Moving Straight Ahead
Linear Relationships

Modified Lessons for Sheltered Instruction for 7th grade Mathematics

Lesson 1 – 1.3-1 Raising Money, Using Linear Relationships
Lesson 2 – 1.3-2 Raising Money, Using Linear Relationships
Lesson 3 - 2.4 Connecting tables, graphs and Equations.

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Unit Selection Introduction

Unit Information

Lessons #1-4

Title of Unit: Moving Straight Ahead, Linear Relationships

Grade Level: 7th Grade Mathematics

Target Group: 7th Grade Sheltered Mathematics Class

Lesson Source: Stamford Public Schools Required Program -

1. I want my students to recognize the patterns in tables and graphs that connect to linear relationships.

2. I want my students to be able to construct tables, graphs and symbolic equations that represent linear relationships.

3. I want my students to convert information about a linear relationship presented in a verbal description, a table, a graph or an equation between one form to another.

4. I want my students to identify the slope, constant of proportionality, unit rate, rate of change, and the y-intercept in a verbal description, a graph, a table and an equation of a linear relationship.

5. I want my students to be able to solve linear equations.
Lesson 1
Unit Selection Introduction

Unit Information

Lessons #1-3

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Boston, MA: Pearson Prentice Hall.

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5. I want my students to be able to solve linear equations.

Problem 1.3-1
**EL modifications for CMP3 Moving Straight Ahead Problem 1.3-1**

Jennifer Chichester

### CMP3 Moving Straight Ahead Problem 1.3-1

<table>
<thead>
<tr>
<th>Content Objective</th>
<th>Language Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be able to:</td>
<td>Students will be able to:</td>
</tr>
<tr>
<td>1. identify the independent and dependent variables in a linear relationship.</td>
<td>1. Working in small groups students will:</td>
</tr>
<tr>
<td></td>
<td>a. <strong>discuss</strong> and <strong>conclude</strong> which are the independent and dependent variables of the problem.</td>
</tr>
<tr>
<td></td>
<td>b. individually <strong>create</strong> a table for the data in the problem,</td>
</tr>
<tr>
<td></td>
<td>c. individually <strong>create</strong> graph for the data in the problem placing the independent and dependent variables on the correct axis and plot the points from the table.</td>
</tr>
</tbody>
</table>

### Performance Indicators for CMP3 Moving Straight Ahead Problem 1.3-1

<table>
<thead>
<tr>
<th>Task/Domain</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong>: Identify the independent and dependent variables in a linear relationship.</td>
<td>In small groups: students will discuss and identify in writing the independent and dependent variables of the problem. Individually create a table representing the independent and dependent variables in the problem and draw a line graph for each data set in the problem.</td>
<td>In small groups with a graphic organizer: students will discuss and identify in writing the independent and dependent variables in the problem. Individually fill-in the table representing the independent and dependent variables in the problem and draw a line graph for each data set in the problem on the grid provided.</td>
<td>In small groups students will discuss the independent and dependent variables in the problem and with a graphic organizer and sentence frames complete the table and draw a line graph for each data set in the problem.</td>
<td>In small groups: students will discuss and fill-in questions about the independent and dependent variables in the problem using the word bank. Analyze the table provided and use the sentence starters to answer questions. Read the line graph for the problem and fill-in the missing labels using the word bank.</td>
<td>In small groups: students will listen to discussion and circle the two pieces of information (independent and dependent variables) in the problem. Using the completed table and graph, students will trace over the filled in table data and graph labels where indicated.</td>
</tr>
<tr>
<td><strong>Domain</strong>: Reading, Speaking and Writing</td>
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</tr>
</tbody>
</table>
### Functional Notational Chart for CMP3 Moving Straight Ahead Problem 1.3

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking/ Writing</td>
<td>elements of a linear</td>
<td>The <strong><strong><strong>1</strong></strong></strong> variable is the money donated.</td>
<td>1. Independent, Dependent</td>
<td>Declarative sentences. Noun phrase + b</td>
</tr>
<tr>
<td>Identify</td>
<td>relationship</td>
<td>The <strong><strong><strong>1</strong></strong></strong> variable is the distance walked.</td>
<td></td>
<td>Use of symbolic representation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The independent variable is located on the <strong><strong>2</strong></strong> axis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The dependent variable is located on the <strong><strong>2</strong></strong> axis.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**The A student answer would be:**
The independent variable is the variable that determines the value of the other variable, the dependent variable. The independent variable is represented by the letter X.

| Speaking/ Writing/Reading | analyze the graph           | ______1______ sponsor will donate ______2______ dollars no matter how far she walks. | 1. Gilberto’s, Alana’s, Leanne’s   | Declarative sentences. Indicators of possession. Capitalization of proper nouns. |
|                          |                             | ______1______ sponsor will donate ______2______ dollars a kilometer.            | 2. ten, two, five                  |                                              |
|                          |                             | ______1______ sponsor will donate ______2______ dollars plus 50 cents per kilometer. |                                    |                                              |

**The A student answer would be:**
Leanne’s sponsor will donate a flat rate of $10 no matter how far she walks. Gilberto’s sponsor will donate $2 for every kilometer he walks. Alana’s sponsor will donate $5 and an additional $0.50 for every kilometer she walks.
Lesson Plan for:
Moving Straight Ahead Modified Problem 1.3-1 Raising Money, Using Linear Relationships.

This lesson is from the Connected Math Program 3 and a lesson plan format of the workshop model is used from the teacher’s guide.

(This lesson covers: Problem 1.3 Introduction, Vocabulary review, Dependent/Independent Variable mini-lesson and Problem questions A1, A2 only)

Teacher: Jennifer Chichester
Grade Level and Subject: 7th Grade Sheltered Mathematics
Timing: Mid to end of school year.
Length of Period: 55 minutes

Expectation(s): Student will be familiar with simple tables and graphs. Students will be familiar with how to place points on a coordinate plan and connect them.

- Students will have completed the first problem in the book 1.1 Walking Marathons-Finding and Unit Rates.
- The lesson activity requires students to walk 10 meters as someone times them. So when they are complete they have their own meter walking rate, for example 10m in 8 seconds so they walk 1m in 0.8 seconds, so they will understand unit rates and walking rates.

Pre-lesson Notes:
- Use L1 in Frayer model for homework and SHOULD NOT have student fill-in the definitions yet
- They have heard the word walk-a-thon and should have had a discussion about it but if not the term must be review during the problem introduction reading.

Resources/Materials: Graph paper for level 4/5, calculators, pencil, ruler.
Activities:
(Pages 28-2) Word Wall Words
Vocabulary Words on Quizlet.com
(Pages 11,12) - Frayer Model for Problem Vocabulary
(Pages 9, 10) - Match-Up Independent and Dependent Variables
(Page 13) – Walk-a-thon discussion.

