

Stage 1 Desired Results	
<p>Unit title &amp; # in sequence 3 PLANNING FOR THE FUTURE</p>	<p>Unit Summary:  A Junior Achievement USA/ Allstate Foundation online survey in March 2012 of 1059 US teenagers aged 14-18 revealed that only 18% (down from 44 % just a year ago) believed that they would be financially independent by age 20. Although current economic realities may have caused these teens to be more guarded in predicting their financial independence, the same survey found that 80% of teens felt the best time to learn to manage their money was during grades Kto12 (<a href="http://www.ja.org/docload/2012-Teens-Personal-Finance.pdf">http://www.ja.org/docload/2012-Teens-Personal-Finance.pdf</a>). This important real-world context serves as the backdrop for numerous transfer activities for the students to review and reinforce their understanding of proportional relationships and unit rates, graphs of lines and the meaning of slope, solutions of linear equations, and systems of equations. Students will make a personal budget based on their financial goals, try out a stock market simulation, and come up with a winning business idea! Another critical real-world 21<sup>st</sup> century skill students will need is how to carry out the design process. This unit will also introduce students informally to some steps of the design process, as applied to their own small entrepreneurial venture.</p>
<p>KIAs TARGETED</p> <ul style="list-style-type: none"> <li>○ QUESTION</li> <li>○ DISCERN</li> <li>○ INFER</li> <li>○ PLAN</li> <li>○ ANALYZE</li> <li>○ GENERALIZE</li> <li>○ EVALUATE</li> <li>○ JUSTIFY</li> <li>○ COMMUNICATE</li> <li>○ CREATE</li> </ul>	<p style="text-align: center;"><b>Transfer</b></p> <p><i>Students will be able to independently use their learning in new situations to...</i></p> <ul style="list-style-type: none"> <li>• <b>Plan and Create</b> a model of a linear relationship based on an <b>Analysis</b> of a linear relationship that has been presented in a world problem, table or graph and (SMP1, SMP3, SMP4, SMP6, EQ1, EQ2.a, EQ2.b, EQ2.c, EQ3, EQ4)</li> <li>• <b>Justify and Communicate</b> a conclusion of their analysis and interpretation of the linear relationship. (SM2, SMP3, EQ2.a, EQ2.b, EQ2.c)</li> </ul>
<p>STANDARDS TARGETED</p> <p>Common Core Practice: SMP.1, SMP.2, SMP.3, SMP.4, SMP.5, SMP. 6, SMP.8</p> <p>Common Core Content:</p>	<p style="text-align: center;"><b>Meaning</b></p> <p><i>Students will explore and address these key recurring ideas and questions:</i></p> <p><b>Goal:</b> Students will be able to use their skills and knowledge of linear relationships to interpret relationships of linear equations and solve linear equations and systems of linear equations through graphing.</p> <p>EQ1: What story does the graph (data) tell? EU1: Graphs tell a story about real situations, relationships, and data.</p>

<p>(D) 8.F.3                  (D) 8.F.4                  (M) 8.EE.5                  (D) 8.EE.7.b                  (I) 8.EE.8.a</p>	<p>EQ2a: Given this information, what patterns and trends are suggested?                  EQ2b: What math model can describe this?                  EQ2c: How does the model differ from the situation?                  EU2: Situations with a constant rate of change are well-modeled by lines and linear functions, but the constraints on one may not be present in the other.</p> <p>EQ3: Where do I start when looking at ('reading') this graph? Is there any information I have missed?                  EU3: Reading mathematics does not necessarily involve top-down and left-right. It does involve discerning all information given, and determining for ourselves where to start, what to pay the most attention to.</p> <p>EQ4: Are there special things to consider when working with these numbers? What can I do if I am not sure?                  EU4: The form of a number dictates the rules and methods we use to operate or model with it.</p>
<b>Acquisition</b>	
<p><i>To achieve these goals, students will need to know and know how to...</i></p> <p>A1: Construct a function to model a linear relationship between two quantities. (8.F.4)</p> <p>A2: Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. (8.F.4)</p> <p>A3: Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the graph or a table of values. (8.F.4)</p> <p>A4: Interpret the equation <math>y = mx + b</math> as defining a linear function, whose graph is a straight line. (8.F.3)</p> <p>A5: Sketch, show equations for or show data tables for relationships that are not functions. (8.F.3)</p> <p>A6: Graph proportional relationships, interpreting the unit rate as the slope of the graph. (8.F.4, 8.EE.5)</p> <p>A7: Compare two different proportional relationships represented in different ways. (8.EE.5)</p> <p>A8: Solve linear equations with rational coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms (8.EE.7.b)</p> <p>A9: Use graphing technology to verify solutions of linear equations (one equation being <math>y = b</math>) (8.EE.7.b)</p>	

