding mathematics so that all students---

recognize and use connections among different mathematical ideas;
understand how mathematical ideas build on one another to produce a coherent whole;
recognize, use, and learn about mathematics in contexts outside of mathematics.

⁵ "Principles and Standards for School Mathematics: Discussion Draft. National Council of Teachers of Mathematics, October 1998, pp. 320.

SMG WORLDWIDE Connection:

Grades 3-5:

Money and finances are everyday life. The SMG WORLDWIDE program provides infusion of the disciplines to teach students about the life-long concept of investment. Students will realize that mathematics is not an isolated subject but a tool used everyday and a tool that has strong connections with the other disciplines.

Examples of connections:

- 1) Using the minimum number of shares (100) to be purchased, students can make connections from ones to tens to hundreds.
- 2) Fractional price listings of stocks provide work with connections of portions to whole, fractions to percents, and decimal placement.

Grades 6-12:

As with communication, this increases with maturity of the student. Students can more easily transfer data analysis from one setting to another, use mathematical information gained from one trade to make conjectures about other potential investments.

Lessons:

Learning from the Market, lessons 7, 8, 22

Personal Finance Economics, 9-12: "Wallet Wisdom" lessons 2

Standard 10: Representation

Mathematics instructional programs should emphasize mathematical representations to foster understanding of mathematics so that all students---

create and use representation to organize, record, and communicate mathematical ideas;
develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately;
use representations to model and interpret physical, social, and mathematical phenomena.

SMG WORLDWIDE Connection:

Grades 3-5:

Using money manipulatives or diagrams of a dollar divided into fractional parts helps students learn the fractions used in the SMG WORLDWIDE program. Students create spreadsheets, charts/graphs to demonstrate what would happen if the brokers fee was increased or decreased, or if a given stock's price increased one-half point, a full point, three points. et cetera.

Grades 6-12:

Students become more sophisticated in their knowledge and use of representation.

Lessons:

Personal Finance Economics, 3-5: "\$mart Spending and Saving" lessons 9

Personal Decision Making, lesson 14

Learning from the Market, lessons 2, 6, 7, 8, 10, 11, 15, 16, 18, 21, 22

Personal Finance Economics, 6-8: "Money in the Middle" lessons 5, 7

The Stock Market Game Guide, lessons 3, 6, 7, 8, 9, 13

Personal Finance Economics, 9-12: "Wallet Wisdom" lessons 2

SMG WORLDWIDE Curriculum Resources

The Stock Market Game Guide: Classroom Activities

This binder includes 18 lesson plans for middle and high school students. Field-tested by teachers and reviewed by economics educators, each lesson provides a brief overview, a description of the lesson's economic content, a list of learning objectives for students, vocabulary, and classroom activities for the teacher. TO ORDER PLEASE CONTACT THE SECURITIES INDUSTRY FOUNDATION FOR ECONOMIC EDUCATION (212)618-0519.

SMG Teacher's Guide to the Internet

This guide contains an array of activities, tips, and recommendations on how to integrate the Internet into the classroom through the SMG program. For beginners and more advanced users, the Guide explains everything teachers need to know about the Internet and demonstrates how they can incorporate this knowledge to enrich and enliven daily classroom lessons. TO ORDER PLEASE CONTACT THE SECURITIES INDUSTRY FOUNDATION FOR ECONOMIC EDUCATION (212)618-0519.

Learning From the Market

This curriculum guide is designed to help teachers connect SMG WORLDWIDE, The Stock Market Game™ to their school's curriculum through 24 classroom-tested lessons. Curriculum areas addressed include business, language arts, mathematics, economics, and social studies. Instructional and assessment materials are included. TO ORDER PLEASE CONTACT: THE NATIONAL COUNCIL ON ECONOMIC EDUCATION (800) 338-1192, EXT. 763.

Personal Finance Economics

These curriculum units show students how to use economic knowledge and decision-making skills to make better choices in real-world situations.

Smart Spending & Saving (grades 4-6)

Money in the Middle (grades 6-8)

Wallet Wisdom (grades 9-12)

TO ORDER PLEASE CONTACT: THE NATIONAL COUNCIL ON ECONOMIC EDUCATION (800) 338-1192, EXT. 763.

Personal Decision Making: Focus on Economics

This curriculum piece connects high school academic skills to the real world responsibilities of budgeting, credit management, and financial planning. TO ORDER PLEASE CONTACT: THE NATIONAL COUNCIL ON ECONOMIC EDUCATION (800) 338-1192, EXT. 763

SMG WORLDWIDE Audio Visual Resources

How Wall Street Works

Produced by PBS's acclaimed Nightly Business Report, this video follows the stock trading process from the buyer to the broker to the exchange floor. Provides the basic "do's" and "don'ts," tells how to read a stock listing, explains futures and options, and the effects of program trading. TO ORDER CALL 800-535-5864.

NYSE: It All Starts Here

This 13-minute video looks at the operation of the New York Stock Exchange. To order please contact: The New York Stock Exchange, 20 Broad Street, 3rd floor, New York, NY 10005, or call 212-656-5166.

Stock Market Game Adventure

A fast-paced, eight-minute video designed to motivate students to learn about the world of stocks in our financial system. Sponsored by Fidelity Investments, the video features Wall Street guru, Peter Lynch. TO ORDER PLEASE CONTACT YOUR LOCAL SMG COORDINATOR.

UMP'S FWAT: Fully Animated Video Story

An eight-minute animated video tells the story of how a caveman named UMP turns a single idea into a successful business. A perfect way to introduce students to basic business, economic and investing principles. TO ORDER PLEASE CONTACT: CHIP TAYLOR COMMUNICATIONS AT 800-876-2447 OR 2 EAST VIEW DRIVE, DERRY, NH, 03038.

Understanding Wall Street

This 110-minute video reviews: what is a stock, how Wall Street works, interpreting financial statements, reading stock tables, investing and trading growth stocks, bonds, money market instruments, and technical analysis. TO ORDER PLEASE CONTACT: LIBERTY PUBLISHING CO., P.O. BOX 4248, DEERFIELD, FL 33442, OR CALL 954-360-9000