

Subject: Mathematics

Grade Level: Middle School

Wall Street Decisions

Purpose/Rationale

This task and rubric are designed to assess the degree to which students can understand and apply mathematical concepts and calculations such as estimation, rate of change, and percent/decimal/fraction conversions to make decisions about stock purchases and to explain changes in the stock market.

Knowledge, Skill, and Disposition Objectives

Students will demonstrate their ability to:

- use mathematical logic to make an appropriate decision given many equally appealing choices.
- choose appropriate strategies to solve problems.
- apply strategies correctly.
- perform accurate mathematical calculations, transformations, and conversions.
- use graphs, tables, and/or charts to organize and display relevant information.
- describe their problem-solving and decision-making process so that others can easily understand them.
- present information in a legible and appealing format.

Related Standards of Learning

The student will:

- identify representations of a given percent and describe orally and in writing the equivalence relationship between fractions, decimals, and percents.
- solve problems that involve addition, subtraction, and multiplication with fractions and mixed numbers, with and without regrouping, that include like and unlike denominators of 12 or less and express their answers in simplest form.
- use estimation strategies to solve multi-step practical problems involving whole numbers, decimals, and fractions.
- compare, order, and determine equivalent relationships between fractions, decimals, and percents.
- solve consumer application problems (tips, discounts, sales tax, etc.).
- solve practical problems involving whole numbers, integers, and rational numbers, including percents. Problems will be of varying complexity involving real life data.

Prerequisite Knowledge/Skills

- Understanding of and practice working with fractions, decimals, ratios, and conversions among them
- Calculating rate of change
- Understanding of consumer decision-making
- Basic understanding of the stock market (how it works, how stocks are reported, etc.)
- Organizing and displaying information using graphs, tables, and charts
- Problem-solving and decision-making skills
- Using a calculator
- Using the internet and newspapers to find stock information (prompts 2, 3)

Context

This assessment may be given as homework or completed in class. It should take students 1-2 hours to complete, but some “incubation” time might be helpful. It may be best to break up the time over a couple of days. The task and rubric are targeted to a sixth or seventh grade audience, but may be modified further for use with any middle grade level or any readiness level. Teachers should insure that students have access to calculators, newspapers with stock performance summaries, and Internet resources.

Form

The assessment is designed to be completed by students individually with minimal teacher intervention. Students should read the scoring rubric before beginning the task. Prompt and rubric should be read aloud by teacher after students receive handouts (see following pages for student handouts).

Rater

This task should be rated by the teacher and discussed in class. Scoring may be done on the rubric itself by highlighting the level of performance (Incomplete-Expert) as well as any specific descriptors under performance levels which may apply to particular student responses.

Prompts

There are three prompts. The first is designed for learners who have trouble with fractions and decimals as well as those students who struggle with graphs. Students functioning far below grade average may need further modifications. For those students, the teacher may use whole number stock prices, use simpler change rates (like 50%, 100%, and 200%), and/or provide graphs and graphic organizers to help guide students through the problem.

The second prompt is designed for students who are functioning at grade level in the way they solve mathematical problems, handle fractions and decimals, and integrate graphs and estimation into their problem-solving processes. It is more open-ended and slightly more complex than the first prompt. It requires students to find their own stock information in the paper or on the web and use performance history to make a case for their decisions.

Moon, T. R., Callahan, C. M., Brighton, C. M., Tomlinson, C. A. (2002). *Development of differentiated performance assessment tasks for middle school classrooms* (RM02160). University of Connecticut, National Research Center on the Gifted and Talented. <https://nrcgt.uconn.edu/wp-content/uploads/sites/953/2015/04/rm02160.pdf>

The third prompt is designed for those students functioning above grade level in the way they solve mathematical problems, handle fractions and decimals, and integrate graphs and estimation into their problem-solving process. These students need little to no reinforcement in simple fractional conversions. The task requires them to make decisions about stocks that they find in the paper or on the web, make predictions about how the stocks will perform in the future, and explain the multi-faceted nature of stock performance. More complexity may be added to the task by including additional facets such as the pros and cons of investing in stocks versus mutual funds, mortgages, etc.