Teaching Strategies: Sheltered Modification for Levels 5-1
- Level 5 will be using Mainstream Workbook and Graph paper.
- Level 4-1 Modifications attached.
Pre-lesson exercise (10 mins):
- Students will individually fill-out Frayer Model Vocabulary GO’s (BUT NOT DEFINITION) for homework the night before and review terms as a group to create shared background understanding. Student will use word wall words (pages 28-32)
  (Pages 11 & 12)
Warm-up (10 mins):
- In small groups, students will sort Dependent and Independent Variable examples, come to consensus, and paste them on a graphic organizer.
  Whole group review and discuss. (Pages 9 & 10)
Problem Activity (25 mins):

- As you begin introductory text from workbook you may need to take a few minutes to introduce the concept of a Walk-a-thon. Use (Page 13) for reference.
- Teacher and students will read aloud introduction to problem 1.3 in text. Students with modified text will follow along (Pages 19, 20, 24, 25). Teacher will circulate and check for understanding.
- In whole group class will discuss what the independent and dependent variables of the problem.
- Teacher will review the steps of the problem and the work expectations.
- Teacher will start the first problem modeling the first values in the table. (Pages 16, 21, 26)
- At this point student of different language levels will begin to work in small groups with students of similar language level on question A1.
- Teacher will circulate for understanding of the task and completion of the table or table exercises.
- Teacher will model graphing the first few point from the table.
- Student will continue to work in small groups with students of similar language level on question A2.
- Teacher will check-in frequently with the following groups to check for understanding and completeness.
- In small groups Level 5&4 students will use textbook, graph paper and graphic organizers and proceed independently through the problem.
- In small groups Level 3 students will use graphic organizer and annotated text to proceed at their own pace.
- In small groups Level 1&2 students will use graphic organizer and annotated text and work with the teacher to proceed with the problem.

Wrap-up and Assessment (10 mins)-

- In a whole class group students and teacher will discuss the steps of the problem and how students completed them.
- Do they have the same table and graphs?
- What were the independent and depend variable and how the are present on the table and the graph.
- Students will be encouraged to share their tables and graphs with the class.

Homework – Students will be expected to share their activity with a person at home explaining what they learned from the day’s lesson. Parent signature required.

Students will use https://quizlet.com
To practice vocabulary words – this site offers a wide variety of activities and languages for word study.
**Moving Straight Ahead Problem #1.3 Modified Text – For Teacher Reference Only**

Level 5 – Workbook – Original Text and
Level 4 – Workbook for Original Text ONLY and Graphic Organizer Handout
Level 3 – Graphic Organizer Handout with Modified Text
Level 2/1 – Graphic Organizer Handout with Modified Text

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<table>
<thead>
<tr>
<th>Focus Question: What is the pattern of change in a linear relationship?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original Text 5/4</strong></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

**Problem 1.3 Problem Setup Text**

In *Variables and Patterns*, you looked at situations that involved **dependent** and **independent variables**. Because the distance walked depends on the time, you know distance is the dependent variable and time is the independent variable. In this problem, you will look at relationships between two other variables in a walkathon.

In past problems you looked at situations that involved **dependent** and **independent variables**.

- The distance walked **depends** on the time.
- The distance is the dependent variable.
- The time is the independent variable.

In this problem, you will look at relationships between two variables in a walkathon.

---

dependent and independent variables.

Distance walked depends on time.

Distance = Dependent variable

Time = Independent variable.

In this problem, you will look at relationships between two variables in a walkathon.
| Each participant in the walkathon must find sponsors to pledge a certain amount of money for each kilometer the participant walks. | Each person in the walkathon has a sponsor. The sponsor pledges money for each kilometer a student walks. | In a walkathon sponsors pay money for distance walked. |

| The student's in Ms. Chang's class are trying to estimate how much money they might be able to raise. Several questions come up in their discussions:  
  - What variables can affect the amount of money that is collected?  
  - How can you use these variables to estimate the amount of money each student will collect?  
  - Will the amount of money collected be the same for each walker? | Ms. Chang's class wants to estimate the money they might raise. Questions to discuss:  
  - What variables affect the amount of money that is collected?  
  - How can you estimate the amount of money collected?  
  - Will the amount of money be the same for each student? | Questions about the money Ms. Chang's class might make:  
  - What are the variables?  
  - How do they change the money?  
  - Will the money be the same for each student? |

| Each student found sponsors who are willing to pledge money according to the following descriptions.  
  - Leanne's sponsors will donate $10 regardless of how far she walks.  
  - Gilberto's sponsors will donate $2 per kilometer (km)  
  - Alana's sponsors will make a $5 donations plus $0.50 per kilometer. The class refers to these as *pledge plans*. Tables, graphs, and equations will help you predict how much money might be raised with each plan. | Each student found sponsors who will to pledge money.  
  - Leanne's sponsors will donate $10 regardless of how far she walks.  
  - Gilberto's sponsors will donate $2 per kilometer (km)  
  - Alana's sponsors will make a $5 donations plus $0.50 per kilometer. The class calls these *pledge plans*. Tables, graphs, and equations will help predict the amount of money raised for each plan. | Money pledged:  
  - Leanne's sponsors donate $10 no matter how far she walks.  
  - Gilberto's sponsors donate $2 per kilometer (km)  
  - Alana's sponsors donate $5 and $0.50 per kilometer. The class calls these *pledge plans*.  
  
    We will use tables, graphs, and equations to see how much money will be made by each plan. |
<table>
<thead>
<tr>
<th>Problem Questions- in workbook or modified handout:</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>A) 1.</strong> Make a table for each student’s pledge plan, showing the amount of money each sponsor would owe if the student walked distances from 0 to 6 kilometers.</td>
<td><strong>A) 1.</strong> Make a table for each student’s pledge plan. Show the amount of money each sponsor will pay if the student walked distances from 0 to 6 kilometers. What are the dependent and independent variables? On the graph, on the table?</td>
<td><strong>A) 1.</strong> Make a table for each student’s pledge plan. Show the amount of money each sponsor will pay if the student walked distances from 0 to 6 kilometers. What are the dependent and independent variables? The _______ variable is the money donated. The _______ variable is the distance walked.</td>
</tr>
<tr>
<td><strong>A) 2.</strong> Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.</td>
<td><strong>A) 2.</strong> Graph all three pledge plans on the same graph. Use a different color for each line.</td>
<td><strong>A) 2.</strong> Look at the graph. Using the word bank label the parts of the graph. The independent variable is located on the ____ axis. The dependent variable is located on the ____ axis.</td>
</tr>
</tbody>
</table>
Directions:
Using the slips of paper from your teacher, sort, match and paste the Dependent and Independent variables that go together.

<table>
<thead>
<tr>
<th>Match-Up</th>
<th>Independent and Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing the Independent Variable (The Cause)</td>
<td>causes a change in the</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
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</tbody>
</table>

Problem 1.3-1
Moving Straight Ahead
Problem 1.3 Warm-up

Match-up Game
Practice Independent and Dependent variable problems.
Teacher will cut out squares and place in bag to mix-up. One set per student. Students will sort, match and paste on Match-Up template.