Stage 2 – Evidence		
Alignment Coding	Aligned Criteria (Rubric Titles)	
		<p>TRANSFER TASK(S):</p> <p>Task Frame:                      Given a prospective business venture, come up with a financial projection which clearly shows expected profit over time, expected break-even point (or when you expect to have recovered your capital), and the feasibility of expansion plans in the future. Make a decision about the viability of the venture. Analyze various options and decide which is the most viable.</p> <p>Task #1:  <b>MISSION: ENTREPRENEUR, COME UP WITH A WINNING BUSINESS IDEA!</b></p> <p>You are an entrepreneur with an idea for a new business venture. Be creative! This might be the next big new business or franchise!</p> <p><i>(Note to the teacher for differentiation and/or scaffolding: For students who have business acumen or for the advanced students, you may get them to use a formal design process to come up with their business idea. Go through the design steps with them, e.g., Stanford Design toolkit steps, or the Nasa Design Packet, which they will be using for their capstone project.</i></p> <p><i>For some other students, you may use parts of the design process as scaffolding early on in the course for the capstone assessment. They may use this to come up with their ideas but need not submit this as part of the Transfer Task.)</i></p> <p>Come up with an informal market study for your business idea.</p> <p>An entrepreneur has to be creative and imaginative, but he also has to be realistic. His business idea has to capture the imagination of the buyer, but it has to be viable too! Come up with a financial projection to show your investors, which clearly shows the profit that you expect, when you expect to break even (or when you expect to have recovered your capital), and plans for expansion in the medium-term. Your decision also involves a choice as to whether to go into the venture on a small scale or a larger scale. Make calculations for both these options to help you make a decision.</p> <p>L2: Business usually have what is known as “the bottom-line.” This is, of course, that you must be able to make a profit. Nowadays, many businesses usually have a “triple bottom-line” or people, planet, profit. In addition to profit, they must also be environmentally friendly and they must have a corporate social responsibility component. Add at</p>

		<p>least one more “bottom-line” to your business idea and reflect this in your financial projection.</p> <p>Possibility: This task can be designed so that it is a contest among the different groups in the class for the best business idea that will help meet the needs of certain groups in the city; the venture can be presented to a school or city official who will be the judge for the winning business idea.</p> <p>Example:          You are thinking of setting up a lemonade stand, in either of two locations – a smaller stand in the school canteen and a larger one in the mall. You will serve lemonade with a twist (e.g., X-treme Lemonade, with an extra sour twist, Limonada a la Mexicana, with lime and a Mexican spice, etc.). Come up with 4-5 exciting variants to try out. Your recipes must only contain the proportions of sugar: lemon: secret ingredient(s): water to allow for easy adjustment of the proportions, scaling up or down according to number of people, and computation of cost estimates. You must also compute the viability of the smaller stand and the larger stand. (e.g., If you consider projected sales versus profit, at what point will it make more sense to go with one or the other?)          L2: If you use organic vegetables only, will your profit be substantially decreased? What if you market your product as “organic,” will the higher cost of organic vegetables be offset by the marketing potential of advertising your product as organic?</p>
		<p>OTHER EVIDENCE:</p> <p><b>Diagnostic Activity: It’s Never Too Early for Financial Planning!</b>          Financial goals worksheet, budget</p> <p><b>High Risk Investments: Beware the Stock Market?</b>          Computations and explanations</p> <p><b>What is the Better Deal?</b></p> <p><b>Unit Problem Set</b> Individual and Group Solutions to engaging, non-routine problems that have multiple solution strategies, or multiple solutions.</p> <p><b>Journal:</b>          Student Reflections on Personal Strategies for Problem Solving, Individual Strengths and Struggles in Mathematics.          One open-ended, non-routine problem with subtle cues to solution methods</p> <p><b>Quizzes, Tests on Math Content</b></p>

Unit Framework - PGCPs

NOTES:

- Alignment Coding refers to the STAGE 1 elements addressed by each assessment.
- Aligned criteria refer to rubric titles that link back to the STAGE 1 Goals

**Stage 3 – Overview of Unit Learning Plan***Summary of the unit learning experiences and a list of the lessons**Unit learning plan summary & rationale:**Lessons:***1. (5-6 days) Diagnostic Activity: It's Never Too Early to Learn How to Manage Your Money!**

Rationale: This lesson will serve as a diagnostic activity on the students' ability to question, analyze, and justify. It will also diagnose students' understanding of linear functions, graph of a line, and unit rate. Students will be able to find the solutions of linear equations as they apply in a real world context. It will provide opportunity for intervention. This lesson is a student centered activity in which teachers will provide guidance on the financial aspect of the mathematics. Specifically the lesson will incorporate the algebraic topics into a lesson in money management for teens.

**2. (2-3 days) A Slope Story**

Rationale: The problems in this lesson will develop students' abilities to discern, communicate, and analyze through meaning making activities. Students will use their previous learning to explore and deepen their understanding of linear equations, graph of a line, and slope, with focus on: 1) slope of horizontal or vertical lines, 2) positive or negative slopes, and 3) their relationship to linear equations in 1 variable that are conditional (1 unique solution), identities (infinitely many solutions), or contradictions (no solutions).