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Prompt 1

For your 10th birthday, your grandfather gave you \$1,000 to invest in stocks. You and he went through some newspapers and used the Internet to narrow down some choices for your investment. You worked with your grandfather's five favorite companies (listed on the next page). Based on past performance of the stocks, you made decisions along the way to buy and sell stocks in certain companies. You had the liberty to buy and sell as many stocks as you wanted. The performance of the stocks over time, since you started investing, is outlined below. The initial prices are given in Table 1. You have charted the progress of the five stocks over the last two years, whether you actually invested in them or not because you know that a smart investor is always informed of what's going on around him/her.

A recent examination of your stocks' performances has shown that your investments have paid off! You made decisions that brought in big money. What a master investor you are! So . . . how did you do it?

Show your thanks to your grandfather in a letter in which you explain to him how your decisions led you to big bucks! You know your grandfather would be interested to know how you did it. In the letter, you should summarize your decision-making over the past two years. How was it you were able to make so much money? Which shares did you buy and sell along the way?

Let your grandfather know exactly how you spent the money. Include the record of your transactions. Include the graphs, tables, or charts that helped you make your decisions and/or will help your grandfather understand your decisions. In the letter, describe your problem-solving process so that your grandfather gets a clear idea of what you did with the money he gave you and why.

You will be assessed on the mathematical "logic" behind your decision, the accuracy of your supporting materials (calculations, estimations, charts, graphs, etc.), your letter to grandpa thoroughly discussing how you solved the problem, and the presentation of your information (neatness, spelling, grammar, etc.).

Stock Prices: February 1996 through August 1997

Table 1: February 1996

Stock	Price per share
Mason Corp.	82.50
Pullano, Inc.	110.00
Shockey Co.	60.27
Ruston's	121.00
Garofolo, Inc.	109.74

Table 2: August 1996

Stock	Price Per Share
Mason Corp.	36.21
Pullano, Inc.	90.89
Shockey Co.	50.00
Ruston's	242.64
Garofolo, Inc.	121.12

Table 3: February 1997

Stock	Price per share
Mason Corp	36.00
Pullano, Inc.	120.98
Shockey Co.	40.71
Ruston's	200.95
Garofolo, Inc.	100.50

Table 4: August 1997

Stock	Price Per Share
Mason Corp.	82.33
Pullano, Inc.	120.50
Shockey Co.	30.82
Ruston's	150.99
Garofolo, Inc.	90.00

Wall Street Decisions Scoring Rubric

Rubric for Prompt 1	Expert	Proficient	Emerging	Incomplete
Support for Conclusions	Consumer offers both mathematical and logical support for the conclusions drawn.	Consumer offers mathematical OR logical support for the conclusions drawn.	Consumer offers inappropriate support for the choices made.	Consumer offers no support for the choices made.
Strategy and Calculations	Consumer analyzes the problem using multiplicative logic to demonstrate rate of change, percent increase/decrease, etc. for the stock prices. Consumer chooses an appropriate strategy for calculating or estimating.	Consumer analyzes the problem using additive logic to demonstrate the rate of change for stock prices. Consumer chooses an appropriate strategy for calculating or estimating.	Consumer uses neither additive nor multiplicative logic to analyze the problem. Consumer chooses an inappropriate strategy or misapplies an appropriate strategy.	Consumer begins the process of logical and mathematical applications to solve the problem, but does not complete calculations or make appropriate estimations.
Supporting Materials	Calculations and/or graphs are mathematically accurate. Calculations, estimations, and graphs clearly support the decision made and work in concert with the logic of the strategy chosen.	Calculations and/or graphs are mathematically accurate. There are minor errors in calculations, estimations, or graphs that do not interfere with or effect the decision.	Calculations and/or graphs are inaccurate. Errors interfere with the decision OR no clear connection exists between the decision made and the calculations, estimations, and graphs.	Consumer makes no calculations or graphs OR many and/or major errors prevent the consumer from solving the problem.
Justification	Problem solving process is clearly described so that anyone reading the discussion could reproduce the process.	Problem solving process is clear enough so that someone reading the discussion could glean a basic understanding of what the consumer did to solve the problem, but may have a few clarifying questions.	There is little evidence of how the student solved the problem. The problem-solving process is not reproducible by the reader.	Consumer leaves no evidence of how a decision was reached OR indicates that s/he made the decision based on a guess indicating no logical or mathematical underpinnings to support the guess.
Presentation	Writing is legible and neat and graphs are easy to understand. Response has a "professional" quality. Consumer uses correct grammar and spelling.	Writing and graphs are legible. Consumer makes minor errors in grammar and/or spelling that do not distract the reader.	Writing and graphs are very difficult to follow. Errors in grammar and/or spelling distract the reader.	Response is presented in "note" form and there is little to no flow from one idea to the other. Reader can not decipher graphs and/or sentences.