<table>
<thead>
<tr>
<th>The time it takes to run a mile</th>
<th>the person's running speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /> The height of bean plants</td>
<td><img src="image2.png" alt="Image" /> the amount of water it gets</td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /> The higher the temperature of the air in the oven</td>
<td><img src="image4.png" alt="Image" /> the faster a cake will bake</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /> Lemon trees are watered the most</td>
<td><img src="image6.png" alt="Image" /> grow the most lemons</td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /> The more bushels of potatoes</td>
<td><img src="image8.png" alt="Image" /> the more the soil was fertilized</td>
</tr>
</tbody>
</table>
Moving Straight Ahead
Problem 1.3 Pre-lesson Homework

Teacher Instructions:
Copy 3 pages of Frayer Model for each student.
Use the Frayer Model to have students pre-learn the problem vocabulary.
Students should fill in the vocabulary word in the center, write a synonym or
cognate for the word, give an example or draw a picture, list facts or
characteristics they know about the vocabulary word and create a non-example if
they can. **Students should not write the definition in this pre-lesson activity,** we
will discuss the terms during the exercise and come up with a definition together
at the end of the lesson. Students can use the Moving Straight Ahead workbook
glossary and are encouraged to use their L1. The purpose of this activity is to get
the students thinking about the problem vocabulary.

Students can create a unit flipbook or interactive notebook pages.

Vocabulary List:

1. Variable

2. Independent Variable

3. Dependent Variable

4. Increase

5. Decrease
A walkathon (walk-a-thon), walking marathon or sponsored walk is a type of community or school fundraiser in which participants raise money by collecting donations or pledges for walking a predetermined distance.
Moving Straight Ahead
Problem 1.3-1
Level 5 NOT Modified.

Students will use the CMP3 Moving Straight Ahead workbook and graph paper for the entire problem.

They will be grouped with level 4 students where appropriate.
Moving Straight Ahead
Problem 1.3-1
Modified Level 4

Students will use workbook for problem introduction text and use the following graphic organizer handout for the problem questions.
Focus Question: What is the pattern of change in a linear relationship?

Pledge Plans:
- Leanne’s sponsors: $10 regardless of how far she walks.
- Gilberto’s sponsors: $2 per kilometer (km)
- Alana’s sponsors: $5 donations plus $0.50 per kilometer.

A) 1. Make a table for each student’s pledge plan. Show the amount of money each sponsor would owe if the student walked distances from 0 to 6 kilometers.

<table>
<thead>
<tr>
<th>Distance (km) (d) on x</th>
<th>Leanne $ (M) on y</th>
<th>Gilberto $ (M) on y</th>
<th>Alana $ (M) on y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<td>3</td>
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<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What are the dependent and independent variables on the table?

Dependent Variable = ____________

Independent Variable = ____________

A) 2. Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.

What are the dependent and independent variables on the graph?

Dependent Variable = ____________

Independent Variable = ____________
a) Now make your own problem, with your own pledge plans for 0-6 km. You can do it!

Pledge Plans:
- Leanne’s sponsors: $_______
- Gilberto’s sponsors: $_______
- Alana’s sponsors: $_______

b) Create a table for the pledge plans.

<table>
<thead>
<tr>
<th>Distance (km) (d) on x</th>
<th>Leanne $ (M) on y</th>
<th>Gilberto $ (M) on y</th>
<th>Alana $ (M) on y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
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<td></td>
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<tr>
<td>1</td>
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<td>4</td>
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<tr>
<td>6</td>
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</tr>
</tbody>
</table>

c) Graph the three pledge plans on the same coordinate axes.
d) Use a different color for each plan. Make sure to label the X-axis and Y-axis.
e) Label your dependent and independent variables.
Moving Straight Ahead
Problem 1.3-1
Modified Level 3

Students will use the following modified page of introduction workbook text and use graphic organizer handout for the problem questions.
Problem 1.2 continued

Four other friends who are part of the walkathon made the following representations of their data. Could any of these relationships be linear relationships? Explain.

<table>
<thead>
<tr>
<th>George's Walking Rate</th>
<th>Elizabeth's Walking Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (seconds)</td>
<td>Distance (meters)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

Billie’s Walking Rate

\[ D = 2.25t \]

\( D \) represents distance,
\( t \) represents time.

Bob’s Walking Rate

\[ t = \frac{100}{r} \]

\( r \) represents walking rate.
\( t \) represents time.

In past problems you looked at situations that involved dependent and independent variables.

The distance walked depends on the time.

The distance is the dependent variable.

The time is the independent variable.

In this problem, you will look at relationships between two variables in a walkathon.

Each person has a sponsor.

The sponsor pledges money $\$ for each kilometer a student walks.

1.3 Raising Money
Using Linear Relationships

In Variables and Patterns, you looked at situations that involved dependent and independent variables. In Problem 1.2, the distance walked depended on the time. This tells you that distance is the dependent variable and time is the independent variable. In this Problem, you will look at relationships between two other variables in a walkathon.

Each participant in the walkathon must find sponsors to pledge a certain amount of money for each kilometer the participant walks.
The students in Ms. Chang's class are trying to estimate how much money they might be able to raise. Several questions come to mind:

- What variables can affect the amount of money collected?
- How can you use these variables to estimate the amount of money the student will collect?
- Will the amount of money collected be the same for each student?

Each student found sponsors who are willing to pledge money according to the following descriptions:

- Leanne’s sponsors will donate $10 regardless of how far she walks.
- Gilberto’s sponsors will donate $2 per kilometer (km).
- Alana’s sponsors will make a $5 donation plus 50c per kilometer.

The class refers to these as pledge plans.

Tables, graphs, and equations will help you predict how much money might be raised with each plan.

- What are the dependent and independent variables?

Who will raise the most money after d kilometers?

Problem 1.3

1. Make a table for each student’s pledge plan, showing how much money each of his or her sponsors would donate for distances from 0 to 6 kilometers. What are the independent variables?

2. Graph the three pledge plans on the same coordinate plane using a different color for each plan.

The class calls these pledge plans.

Tables, graphs, and equations will help predict the amount of money raised for each plan.
Focus Question: What is the pattern of change in a linear relationship?

Pledge Plans:
- Leanne’s sponsors: $10 regardless of how far she walks.
- Gilberto’s sponsors: $2 per kilometer (km)
- Alana’s sponsors: $5 donations plus $0.50 per kilometer.

A) 1. Make a table for each student’s pledge plan. Show the amount of money each sponsor will pay if the student walked distances from 0 to 6 kilometers.

<table>
<thead>
<tr>
<th>Distance Walked (d) on x</th>
<th>Leanne’s Pledges (M) on y</th>
<th>Gilberto’s Pledges (M) on y</th>
<th>Alana’s Pledges (M) on y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$10</td>
<td>$2</td>
<td>$5.50</td>
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<td>2</td>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What are the dependent and independent variables?
Use the word bank below to fill-in the blanks:

**Word Bank**

Independent   Dependent   X   Y

The _____________ variable is the money pledged.