**3. (2 days +1 day +1 day = 4 days) High Risk Investments: Beware the Stock Market? (1 day after a few days have elapsed, and 1 more day after another few days have elapsed)**

Rationale: Guided by the teacher, the students will explore another real-world example of an investment, this time a high risk investment. This lesson will focus on the students' ability to question, analyze, generalize and communicate. The students will study behavior over time graphs of the performance of five stocks, make an investment decision, and track their investment over a week or two. Students will have numerous opportunities to use linear equations and graphs in an exciting simulation of a real-world financial activity.

**4. (2-3 days) What is the Better Deal?**

Rationale: In this lesson, students will use their learning to make appropriate financial decisions. Students will be given options for different financial situations and will need to apply their learning of systems of equations to make the optimal decision. After analyzing the situation and solving the system of linear equations, the students will have to communicate a justification for their decision.

[the lesson titles are listed in chronological order; further detail is found on the learning plan page – see below]

**STAGE 3 – Learning Plan**

**Lesson #1 Title: It's Never Too Early to Learn How to Manage your Money!**

**Appr 5-6 Days**

*The KIA(s) at the heart of the lesson*

*Lesson rationale (in terms of goals, engagement sequence)*

- QUESTION
- ANALYZE
- JUSTIFY
- COMMUNICATE

This lesson will serve as a diagnostic activity on the students' ability to question, analyze, and justify. It will also diagnose students' understanding of linear functions, graph of a line, and unit rate. Students will be able to find the solutions of linear equations as they apply in a real world context. It will provide opportunity for intervention. This lesson is a student centered activity in which teachers will provide guidance on the financial aspect of the mathematics. Specifically the lesson will incorporate the algebraic topics into a lesson in money management for teens.

*Events (numbered & sequenced)*

*Differentiation*

*Potential Rough Spots, Look fors, and Adjustments*

*Event Resources & Text Correlation*

**PART I**

Propose the following question to the students: "Would you be able to afford a McDonald's hamburger in 10 years if you leave the money it costs now in the bank?" Ask the students to state their answers and explain their thought process. The topics of interest rates and mark-up percentages should be included in this discussion. Then provide the students with the following information:

- A hamburger cost at McDonald's in 2003 \$0.77, in 2008 \$0.89 and in 2013 it costs \$0.99.
- A savings account currently has an interest rate of 2%

Have the students find the equation for the hamburger. From their learning in the previous unit, the students should be able to do this independently.

Students will need guidance in finding the equation of the savings account. First, the teacher needs to introduce the students to the idea of simple interest and the simple interest formula  $I=PRT$ . The teacher should use examples of simple interest to introduce this to the students. Have the students practice problems with simple interest.

The teacher should guide the student to finding the slope of the line using the simple interest formula ( $m = PR$ ). After finding the slope, the students should be able to then find the equation of the savings account independently.

Accommodations:

- Change the values so the students are working with integers and fractions instead of decimals.
- Allow the students to create a function table to assist in finding the slope.
- Provide the students with the slope of the equation for the savings account.

- Some students may have difficulty working with decimals in the form of linear equation.
- Since the slopes of the two equations are close .15 and .2, provide the students with the graphs, having them create the graphs themselves

- Graph paper
- Ruler

**Text Book Correlation**

Appendix B.1 Simple and Compound Interest

Larson, R. & Boswell, L. (2010) *Big Ideas Math: A Focal Points Curriculum*. Erie, PA: Big Ideas Learning.

Unit Framework - PGCPs

<p>Once they have both lines, the teacher should instruct the students to brainstorm on how they could find the answer to the initial question. The end result should be to substitute 10 years into both equations. This will be the students' first introduction to solutions of linear equations. The teacher should discuss this concept with the students.</p> <p>After finding that answer, the teacher should ask the students if they can think of another method to solve the problem. The teacher should show or provide the students with a graph of the two equations on a coordinate plane. Discuss how to answer the equation graphically. Also discuss that the equations only intersect at the initial value. Ask the students to explain why that is. This introduces the idea of systems of equations.</p> <p><b>Journal Prompt:</b> Have the students write about what they have learned in terms of the cost of living and the value of money over time. In this situation the savings account proved to save money at a rate greater than the increase in the cost of the hamburger. Have the students explain situations in which the price may increase faster than the savings account.</p> <p><b>ALIGN CODES:</b>          AMT – A, M          KIA – Question, Analyze          ESSENTIAL QUESTIONS – 2a, 2b, 2c</p>	<ul style="list-style-type: none"> <li>- Guide the students through the independent parts of the lesson.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Have the students find the slope from the simple interest formula without guidance.</li> </ul>	<p>with decimals and those slopes could prove problematic.</p>	
<p><b>PART II</b></p> <p>Have the students work in pairs for this part of the lesson. Ask the students to think of something they would like to save money to purchase (car, college loans, cell phone, etc.) Tell them that the objective is to find the best method of saving for their goal.</p> <p>Provide the students with a list of different banks and their savings account rates. Take this from the newspaper to bring authenticity to activity. Have the students choose which bank to use and calculate the annual interest based on the deposited amount (this may be given to the students or they can use what they feel is realistic to them).</p> <p>Have the students find the equation of the line that models their investment. The students may need to use a function table to find the slope of the line. The students should graph the line on a coordinate plane. Using the coordinate plane, the students should determine</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Scaffold the activity into small manageable steps.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Have the students use CD accounts instead of savings accounts.</li> </ul>	<ul style="list-style-type: none"> <li>- Students may need to be reminded how to calculate the slope from the simple interest formula.</li> <li>- Make sure the amount deposited and the cost of the item</li> </ul>	<ul style="list-style-type: none"> <li>- Graph Paper</li> <li>- Ruler</li> <li>- Newspaper page of interest rates</li> </ul>