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Prompt 2

Your grandfather has just given you and your 20-year-old brother \$1,000 each to invest in stocks. Your brother doesn't know much about stocks, so he called one of those hotlines that are supposed to advise you of safe bets and pitfalls. The woman on the hotline suggested that he invest his money in one of the following companies:

- Lucent Technologies
- Apple
- Coca Cola
- International Paper
- Chrysler
- Xerox
- R. J. Reynolds

Your brother is about to invest the money without even checking the stock performance himself. You want to help him, but you know he won't listen to you unless you plan your argument well. So you've decided to do some research on the companies suggested by the woman on the hotline. Your research will help your brother make his decision, and will help you to choose a company or companies in which to invest your money. Which company/companies, if any of them, is/are best for your brother (and you!) to invest in? If you find a better stock to invest in, you may recommend it instead, but spend the majority of your time working with the stocks suggested on the hotline.

Use newspapers and the Internet to chart the past progress of the above stocks. Include enough data in your charts and graphs to provide your brother with sufficient information to back up the recommendations you make to him. Create an investment plan that includes any buying, selling, or trading you might advise over the next year. How can you make the most money? Which shares do you buy and sell when?

Record all of your evidence for your decisions. Use graphs, tables, or charts to help you make your decisions. Estimate when appropriate. Use all of your evidence, research, and calculations to support the investment plan you propose. Remember that your brother is a hard sell. He'll need some strong evidence to convince him to believe you over the woman on the hotline. You'll have to prepare a plan that includes explanations of your reasoning and problem-solving so that he can understand why you make the suggestions you make.

You will be assessed on the mathematical "logic" behind your decisions, the accuracy of your supporting materials (calculations, estimations, charts, graphs, etc.), your plan of investment including a thorough discussion of how you solved the problem and why you made the decisions you made, and the presentation of your information (neatness, spelling, grammar, etc.).

Wall Street Decisions Scoring Rubric

<i>Rubric for Prompt 2</i>	Expert	Proficient	Emerging	Incomplete
Support for Conclusions	Consumer chooses most financially sound stocks. Consumer offers both mathematical and logical support for the conclusions drawn. This evidence would convince the consumer's brother to follow his/her advice.	Consumer chooses financially sound stocks. Consumer offers mathematical support for the conclusions drawn, but fails to make logical connections that may have led to a more appropriate choice.	Consumer chooses one of three most appropriate stocks but offers no support for the choice OR consumer chooses one of the least appropriate stocks with inappropriate support for the choice.	Consumer bases decision on a guess OR is unable to reach a decision.
Strategy and Calculations	Consumer analyzes the problem using multiplicative logic to demonstrate rate of change, percent increase/decrease, etc. for the past stock performances. Consumer chooses an appropriate strategy for calculating, estimating, and predicting.	Consumer analyzes the problem using additive logic to demonstrate the rate of change for past stock performances. Consumer chooses an appropriate strategy for calculating, estimating, and predicting.	Consumer uses neither additive nor multiplicative logic to analyze the past stock performances. Consumer chooses an inappropriate strategy or misapplies an appropriate strategy.	Consumer begins the process of logical and mathematical applications to solve the problem, but does not complete calculations or make appropriate estimations.
Supporting Materials	Calculations and/or graphs are mathematically accurate. Calculations, estimations, and graphs clearly support the decisions made and work in concert with the logic of the strategy chosen.	Calculations and/or graphs are mathematically accurate with the exception of minor errors in calculations, estimations, predictions, or graphs that do not interfere with or affect the decision.	Calculations and/or graphs are inaccurate. Errors interfere with the decision OR no clear connection exists between the decision made and the calculations, estimations, predictions, and graphs.	Consumer makes no calculations or graphs OR many and/or major errors prevent the consumer from solving the problem.
Justification	Problem solving process is clearly described so that anyone reading the discussion could reproduce the process and understand the decisions made.	Problem solving process is clear enough so that someone reading the discussion could glean a basic understanding of what the consumer did to make decisions, but may have a few questions.	There is little evidence of how the consumer made decisions. The problem-solving process is not reproducible by a reader.	Consumer leaves no evidence of how decisions were reached OR indicates that s/he made the decision based on a guess indicating no logical or mathematical underpinnings to support the guess.