The _____________ variable is the distance walked.

The **independent** variable is located on the ____ axis.

The **dependent** variable is located on the ____ axis.
Make a graph.

A) 2. Graph all three pledge plans on the same graph.
   Use a different color for each plan. (Use a ruler)
Moving Straight Ahead
Problem 1.3-1
Modified Level 1/2

Students will use the following modified page of introduction workbook text and use graphic organizer handout for the problem questions.
Problem 1.2 continued

Four other friends who are part of the walkathon made the following representations of their data. Could any of these relationships be linear relationships? Explain.

<table>
<thead>
<tr>
<th>George's Walking Rate</th>
<th>Elizabeth's Walking Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (seconds)</td>
<td>Distance (meters)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

Billie's Walking Rate

\[ D = 2.25t \]

\[ D \text{ represents distance} \]
\[ t \text{ represents time} \]

Bob's Walking Rate

\[ t = \frac{100}{r} \]

\[ r \text{ represents walking rate} \]

Dependent and Independent variables.

Distance walked depends on time.

Distance = Dependent variable

Time = Independent variable

In this problem, you will look at relationships between two other variables in a walkathon.

In a walkathon sponsors pay money for distance walked.

1.3 Raising Money
Using Linear Relationships

In Variables and Patterns, you looked at situations that involved dependent and independent variables. In Problem 1.2, the distance walked depended on the time. This tells you that distance is the dependent variable and time is the independent variable. In this Problem, you will look at relationships between two other variables in a walkathon.

Each participant in the walkathon must find sponsors to pledge a certain amount of money for each kilometer the participant walks.
The students in Ms. Chang's class are trying to estimate how much money they might be able to raise. Several questions come up in the process. Here are a few:

- What variables can affect the amount of money that is raised?
- How can you use these variables to estimate the amount that each student will collect?
- Will the amount of money collected be the same for each student?

Each student found sponsors who are willing to pledge money according to the following descriptions.

- Leanne's sponsors will donate $10 regardless of how far she walks.
- Gilberto's sponsors will donate $2 per kilometer (km).
- Alana's sponsors will make a $5 donation plus 50¢ per kilometer.

The class refers to these as **pledge plans**. Tables, graphs, and equations will help you predict how much money might be raised with each plan.

- What are the dependent and independent variables?

**Question:** Who will raise the most money after \( d \) kilometers?

**Problem 1.3**

1. Make a table for each student’s pledge plan. Show the amount of money each of his or her sponsors would donate if he or she walked distances from 0 to 6 kilometers. What are the dependent and independent variables?
2. Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.

**Money pledged:**
- Leanne's sponsors will donate $10 no matter how far she walks.
- Gilberto's sponsors will donate $2 per kilometer (km).
- Alana's sponsors will donate $5 and $0.50 per kilometer.

The class calls these **pledge plans**.

We will use tables, graphs, and equations to see how much money will be made by each plan.
Moving Straight Ahead
Problem 1.3-1 – Raising Money

Focus Question: What is the pattern of change in a linear relationship?

Pledge Plans:
- Leanne’s sponsors: $10
- Gilberto’s sponsors: $2 per kilometer (km)
- Alana’s sponsors: $5 plus $0.50 per kilometer.

A) 1. LOOK a table for each student’s pledge plan. It shows the amount of money each sponsor will pay if the student walked distances from 0 to 6 kilometers.

<table>
<thead>
<tr>
<th>Distance Walked (d) on x</th>
<th>Leanne’s Money Donated (M) on y</th>
<th>Gilberto’s Money Donated (M) on y</th>
<th>Alana’s Money Donated (M) on y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$10</td>
<td>$0</td>
<td>$5</td>
</tr>
<tr>
<td>1</td>
<td>$10</td>
<td>$2</td>
<td>$5.50</td>
</tr>
<tr>
<td>2</td>
<td>$10</td>
<td>$4</td>
<td>$6</td>
</tr>
<tr>
<td>3</td>
<td>$10</td>
<td>$6</td>
<td>$6.50</td>
</tr>
<tr>
<td>4</td>
<td>$10</td>
<td>$8</td>
<td>$7</td>
</tr>
<tr>
<td>5</td>
<td>$10</td>
<td>$10</td>
<td>$7.50</td>
</tr>
<tr>
<td>6</td>
<td>$10</td>
<td>$12</td>
<td>$8</td>
</tr>
</tbody>
</table>

a) What are the dependent and independent variables?

Using the word bank and the sentences below, circle the matching words or letters:

WORD BANK
independent dependent X Y

The **dependent** variable is the **money donated**.

The **independent** variable is the **distance walked**.

The **independent** variable is located on the **X** axis.

The **dependent** variable is located on the **Y** axis.

b) NOW circle the **independent variable** on the table and a square around the **dependent variables**.
A) 2. **Look at the graph.** Look for the dependent and independent variables.

The Dependent Variable is:
- the money donated
- the Y-axis

The Independent Variable is:
- the distance walked
- the X-axis

a) Circle $10 $10 is the money donated.

b) Underline 6km 6km is the distance walked.

c) Fill-in the blanks with X or Y.

The independent variable is located on the ____ axis.

The dependent variable is located on the ____ axis.

Just for FUN!
1. Color the y-axis red
2. Color the x-axis blue
3. Color the independent variable yellow
4. Color the dependent variable
Decrease

going down

become or make smaller in size or amount
Dependent Variable

2a

**Independent Variable**

Influences **CHANGE** in the

**Dependent Variable**

A variable that changes as a result of a change in the independent variable; y - variable

2b
Increase

going up
become or make greater in size or amount
Independent Variable

A variable whose values are independent of changes in the values of other variables; x-variable
Variable

Coefficient      Variable

$4x - 7 = 5$

Operator      Constants

A letter or symbol used to represent an unknown number or value.
Modification Narrative for CMP3 Moving Straight Ahead Problem 1.3-1

The first thing I wanted to modify was the text of the problem. Not only is the text dense, it is also visually intimidating and lack variation, especially for the lesson. This series of workbooks is all literacy based and lacks meaningful visuals and it lacks any real mathematical examples. I modified the text to three levels, using simpler syntax and vocabulary but being sure not to change meaning or alter understanding. Organizing the text alone adds visual breaks and allows for less visual clutter and I think students are more willing to try to read it.

Next, I cut the amount of information to deliver in one lesson and made the problem two lessons. Each lesson focuses on one concept, the first one was: independent and dependent variables of a problem.

I had made a graphic organizer for this problem for my lower level students and found that it not only helped students organize the information of the problem but also organize their thoughts about the problem. It was little more than a table and a blank graph. As I examined that GO and thought of the language I expected the students to use, orally and in writing I realized my sad little GO did not grant access to ELs.