Unit Framework - PGCPs

<p>when they will have enough money for their purchase. Have the students explain their determination in writing.</p> <p><b>ALIGN CODES:</b>          AMT – M, T          KIA – Analyze, Justify, Communicate          ESSENTIAL QUESTIONS – 1, 2a, 2b, 2c</p>	<ul style="list-style-type: none"> <li>- Introduce the idea of compound interest rates.</li> </ul>	<p>are realistic. After a given number of years the students should be able to purchase the item.</p>	
<p><b>PART III</b></p> <p>Explain to the students that their purchase from the previous problem needs to take place two years before they can afford to purchase it. Explain to the students that they will need to take an installment loan. Teach the students about installment loans and how they work. Provide the students with examples. Students may need to complete a few sample problems.</p> <p>Provide the students with a variety of loan options. Have the students choose the best option and calculate their total loan amount as well as their installment options. Have the students justify their option in writing.</p> <p><b>Journal Prompt:</b> Have the students write about their feelings on taking a loan. Ask the students to justify when they feel it is acceptable to take out a loan and when they feel it is not acceptable.</p> <p><b>ALIGN CODES:</b>          AMT – M, T          KIA – Justify, Communicate          ESSENTIAL QUESTIONS – 1, 2a, 2b</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Only provide the students with one loan option or guide the students in determining the best option.</li> </ul>		<ul style="list-style-type: none"> <li>- Graph Paper</li> <li>- Ruler</li> <li>- List of Loan Options</li> </ul> <p><b>Text Book Correlation</b>          Appendix B.3          Installment Loans</p> <p>Larson, R. &amp; Boswell, L. (2010) <i>Big Ideas Math: A Focal Points Curriculum</i>. Erie, PA: Big Ideas Learning.</p>

STAGE 3 – Learning Plan			
Lesson #2	Title: A Slope Story	Appr 2-3 Days	
<i>The KIA(s) at the heart of the lesson</i>	<i>Lesson rationale (in terms of goals, engagement sequence)</i>		
<p>○DISCERN ○ANALYZE ○COMMUNICATE</p>	<p>The problems in this lesson will develop students' abilities to discern, communicate, and analyze through meaning making activities. Students will use their previous learning to explore and deepen their understanding of linear equations, graph of a line, and slope, with focus on: 1) slope of horizontal or vertical lines, 2) positive or negative slopes, and 3) their relationship to linear equations in 1 variable that are conditional (1 unique solution), identities (infinitely many solutions), or contradictions (no solutions).</p>		
<i>Events (numbered &amp; sequenced)</i>	<i>Differentiation</i>	<i>Potential Rough Spots, Look fors, and Adjustments</i>	<i>Event Resources &amp; Text Correlation</i>
<p><b>PART I</b></p> <p>Provide the students with six lines graphed on a Cartesian plane that does not have markings. The lines should have the following slopes 2, 1/2, -2, -1/2, 0, and undefined. The positive and negative slopes should have different y-intercepts to limit any confusion. Provide the students with a list of the slopes. Ask the students to match the slope to the line.</p> <p>Have the students create stories that match the graphs of the lines. Have students share some of their stories with the class or in small groups.</p> <p><b>Journal Prompt:</b> How can you describe the graph of a line, merely by looking at its equation?</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Students may need to be reminded of (change in y)/(change in x). They may also require more guidance.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Do not provide the students with the list of</li> </ul>	<ul style="list-style-type: none"> <li>- This can be a very abstract thought for a lot of students. They may have trouble visualizing and making the connections.</li> </ul>	<ul style="list-style-type: none"> <li>- Cartesian Plane with graph of the given lines</li> <li>- List of possible slopes</li> </ul>