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<i>Rubric for Prompt 2</i>	Expert	Proficient	Emerging	Incomplete
Presentation	Writing is legible and neat and graphs are easy to understand. Response has a “professional” quality. Consumer uses correct grammar and spelling.	Writing and graphs are legible. Consumer makes minor errors in grammar and/or spelling that do not distract the reader.	Writing and graphs are difficult to follow. Errors in grammar and/or spelling interfere with the reader’s message.	Response is presented in “note” form and there is little to no flow from one idea to the other. Reader cannot decipher graphs and/or sentences.

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Prompt 3

You have just been hired as a stockbroker for a local financial consulting and investment company. Your first client has come in asking for your help in investing the \$12,000 that he and his wife received in wedding gifts. You must design an investment plan for him that includes any and all companies he will invest in, how much he will invest and when, as well as any buying and selling you think will be beneficial. He agrees to let you help him invest his money, but he seems a little skeptical and concerned. After all, you are young and new to the company, and he is recently married and trying to start a nest egg to secure his family's future.

As you talk try to reassure him, you uncover that he has recently seen a clip on the national news about a "study" being done that compares the stock performance of company stocks selected by top brokers to the stock performance of company stocks selected by inexperienced lay persons. In the study, the experienced brokers make their decisions based on complicated mathematical calculations, inside knowledge about corporate performance, and experience playing the stock market. The inexperienced "brokers" make their investment decisions by throwing darts at a *Washington Post* investment section. Whichever companies the darts land on, those are the companies in which they invest. So far, as your client points out, the experienced brokers are ahead by only a hair.

Because your credibility with your client is on the line here (as well as your job!), you feel it is necessary to look into the matter and defend your knowledge and experience as a stockbroker. You know you didn't go to school for nothing and you pride yourself on the investment advice you are able to offer your clients.

Upon your client's next visit, you will present him with an investment plan to cover the next five years of investments, including projected returns, buying and selling, etc. You should also include graphs and charts to back up your projected plan and a detailed mathematical and written justification for why following your advice will pay off for your client in the long run. In addition, in your introduction, you must address and refute the issue raised by your client concerning the study he cited. You must make a case for the need for informed stockbrokers and explain the anomalies of the dart-throwers' success.

You may use the Internet, newspapers, e-mail, community members, or any resources necessary to address the issue (you'll probably want to do some research about the study to find out what's going on) and prepare your investment plan (you might even want to find some real investment plans as a model for your response). You will be assessed on the mathematical "logic" behind your decisions, the accuracy of your supporting materials (calculations, estimations, charts, graphs, etc.), your plan of investment that includes a thorough justification for your decisions, the effectiveness of the way you analyze and refute the argument of the dart-throwers, and the presentation of your information (neatness, spelling, grammar, etc.).