I added large and clear grids that kept the students graphing in the first quadrant of the coordinate plane, a place most students are familiar with already. I graded the amount of information or graphing the students had to do according to their language level. I found level 1 & 2 they most difficult to boil down and come up with appropriate tasks. But I know I needed to give a complete visual and still require them to identify the main concepts of the lesson. I think this level will be my most challenging to modify.

I included a table for all levels and completely or partially filled in the numbers, as examples were needed. I included a variety of sentence starter, fill-in-the-blank and word bank questions, scaffolding the assistance as levels changed.

I added two pre-lesson activities that I felt were needed for better student understanding and to create a shared (history) understanding so the group started out with the same basic knowledge. Thinking about it now I probably should scaffold the Frayer model for the level 1’s. I also added word wall words to use in classroom or give to students- they have the option to study all vocabulary words on https://quizlet.com
The math program this lesson comes from, promotes the use of the workshop model. This model works well when students are active participants. Although I is not evident in the modified worksheets, but present in my lesson plan I hope I added more opportunity for interaction both in small groups, whole class, with (me) the teacher and at home, making sure all of the students have an opportunity to listen and talk about this lesson in their comfort zone.
Lesson 2
Jennifer Chichester
Dr. Lorrie Stoops Verplaetse
fSL 518
6/26/17

Unit Selection Introduction

Unit Information

Lessons #1-4

Title of Unit: Moving Straight Ahead, Linear Relationships

Grade Level: 7th Grade Mathematics

Target Group: 7th Grade Sheltered Mathematics Class

Lesson Source: Stamford Public Schools Required Program -
Moving straight ahead; linear relationships, (pp-11-14, 195, 36-37, 64-65,

1. I want my students to recognize the patterns in tables and graphs that connect to linear relationships.
2. I want my students to be able to construct tables, graphs and symbolic equations that represent linear relationships.
3. I want my students to convert information about a linear relationship presented in a verbal description, a table, a graph or an equation between one form to another.
4. I want my students to identify the slope, constant of proportionality, unit rate, rate of change, and the y-intercept in a verbal description, a graph, a table and an equation of a linear relationship.
5. I want my students to be able to solve linear equations.

Problem 1.3-2
EL modifications for CMP3 Moving Straight Ahead Problem 1.3-2
Jennifer Chichester

<table>
<thead>
<tr>
<th>Content Objective</th>
<th>Language Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will be able to:</strong></td>
<td><strong>Students will be able to:</strong></td>
</tr>
<tr>
<td>1. determine if the relationship is linear.</td>
<td>1. Working in small groups students will <strong>analyze</strong> the graph and <strong>explain</strong> orally using domain specific language if the relationship in the data is linear.</td>
</tr>
</tbody>
</table>
| 2. identify the pattern of change in the independent and dependent variables in a table and on a graph. | 2. Individually students will  
  a. use domain specific language to orally and in writing **describe** the linear pattern of change of the table.  
  b. use domain specific language to orally and in writing **describe** the linear pattern of change of the graph. |
| 3. write an equation that represents relationship between the variables and understand the information each number and variable represents in the equation. | 3. In small groups students will:  
  a. **discuss and write** an equation for the linear relationship using \( y = mx + b \) format.  
  b. **label** in writing the information each number and variable represents in the equation. |
<table>
<thead>
<tr>
<th>Task/Domain</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task:</strong> determine if the relationship is linear. <strong>Domain:</strong> Speaking</td>
<td>In small groups: students will analyze and discuss the graph and explain orally using domain specific language if the relationship in the data is linear.</td>
<td>In small groups: students will analyze and discuss the graph and explain orally, using a word bank of domain specific language, if the relationship in the data is linear.</td>
<td>In small groups: students will analyze the graph and explain orally if the graph is a straight line and connect it to the term - linear.</td>
<td>In small groups: students will listen to discussion and analyze the graph and agree or disagree if the graph is a straight line. Using a sentence frame they will connect to the domain specific term – linear.</td>
<td>In small groups: students will listen to discussion and analyze the graph and agree or disagree if the graph is a straight line. Tracing the domain specific term – linear.</td>
</tr>
<tr>
<td><strong>Task:</strong> identify the pattern of change in a table and on a graph. <strong>Domain:</strong> Speaking and Writing</td>
<td>Individually students will use domain specific language to orally and in writing describe the linear pattern of change of the table and the graph.</td>
<td>Individually students will orally and in writing, using a word bank of domain specific language, describe the linear pattern of change of the table and graph.</td>
<td>Individually students will orally and using sentence frames and a word bank of domain specific language, describe the pattern of change of the table and graph.</td>
<td>Individually students will orally and in writing using a word (picture) bank pick the correct images that describe the pattern of change of the table and graph.</td>
<td>Individually students will orally and in writing using a word (picture) bank pick the correct images that describe the pattern of change of the table and graph.</td>
</tr>
<tr>
<td><strong>Task:</strong> write an equation that represents relationship in the equation. <strong>Domain:</strong> Speaking and Writing</td>
<td>In small groups students will discuss using domain specific language and write an equation for the linear relationship using ( y = mx + b ) format and label the information each number and variable represents in an equation to a word bank.</td>
<td>In small groups students will discuss and write an equation for the linear relationship using ( y = mx + b ) format and match the information each number and variable represents in an equation to a word bank.</td>
<td>In small groups students will discuss and write an equation for the linear relationship using ( y = mx + b ) format and label each variable in the equation using sentence frames and word bank.</td>
<td>In small groups students will discuss and fill-in a GO for an equation for the linear relationship using ( y = mx + b ) format, label each variable in the equation using a matching word bank.</td>
<td>In small groups students will discuss and trace an equation for the linear relationship using ( y = mx + b ) format, label each variable in the equation using a matching word bank.</td>
</tr>
</tbody>
</table>
### Functional Notational Chart for CMP3 Moving Straight Ahead Problem 1.3

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words</th>
<th>Grammar</th>
</tr>
</thead>
</table>
| Speaking/Writing Identify  | elements of a linear relationship | The _____1_____ variable is the money donated.  
The _____1_____ variable is the distance walked.  
The independent variable is located on the _____2_____ axis.  
The dependent variable is located on the _____2_____ axis. | 1. Independent,  
Dependent  
2. X, Y | Declarative sentences.  
Noun phrase + b  
Use of symbolic representation |

**The A student answer would be:**  
The independent variable is the variable that determines the value of the other variable, the dependent variable. The independent variable is represented by the letter X.

### Speaking/Writing/Reading  
Analyze and Explain

| Analyze the graph            | 1_____ sponsor will donate _____2_____ dollars no matter how far she walks.  
|                             | 1_____ sponsor will donate _____2_____ dollars a kilometer.  
|                             | _____1_____ sponsor will donate _____2_____ dollars plus 50 cents per kilometer. | 1. Gilberto’s, Alana’s,  
Leanne’s  
2. ten, two, five | Declarative sentences.  
Indicators of possession.  
Capitalization of proper nouns |

**The A student answer would be:**  
Leanne’s sponsor will donate a flat rate of $10 no matter how far she walks. Gilberto’s sponsor will donate $2 for every kilometer he walks. Alana’s sponsor will donate $5 and an additional $0.50 for every kilometer she walks.