<p><b>ALIGN CODES:</b>                  AMT – M                  KIA – Analyze, Discern                  ESSENTIAL QUESTIONS – 1, 2a, 3</p>	<p>slopes. See if they can estimate the slopes independently.</p>		
<p><b>PART II</b></p> <p><b>Formative Assessment:</b> Have the student answer the questions on the worksheet “Journey to the Bus Stop”. Circulate as the students are working, taking note of any misconceptions.</p> <p><b>Lesson:</b> Using the “Common Issues-Suggestion Questions and Prompts” worksheet, engage the students in discussions about their interpretations. These discussions can be whole class or small group.</p> <p>As a class, discuss their interpretations of the graph. Then have the students find the individual slopes on the graph and explain the meaning behind the slopes.</p> <p>Provide the students with “Card Set A” Have the students design stories to match the card sets.</p> <p><b>Journal Prompt:</b> “Would it be possible to have an undefined slope in a distance-time graph?” Explain your answer with details and examples.</p> <p><b>ALIGN CODES:</b>                  AMT – M                  KIA – Analyze, Discern                  ESSENTIAL QUESTIONS – 1, 3</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Formative Assessment: Provide the students with possible story-lines for the graph and have the students match the correct story-line to the graph.</li> <li>- Lesson: Provide the students with “Card Set B” and allow the students to match the stories and the graphs.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Have the students create their own graphs to provide to a partner. The partner can then create a story from the graph.</li> </ul>	<ul style="list-style-type: none"> <li>- For the lesson, with “Card Set A”. Students can be asked to work with each scenario independently or in groups.</li> <li>- Individual students or groups could also be assigned cards based on their ability level.</li> </ul>	<ul style="list-style-type: none"> <li>- “Journey to the Bus Stop”</li> <li>- “Common Issues-Suggestion Questions and Prompts”</li> <li>- “Card Set A”</li> <li>- “Card Set B”</li> </ul> <p><i>Mathematics Assessment Project, CLASSROOM CHALLENGES: A Formative Assessment Lesson, Interpreting Distance-Time Graphs © 2012 MARS, Shell Center, University of Nottingham</i></p>

<p><b>PART III</b></p> <p>Begin the lesson by posing this question: Do two lines always intersect? Do they always intersect at only one point?</p> <p>Have the students graph on a Coordinate Plane two lines that will intersect, such as: <math>y = 3x</math> <math>y = 2x + 2</math>. Ask the students to explain the point of intersection. “What does that point represent?” “How can you use that point to verify that you graphed your lines correctly?” (The students should realize that the point represents a solution that satisfies both equations.)</p> <p>Ask the students what they call lines that never intersect. Ask the students to provide real world examples for parallel lines. Ask the student to try and create parallel lines on graph paper. Have the students discover that parallel lines have the same slope. Ask the students if parallel line will ever have a common solution.</p> <p>Define for the students perpendicular lines. Ask the students to use graph paper and try to figure out the relationship between the slopes of perpendicular lines. Ask the students how many common solutions perpendicular lines share.</p> <p>Now have the students graph the following two equations <math>y = \frac{2}{3}x + 1</math>, <math>y = \frac{4}{6}x + 1</math>. Ask the students what they notice about these two lines. Ask the students how many common solutions these lines share.</p> <p><b>Journal Prompt:</b> Can you look at a system or pair of equations and tell how many solutions they will share? If so, how?</p> <p><b>ALIGN CODES:</b>          AMT – A, M          KIA – Discern          ESSENTIAL QUESTIONS – 2a, 4</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Provide the students will the parallel and perpendicular lines already drawn. They can still discover the slopes.</li> </ul>	<ul style="list-style-type: none"> <li>- The topic of linear solutions has been introduced in the first lesson of the unit, but in a contextual sense. This lesson will expand on that. This lesson will introduce parallel and perpendicular lines. It was also show the students that a system of equations can have 0, 1, or infinite solutions.</li> <li>- Graphing Calculators can be used for this part of the lesson.</li> </ul>	<ul style="list-style-type: none"> <li>- Graph Paper</li> <li>- Ruler</li> </ul>
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Lesson #3	Title: High Risk Investments: Beware the Stock Market?		Apr 4-5 Days	
<i>The KIA(s) at the heart of the lesson</i>	<i>Lesson rationale (in terms of goals, engagement sequence)</i>			
<ul style="list-style-type: none"> <li>○QUESTION</li> <li>○ANALYZE</li> <li>○JUSTIFY</li> <li>○COMMUNICATE</li> </ul>	<p>Guided by the teacher, the students will explore another real-world example of an investment, this time a high risk investment. This lesson will focus on the students' ability to question, analyze, generalize and communicate. The students will study behavior over time graphs of the performance of five stocks, make an investment decision, and track their investment over a week or two. Students will have numerous opportunities to use linear equations and graphs in an exciting simulation of a real-world financial activity.</p>			
<i>Events (numbered &amp; sequenced)</i>		<i>Differentiation</i>	<i>Potential Rough Spots, Look fors, and Adjustments</i>	<i>Event Resources &amp; Text Correlation</i>
<p><b>PART I</b></p> <p>Provide the students with background information on the stock market and share prices.</p> <p>Have the students use <a href="http://www.finance.yahoo.com">www.finance.yahoo.com</a> to research the share prices of five companies over a 1-year period. Have the students identify the stocks starting share price and closing share price.</p> <p>For the five companies, have the students identify when the slope was the steepest negatively and positively. Have the students research or try to guess why this may have happened.</p> <p>The students should then rank the companies in the order in which they feel they could yield the greater financial gain.</p> <p>Tell the students to imagine that they inherited \$10,000 from a rich uncle. Have the students determine how they would invest that money in one or more of these companies. If they are going to invest in more than one company, ask them to explain how they will split up the investment.</p> <p><b>Journal Prompt:</b> How did you determine what stocks to invest your money in? Are you confident in your decisions? Why or why not?</p>		<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- Provide the students with the names of the five companies to research and their graphs.</li> <li>- Identify for the students the key points they will need when finding their slopes.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Require students to invest in more than one company. Have them calculate the</li> </ul>	<ul style="list-style-type: none"> <li>- Having the students research companies they know may help them relate to the problem.</li> </ul>	<ul style="list-style-type: none"> <li>- Computer with Internet Capabilities</li> <li>- Calculator</li> </ul>