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Scoring Rubric

<i>Rubric for Prompt 3</i>	Expert	Proficient	Emerging	Incomplete
Support for Conclusions	Broker chooses most financially sound stocks and proposes an investment plan that will make sense to the client. Broker offers both mathematical and logical support for the conclusions drawn. This evidence would convince the broker's client to follow his/her advice.	Broker chooses financially sound stocks. Broker offers mathematical support for the conclusions drawn, but fails to make logical connections that may have led to an alternative, more appropriate choice. Choices still make sense, but the client may remain somewhat skeptical.	Broker chooses a financially sound stock, but offers no support for the choice OR broker chooses one of the least sound stocks with inappropriate support for the choice.	Broker bases decision on a guess OR is unable to reach a decision to propose an investment plan.
Strategy and Calculations	Broker analyzes the past performance of the stocks using multiplicative logic to demonstrate rate of change, percent increase/decrease, etc. for the past stock performances. Broker chooses an appropriate strategy for calculating, estimating, and predicting.	Broker analyzes the problem using additive logic to demonstrate the rate of change for past stock performances. Broker chooses an appropriate strategy for calculating, estimating, and predicting.	Broker uses neither additive nor multiplicative logic to analyze the past stock performances. Broker chooses an inappropriate strategy or misapplies an appropriate strategy.	Broker begins the process of logical and mathematical applications to solve the problem, but does not complete calculations or make appropriate estimations.
Supporting Materials	Calculations and/or graphs are mathematically accurate. Calculations, estimations, and graphs clearly support the decisions made in the investment plan and work in concert with the logic of the strategy chosen.	Calculations and/or graphs are mathematically accurate with the exception of minor errors in calculations, estimations, predictions, or graphs that do not interfere with or affect the decisions made in the investment plan.	Calculations and/or graphs are inaccurate. Errors interfere with the decision made in the investment plan OR no clear connection exists between the decision made and the calculations, estimations, predictions, and graphs.	Broker makes no calculations or graphs OR many and/or major errors prevent the broker from solving the problem.

<i>Rubric for Prompt 3</i>	Expert	Proficient	Emerging	Incomplete
Justification	Problem solving process is clearly described so that anyone reading the discussion could reproduce the process and understand the decisions. The client will be able to understand exactly what is going on and why, and will feel comfortable leaving his money with the broker.	Problem solving process is clear enough so that someone reading the discussion could glean a basic understanding of what the broker did to make decisions. But the client may have several questions before he feels comfortable accepting the broker's plan.	There is little evidence of how the broker made decisions. The problem-solving process is not reproducible by a reader. The client will most likely take his business elsewhere.	Broker leaves no evidence of how decisions were reached OR indicates that s/he made the decisions based on a guess indicating no logical or mathematical underpinnings to support the guess.
Refutation	Broker refutes the argument that throwing darts is a better way to choose stocks than consulting a broker by uncovering flaws in the study and or the conclusions being drawn from it, using a logical argument to defend the expertise of brokers, and citing past successful performance of brokers. Broker deals with the issues of chance as well addresses several of the multiple facets that can affect the ups and downs of the market. The client is likely to accept the argument as a valid one.	Broker refutes the argument that throwing darts is a better way to choose stocks than consulting a broker by uncovering flaws in the study and or the conclusions being drawn from it, using a logical argument to defend the expertise of brokers, or citing past successful performance of brokers. Broker does not address the issue of chance OR does not address many of the multiple facets that can affect the ups and downs of the market. The client may accept the argument, but will require further convincing during the meeting.	Broker uses only one of the following methods to refute the client's claims: uncovering flaws in the study and/or the conclusions being drawn from it, using a logical argument to defend the expertise of brokers, or citing past successful performance of brokers. Broker does not address the issue of chance AND fails to address many of the multiple facets that can affect the ups and downs of the market. The client will likely buy a set of darts to make his own stock decisions.	The broker fails to address the issue raised by the client or addresses the issue without a logical argument or reference to research.
Presentation	Writing is legible and neat and graphs are easy to understand. Response has a "professional" quality. Broker uses correct grammar and spelling.	Writing and graphs are legible. Broker makes minor errors in grammar and/or spelling that do not interfere with the overall message.	Writing and graphs are very difficult to follow. Errors in grammar and/or spelling interferes with the message.	Response is presented in "note" form and there is little to no flow from one idea to the other. Reader can not decipher graphs and/or sentences.