### Reading/Writing  
Identify

| Identify the pattern of change in a table and on a graph. | The pattern of change in the table is expressed by a(n)  
_____1_____ in the value of the _____2_____ pledged and a(n)  
_____1_____ in the _____2_____ walked.  
The pattern of change in the graph is expressed by  
a(n)_____1_____ in the values of _____3_____ axis and  
a(n)_____1_____ in the values of _____3_____ axis. | 1. increase, decrease  
2. money, distance | Adjectives  
Nouns  
Past tense  
Use of symbolic representation |

**The A student answer would be:**  
The pattern of change in the table is expressed by the increase in the values of the money pledged and the distance walked. The pattern of change in the graph is expressed by the increase in the values of X and increase in the values of Y.

### Speaking/Writing  
Synthesize

| Discuss and write an equation | The equation of the line for _____1_____ is y = _____2_____x + _____3_____.  
The equation of the line for _____1_____ is y = _____2_____x + _____3_____.  
The equation of the line for _____1_____ is y = _____2_____x + _____3_____. | 1. Gilberto, Alana,  
Leanne  
2. 10, 0.05, 2  
3. 0, 5 | Prepositional phrases.  
Use of proper nouns.  
Capitalization of proper nouns |

**The A student answer would be:**  
The equation of the line for Gilberto is y = 2x. The equation of the line for Alana is y = 0.05x + 5. The equation of the line for Leanne is y = 10.

---

Problem 1.3-2
Lesson Plan for:
Moving Straight Ahead Modified Problem 1.3-2 Raising Money, Using Linear Relationships.

This lesson is from the Connected Math Program 3 and a lesson plan format of the workshop model is used from the teacher's guide.

(This lesson covers: Problem 1.3 Introduction Review, Vocabulary review, Slope-Intercept Form mini-lesson and Problem questions A3, A4, B1, B2, B3, B4 only)

Teacher: Jennifer Chichester
Grade Level and Subject: 7th Grade Sheltered Mathematics
Timing: Mid to end of school year.
Length of Period: 55 minutes
Expectation(s): Student will be familiar with simple tables and graphs. Students will be familiar with how to place points on a coordinate plan and connect them.
• Students will have completed the first problem in the book 1.1 Walking Marathons-Finding and Unit Rates.
• The lesson activity requires students to walk 10 meters as someone times them. So when they are complete they have their own meter walking rate, for example 10m in 8 seconds so they walk 1m in 0.8 seconds, so they will understand unit rates and walking rates.

Pre-lesson Notes:
• Use L1 in Frayer model for homework and may have student fill-in the definitions. Word Wall Words will be present and available.

Resources/Materials: Graph paper for level 4/5, calculators, pencil, ruler.
Activities:
A separate file of Word Wall Words is attached. Refer to Frayer Model in Lesson 1.3-1 on (Pages 11,12). Frayer Model attached (Page 7).

Teaching Strategies: Sheltered Modification for Levels 5-1
➢ Level 5 will be using Mainstream Workbook and Graph paper.
➢ Level 4-1 Modifications attached.
Pre-lesson exercise (5 mins):
➢ Students will share out how they shared what they learned in 1.3-1 with their small group.
➢ Teacher will pick a few students to share out with whole class.
Warm-up (15 mins):
➢ In small groups, students will review 1.3-1 vocabulary and play a quick round robin deciding on the best definitions for the 5 terms. Whole group review and discuss.
Problem Activity (25 mins):
➢ Teacher will review the steps of the problem A3 and the work expectations.
➢ Teacher and students will read aloud problem 1.3 A3 in text and model first equation. Students with modified text will follow along on the graphic organizer. Teacher will circulate and check for understanding.
➢ In whole group class will discuss the equations when the majority of the class is done with the problem.
➢ Teacher will review the steps of problem A4 and the work expectations.
Teacher will start the first problem modeling patterns of change. (Pages 14, 18, 23)

- At this point student of different language levels will begin to work in small groups with students of similar language level on question A4.
- Teacher will circulate for understanding of the task and completion of the exercises.
- Teacher will the model for individuals when needed but students will be working through the problems in small groups at their own pace.
- Student will continue to work in small groups with students of similar language level on question B.
- Teacher will check-in frequently with the following groups to check for understanding and completeness.

- In small groups Level 5&4 students will use textbook, graph paper and graphic organizers and proceed independently through the problem.
- In small groups Level 3 students will use graphic organizer to proceed at their own pace.
- In small groups Level 1&2 students will use graphic organizer and work with the teacher to proceed with the problem.

Wrap-up and Assessment (10 mins)-

- In a whole class group students and teacher will discuss the steps of the problem and how students completed them.
- Do they understand the patterns of change?
- Using Reference Page 20 students will discuss the patterns of change they found on the graph.

Homework – Using Reference Page 20, Students will be expected to share their activity with a person at home explaining what they learned from the day’s lesson. Parent signature required.
### Focus Question: What is the pattern of change in a linear relationship?