Unit Framework - PGCPs

<p><b>ALIGN CODES:</b>          AMT – M, T          KIA – Question, Analyze, Justify          ESSENTIAL QUESTIONS – 1, 2a, 2b, 2c, 3</p>	<p>percentage for each company and provide detailed reasoning for their selection.</p>		
<p><b>PART II</b></p> <p>After a few days, have the student research their stocks again. Have the students calculate their profit or loss.</p> <p>Have the students calculate the percentage increase or percentage decrease from their initial investment.</p> <p>Students then need to make a decision on whether to sell their stock and invest in another company, keep their stock as it is, or withdraw all of their investments and walk away from the stock market. Have the students provide a detailed report on the decision they made and why they made that decision.</p> <p><b>ALIGN CODES:</b>          AMT – M, T          KIA – Question, Analyze, Justify          ESSENTIAL QUESTIONS – 1, 2a, 2b, 2c, 3</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- The writing assignment provides the differentiation for this part of the lesson.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Require the students to sell at least one stock and reinvest in another company. They can still write the report on whether they agree with this or not and why.</li> </ul>		<ul style="list-style-type: none"> <li>- Computer with Internet Capabilities</li> <li>- Calculator</li> </ul>
<p><b>PART III</b></p> <p>After another few days, have the students research their stocks again. Have the students calculate their profit or loss. If the students had sold their stock in Part II, have them calculate what would have happened had they not sold the stock.</p> <p>Have the students again calculate the percentage increase or percentage decrease from their initial investment.</p>			<ul style="list-style-type: none"> <li>- Computer with Internet Capabilities</li> <li>- Calculator</li> </ul>

Unit Framework - PGCPs

<p>Have the students create another detailed report that answers the following questions:</p> <ul style="list-style-type: none"><li>- Did you choose the best stocks to invest in? How do you know?</li><li>- Did you make a profit? How much?</li><li>- Did you make the right decision to move or keep your investment after the first few days?</li><li>- Why is it called a high-risk investment?</li><li>- Would your uncle have approved?</li></ul> <p><b>ALIGN CODES:</b> AMT – T KIA – Analyze, Justify ESSENTIAL QUESTIONS – 1, 2a, 2b, 2c, 3, 4</p>			
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<b>STAGE 3 – Learning Plan</b>			
<i>Lesson #1</i>	<i>Title: What is the Better Deal?</i>	<i>Appr 2-3 Days</i>	
<i>The KIA(s) at the heart of the lesson</i>	<i>Lesson rationale (in terms of goals, engagement sequence)</i>		
<p>○QUESTION ○ANALYZE ○JUSTIFY ○COMMUNICATE</p>	<p>In this lesson, students will use their learning to make appropriate financial decisions. Students will be given options for different financial situations and will need to apply their learning of systems of equations to make the optimal decision. After analyzing the situation and solving the system of linear equations, the students will have to communicate a justification for their decision.</p>		
<i>Events (numbered &amp; sequenced)</i>		<i>Differentiation</i>	<i>Potential Rough Spots, Look fors, and Adjustments</i>
<p><b>PART I</b></p> <p>Provide the students with the following scenario:</p> <p>You want to open a checking account. The local bank offers two options:</p> <ul style="list-style-type: none"> <li>• Basic Checking: \$10 monthly fee and \$0 per transaction</li> <li>• Premium Checking: \$0 monthly fee and \$.60 per transaction</li> </ul> <p>Have the students create a linear equation for each option and graph the equations on a Coordinate Plane. The students should write an explanatory response to the following question: “What option is best? Why?”</p> <p><b>ALIGN CODES:</b> AMT – M KIA – Question, Analyze, Justify ESSENTIAL QUESTIONS – 1, 4</p>			<p>- Graph Paper - Ruler</p>



<p><b>PART II</b></p> <p>Provide the students with the following scenario:</p> <p>Going green is essential for the welfare of our environment, but is it cost efficient to the consumer?</p> <p>The task is to research on the Internet a car that comes in both a hybrid and traditional model (ex. Toyota Camry). Find the base line price for both cars and the average city miles per gallon (mpg) for both cars.</p> <p>Assume that you will travel \$10,000 miles in one year. Calculate the number of gallons of gas you will need for both cars.</p> <p>In 2013, the average price of a gallon of gas was \$3.67. Create a linear model that demonstrates the cost of both cars over the years.</p> <p>The students should write an explanatory response to the following question: “Which car would you purchase?” They will need to justify their answer mathematically.</p> <p>For example:                  2013 Camry LE \$22,680, MPG City 25                  2013 Camry LE Hybrid \$26,140, MPG City 43</p> <p><math>y=1468x + 22680</math>  <math>y=851x + 26140</math></p> <p>It would take 5.6 years before you begin to save money by purchasing the Hybrid.</p> <p><b>ALIGN CODES:</b>                  AMT – M, T                  KIA –Question, Analyze, Justify, Communicate                  ESSENTIAL QUESTIONS – 1, 4</p>	<p>Accommodations:</p> <ul style="list-style-type: none"> <li>- This problem has a number of steps the students need to do to get the equation of the line, including calculating the gallons per year then the miles per gallon. It may be helpful to provide the students with scaffolded instructions.</li> </ul> <p>Extensions:</p> <ul style="list-style-type: none"> <li>- Have the students calculated the combined highway and city mileage and see if that changes their choice of cars.</li> </ul>	<ul style="list-style-type: none"> <li>- Due to the size of numbers in this problem it is imperative that the students use a graphing calculator.</li> <li>- Students may have trouble realizing how to estimate their average cost of gas.</li> </ul>	<ul style="list-style-type: none"> <li>- Computer with Internet Capabilities</li> <li>- Graphing Calculator</li> </ul>
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Unit Framework - PGCPs

Notes:

**Align codes** refer to the STAGE 1 elements addressed in the activity

**IS & BP** = refer to common **instructional strategies** and to official **'best practices'** for which resource materials exist to explain and discuss how to implement the technique. E.g. IS = Think, Pair, Share; BP = reciprocal instruction.

Samples of student work –

<b>Implementation Notes</b>		
<i>What worked - evidence</i>	<i>What didn't work – evidence &amp; edits to potential rough spotd</i>	<i>Revision Ideas</i>

Unit Framework - PGCPS

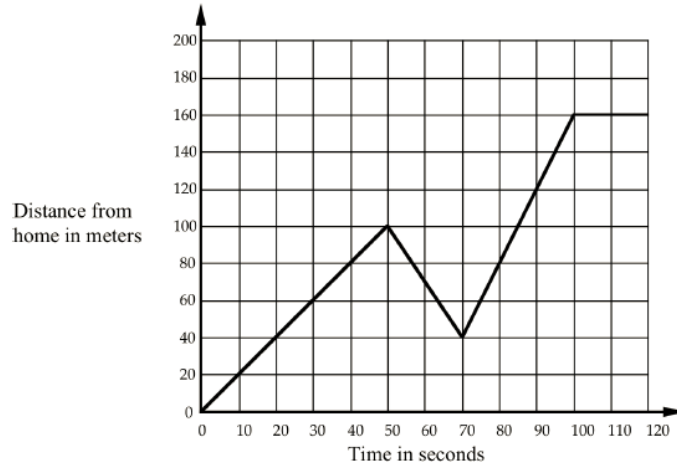
**Common issues:**

**Suggested questions and prompts:**

<p><b>Student interprets the graph as a picture</b>                  For example: The student assumes that as the graph goes up and down, Tom's path is going up and down.                  Or: The student assumes that a straight line on a graph means that the motion is along a straight path.                  Or: The student thinks the negative slope means Tom has taken a detour.</p>	<ul style="list-style-type: none"> <li>• If a person walked in a circle around their home, what would the graph look like?</li> <li>• If a person walked at a steady speed up and down a hill, directly away from home, what would the graph look like?</li> <li>• In each section of his journey, is Tom's speed steady or is it changing? How do you know?</li> <li>• How can you figure out Tom's speed in each section of the journey?</li> </ul>
<p><b>Student interprets graph as speed–time</b>                  The student has interpreted a positive slope as speeding up and a negative slope as slowing down.</p>	<ul style="list-style-type: none"> <li>• If a person walked for a mile at a steady speed, away from home, then turned round and walked back home at the same steady speed, what would the graph look like?</li> <li>• How does the distance change during the second section of Tom's journey? What does this mean?</li> <li>• How does the distance change during the last section of Tom's journey? What does this mean?</li> <li>• How can you tell if Tom is traveling away from or towards home?</li> </ul>
<p><b>Student fails to mention distance or time</b>                  For example: The student has not mentioned how far away from home Tom has traveled at the end of each section.                  Or: The student has not mentioned the time for each section of the journey.</p>	<ul style="list-style-type: none"> <li>• Can you provide more information about how far Tom has traveled during different sections of his journey?</li> <li>• Can you provide more information about how much time Tom takes during different sections of his journey?</li> </ul>
<p><b>Student fails to calculate and represent speed</b>                  For example: The student has not worked out the speed of some/all sections of the journey.                  Or: The student has written the speed for a section as the distance covered in the time taken, such as "20 meters in 10 seconds."</p>	<ul style="list-style-type: none"> <li>• Can you provide information about Tom's speed for all sections of his journey?</li> <li>• Can you write his speed as meters per second?</li> </ul>
<p><b>Student misinterprets the scale</b>                  For example: When working out the distance the student has incorrectly interpreted the vertical scale as going up in 10s rather than 20s.</p>	<ul style="list-style-type: none"> <li>• What is the scale on the vertical axis?</li> </ul>
<p><b>Student adds little explanation as to why the graph is or is not realistic</b></p>	<ul style="list-style-type: none"> <li>• What is the total distance Tom covers? Is this realistic for the time taken? Why?/Why not?</li> <li>• Is Tom's fastest speed realistic? Is Tom's slowest speed realistic? Why?/Why not?</li> </ul>

## Journey to the Bus Stop

Every morning Tom walks along a straight road from his home to a bus stop, a distance of 160 meters. The graph shows his journey on one particular day.