<table>
<thead>
<tr>
<th>Original Text 5/4</th>
<th>Modified Text level 3</th>
<th>Modified Text level 2/1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A) 3.</strong> For each pledge plan, write an equation that represents the relationship between the distance walked and the amount of money donated. Explain what each number and variable in the equations represents.</td>
<td><strong>A) 3.</strong> Write an equation for each pledge plan. For the distance walked and the amount of money donated. Explain what each number and variable in the equations represents.</td>
<td><strong>A) 3.</strong> Write an equation for each pledge plan. Explain each number and variable in the equations.</td>
</tr>
</tbody>
</table>
| **A) 4.** For each plan:  
  a. What is the pattern of change between the two variables in the table?  
  b. What is the pattern of change between the two variables graph? Where is the pattern of change between the two variables in the equation?  
  c. How can you determine if a relationship is linear from a table, a graph, or an equation?  
  d. Does this relationship represent a proportional relationship? | **A) 4.** For each plan:  
  a. What is the pattern of change between the two variables in the table?  
  b. How do you see the pattern in the graph? Where is the pattern of change between the two variables in the equation?  
  c. How can you tell the pattern is a straight line in the table, a graph, or an equation?  
  d. Does this relationship represent a proportional relationship? Is the relationship equivalent? | **A) 4.** For each plan:  
  a. What is the pattern in the table?  
  b. What is the pattern in the graph? Where is this pattern in the equation?  
  c. How can you tell the pattern is a straight line in the table, a graph, or an equation?  
  d. Does this relationship represent a proportional relationship? Is the relationship equivalent? |
<table>
<thead>
<tr>
<th><strong>B) 1.</strong> Each student walks 8 kilometers in the walkathon. How much money does each sponsor donate? Explain how you found your answer.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B) 1. Use your equations from A) 3.</strong></td>
</tr>
<tr>
<td>• Leanne walks 8 kilometers, how much money does each sponsor donate?</td>
</tr>
<tr>
<td>• Gilberto walks 8 kilometers how much money does each sponsor donate?</td>
</tr>
<tr>
<td>• Alana walks 8 kilometers how much money does each sponsor donate?</td>
</tr>
<tr>
<td><strong>B) 1. Each student walks 8 kilometers. How much money does each sponsor donate?</strong></td>
</tr>
<tr>
<td><em><strong>1</strong></em> sponsor will donate <em><strong>2</strong></em> dollars no matter how far she walks.</td>
</tr>
<tr>
<td><em><strong>1</strong></em> sponsor will donate <em><strong>2</strong></em> dollars a kilometer.</td>
</tr>
<tr>
<td><em><strong>1</strong></em> sponsor will donate <em><strong>2</strong></em> dollars plus 50 cents per kilometer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B) 2. Suppose each student receives $10 from a sponsor. How many kilometers does each student walk? Explain.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B) 2. Suppose each student receives $10 from a sponsor. How many kilometers does each student walk? Explain.</strong></td>
</tr>
<tr>
<td><strong>B) 2. Each student receives $10 donation. How many kilometers does each student walk?</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B) 3. On which graph does the point (12, 11) lie? What information does this point represent?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B) 3. On which graph does the point (12, 11) lie? What information does this point represent?</strong></td>
</tr>
<tr>
<td><strong>B) 3. Which graph has the point (12, 11)? What does the 12 mean? 12 what? What does the 11 mean? 11 what?</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>B) 4. In Alana’s plan, how is the fixed $5 donation represented in:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B) 4. In Alana’s plan, how is the fixed $5 donation represented in:</strong></td>
</tr>
<tr>
<td><strong>B) 4. In Alana’s plan, where is the $5 donation on:</strong></td>
</tr>
<tr>
<td>a. the table? b. the graph? c. the equation?</td>
</tr>
<tr>
<td>a. the table? b. the graph? c. the equation?</td>
</tr>
<tr>
<td>a. the table? b. the graph? c. the equation?</td>
</tr>
</tbody>
</table>
Moving Straight Ahead
Problem 1.3-1
Level 5 NOT Modified.

Students will use the CMP3 Moving Straight Ahead workbook and graph paper for the entire problem.

They will be grouped with level 4 students where appropriate.
Moving Straight Ahead
Problem 1.3-1
Modified Level 4

Students will use workbook for problem introduction text and use the following graphic organizer handout for the problem questions.
Focus Question: What is the pattern of change in a linear relationship?

Let's Review Pledge Plans:
- Leanne's sponsors: $10 regardless of how far she walks.
- Gilberto's sponsors: $2 per kilometer (km)
- Alana's sponsors: $5 donations plus $0.50 per kilometer.

Using your Graphic Organizer for problem 1.3-1 look at the tables and graph you created and answer the following question:

A) 3. Write an equation for each pledge plan.
   Explain what information each number and variable in the equations represents

   If \( M = \text{money earned (y)} \)
   \( d = \text{distanced walked in km (x)} \)

   Write the number sentence in the Slope-Intercept Form:
   \( M = \text{slope(d)} + \text{ y-intercept} \)

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>( M = ___ d + ___ )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A) 4. For each plan:
   a) What is the pattern of change between the two variables in the table?

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
b) 1) What is the pattern of change between the two variables graph?

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Where is the pattern of change between the two variables in the equation?

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) How can you determine if a relationship is linear from a table, a graph, or an equation?

<table>
<thead>
<tr>
<th>I know I have a linear relationship if...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

d) Does this relationship represent a proportional relationship?  
(Hint: Compare coordinate pairs as ratios.)
B) 1. If each student walks 8 kilometers in the walkathon, how much money does each sponsor donate? Explain how you found your answer. (HINT: What is the equation for each plan? Look at A3.

<table>
<thead>
<tr>
<th>Leanne earns:</th>
<th>Gilberto earns:</th>
<th>Alana earns:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B) 2. Suppose each student receives $10 from a sponsor. How many kilometers does each student walk? Explain.

<table>
<thead>
<tr>
<th>Leanne walked:</th>
<th>Gilberto walked:</th>
<th>Alana walked:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B) 3. On which graph does the point (12, 11) lie? What information does this point represent?

B) 4. In Alana’s plan, how is the fixed $5 donation represented in:

<table>
<thead>
<tr>
<th>the Table</th>
<th>the Graph</th>
<th>the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Moving Straight Ahead
Problem 1.3-1
Modified Level 3

Students will use the following modified page of introduction workbook text and use graphic organizer handout for the problem questions.
Focus Question: What is the pattern of change in a linear relationship?

Let's Review Pledge Plans:

- Leanne's sponsors: $10 regardless of how far she walks.
- Gilberto's sponsors: $2 per kilometer (km)
- Alana's sponsors: $5 donations plus $0.50 per kilometer.

Using your Graphic Organizer for problem 1.3-1 look at the tables and graph you created and answer the following question:

A) 3. Write an equation for each pledge plan.
   Explain what information each number and variable in the equations represents.

   If \( M = \text{money earned (y)} \)
   \( d = \text{distanced walked in km (x)} \)

   Write the number sentence in the Slope-Intercept Form: \( M = \text{slope}(d) + \text{y-intercept} \)

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>( M = ____ \text{ d = } ____ )</td>
<td>( M = ____ \text{ d = } ____ )</td>
<td>( M = ____ \text{ d = } ____ )</td>
</tr>
<tr>
<td>( M = -0.1d + 10 ) ( M = 10 )</td>
<td>( M = ____.d + ____. \text{ (km) } )</td>
<td>( M = ____.d + ____. \text{ (km) } )</td>
</tr>
</tbody>
</table>

What is $10?

Does \( d \) affect the $10?

Why is the slope = 0?

A) 4. For each plan:
   a) What is the pattern of change between the two variables in the table?

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Money increases by $2 for each kilometer that Gilberto walks.} )</td>
<td>( \text{Money increases by $2 for each kilometer that Gilberto walks.} )</td>
<td>( \text{Money increases by $2 for each kilometer that Gilberto walks.} )</td>
</tr>
</tbody>
</table>
b) 1. What is the pattern of change between the two variables graph?

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>The graph stays flat because there is no change in the money earned.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Where is the pattern of change between the two variables in the equation?

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The is a 0.5 next to the d. OR 0.5 is the coefficient of d.</td>
</tr>
</tbody>
</table>

c) How can you determine if a relationship is linear from a table, a graph, or an equation?