1. Describe what may have happened. You should include details like how fast he walked.

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2. Are all sections of the graph realistic? Fully explain your answer.

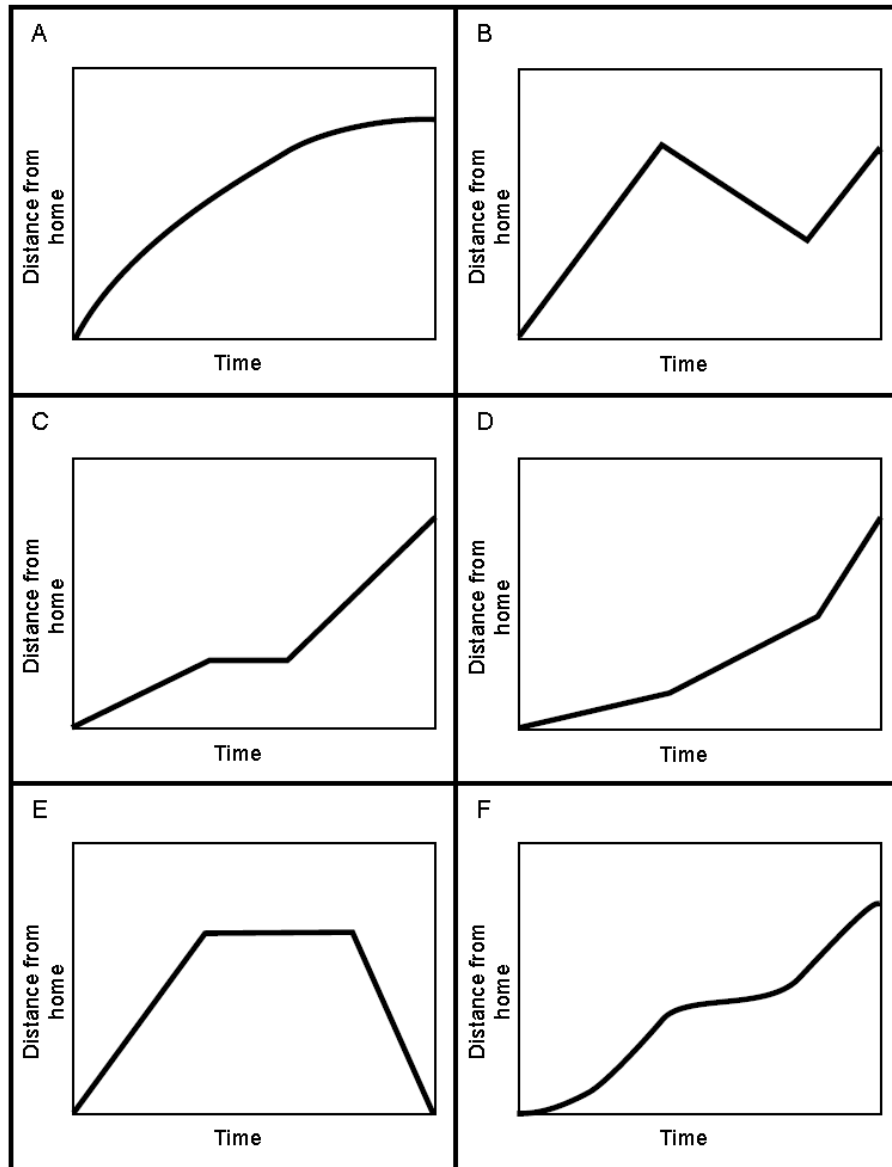
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### Card Set A: Distance–Time Graphs



Student Materials

Interpreting Distance-Time Graphs  
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S-2

### Card Set B: Interpretations

<p><b>1</b> Tom ran from his home to the bus stop and waited. He realized that he had missed the bus so he walked home.</p>	<p><b>2</b> Opposite Tom's home is a hill. Tom climbed slowly up the hill, walked across the top, and then ran quickly down the other side.</p>
<p><b>3</b> Tom skateboarded from his house, gradually building up speed. He slowed down to avoid some rough ground, but then speeded up again.</p>	<p><b>4</b> Tom walked slowly along the road, stopped to look at his watch, realized he was late, and then started running.</p>
<p><b>5</b> Tom left his home for a run, but he was unfit and gradually came to a stop!</p>	<p><b>6</b> Tom walked to the store at the end of his street, bought a newspaper, and then ran all the way back.</p>
<p><b>7</b> Tom went out for a walk with some friends. He suddenly realized he had left his wallet behind. He ran home to get it and then had to run to catch up with the others.</p>	<p><b>8</b> This graph is just plain wrong. How can Tom be in two places at once?</p>
<p><b>9</b> After the party, Tom walked slowly all the way home.</p>	<p><b>10</b> Make up your own story!</p>