<table>
<thead>
<tr>
<th>I know I have a linear relationship if...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
</tr>
<tr>
<td>Graph</td>
</tr>
<tr>
<td>Equation</td>
</tr>
<tr>
<td>The graph makes a straight line. Some are flat, some are steep but they are all straight lines.</td>
</tr>
</tbody>
</table>

d) Does this relationship represent a proportional relationship? Is the relationship equivalent? (Hint: Compare coordinate pairs as ratios.)

\[
\frac{\$2}{1\ km} = \frac{\$4}{2\ km}
\]

Now write your own.
B) 1. If each student walks 8 kilometers in the walkathon, how much money does each sponsor donate? Explain how you found your answer. (HINT: What is the equation for each plan? Look at A3.)

<table>
<thead>
<tr>
<th>Leanne walks 8 kilometers, how much money does each sponsor donate?</th>
<th>Leanne earns:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Gilberto walks 8 kilometers how much money does each sponsor donate? Gilberto earns $16.</td>
<td>Gilberto earns:</td>
</tr>
<tr>
<td>M = 2d + 0</td>
<td></td>
</tr>
<tr>
<td>M = 2 * 8 + 0</td>
<td></td>
</tr>
<tr>
<td>M = 16</td>
<td></td>
</tr>
<tr>
<td>Alana walks 8 kilometers how much money does each sponsor donate?</td>
<td>Alana earns:</td>
</tr>
</tbody>
</table>

B) 2. If each student receives $10 from a sponsor, how many kilometers does each student walk? Explain.

<table>
<thead>
<tr>
<th>Leanne walked:</th>
<th>Gilberto walked:</th>
<th>Alana walked:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leanne gets $10 no matter what.</td>
<td>If M = 10, then 10 = 0.5d + 5 so -5 -5 5 = 0.5d 5/0.5 = 0.5/0.5 d 10 = d</td>
<td>Alana walked 10 km.</td>
</tr>
</tbody>
</table>

B) 3. On which graph does the point (12, 11) lie? What information does this point represent?

The point (12,11) lies on Alana’s graph. This point represents that:

Alana walked_____km and earned $_____.

B) 4. In Alana’s plan, how is the fixed $5 donation represented in:

<table>
<thead>
<tr>
<th>the Table</th>
<th>the Graph</th>
<th>the Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5 is the first value on the table when x = 0. Alana earns $5 before she even starts walking.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Moving Straight Ahead
Problem 1.3-1
Modified Level 1/2

Students will use the following modified page of introduction workbook text and use graphic organizer handout for the problem questions.
Focus Question: What is the pattern of change in a linear relationship?

**Look at the graph.** Look for the dependent and independent variables.

The Dependent Variable is:
- the money donated
- the Y-axis

The Independent Variable is:
- the distance walked
- the X-axis

The pattern of change is expressed by an increase in the money donated and an increase in the distance walked.

The pattern of change is expressed by:

- An increase in the money donated
  And
- An increase in the distance walked.
Focus Question: What is the pattern of change in a linear relationship?

Look at Graphic Organizer for problem 1.3-1.

A) 3. Write an equation for each pledge plan.

If \( M = \text{money earned} \) (y)  
\( d = \text{distance walked in km} \) (x)

Write the number sentence in the Slope-Intercept Form: \( M = \text{slope} \times d + y\)-intercept

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10 donation regardless of how far she walks</td>
<td>$2 donation per kilometer (km)</td>
<td>$5 donations plus $0.50 per kilometer.</td>
</tr>
<tr>
<td>Leanne's sponsor will donate _____ dollars no matter how far she walks.</td>
<td>Gilberto's sponsor will donate _____ dollars a kilometer.</td>
<td>Alana's sponsor will donate _____ dollars plus 50 cents per kilometer.</td>
</tr>
<tr>
<td>( M = -0_d + 10 ) SO</td>
<td>( M = 2_d + 0 ) SO</td>
<td>( M = 0.50_d + 5 ) SO</td>
</tr>
</tbody>
</table>

Leanne Equation is: \( M = $10 \)  
Gilberto's Equation is: \( M = 2d \)  
Alana's Equation is: \( M = 0.50d + 5 \)

A) 4. For each plan:
   a) What is the pattern of change between the two variables in the table?

   Fill-in the blanks for 1 plan:
   The pattern of change in the table is expressed by a(n) ___________ in the value of the ___________ pledged and a(n) ___________ in the ___________ walked.

<table>
<thead>
<tr>
<th>Leanne's Pledge Plan</th>
<th>Gilberto's Pledge Plan</th>
<th>Alana's Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>No change $10</td>
<td>Money increases by $2 for each kilometer that Gilberto walks.</td>
<td>Money increases by $0.50 for each kilometer that she walks.</td>
</tr>
</tbody>
</table>

Problem 1.3-2
b) What is the pattern of change between the two variables graph?

1. **Circle** the number or words that represent the **pattern of change**.

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10 regardless of how far she walks</td>
<td>$2 per kilometer (km)</td>
<td>$5 donations plus $0.50 per kilometer.</td>
</tr>
</tbody>
</table>

The graph stays flat because there is no change in the money earned.

Money increases by $2 for 1 km

Money increases by $0.50 for 1 km

<table>
<thead>
<tr>
<th>Is the line straight?</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the line straight?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Is the line straight?</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Fill-in the blanks for 1 plan:

The pattern of change in the graph is expressed by a(n)_________ in the values of _____ axis and a(n)_________ in the values of _____ axis.

3. Where is the pattern of change between the two variables in the equation?

Copy the equations from A3 and **circle** the number or words that represent the **pattern of change** in the equation.

<table>
<thead>
<tr>
<th>Leanne’s Pledge Plan</th>
<th>Gilberto’s Pledge Plan</th>
<th>Alana’s Pledge Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ M = $____ ]</td>
<td>[ M = 2d ]</td>
<td>____ = 0.50d + ____</td>
</tr>
</tbody>
</table>

Fill-in a correct answer for 1 plan:

The pattern of change in the equation is expressed by the_________ before the independent variable ___d____.
c) How can you see if the relationship is linear from a table, a graph, or an equation?

**Underline** the word that describes the linear relationship in each.

<table>
<thead>
<tr>
<th>Table</th>
<th>Graph</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Walked (d) in m</td>
<td>Leanne's Money (M) in $</td>
<td>Gilberto's Money (M) in $</td>
</tr>
<tr>
<td>0</td>
<td>$10</td>
<td>$0</td>
</tr>
<tr>
<td>1</td>
<td>$10</td>
<td>$2</td>
</tr>
<tr>
<td>2</td>
<td>$10</td>
<td>$4</td>
</tr>
<tr>
<td>3</td>
<td>$10</td>
<td>$6</td>
</tr>
<tr>
<td>4</td>
<td>$10</td>
<td>$8</td>
</tr>
<tr>
<td>5</td>
<td>$10</td>
<td>$10</td>
</tr>
<tr>
<td>6</td>
<td>$10</td>
<td>$12</td>
</tr>
</tbody>
</table>

The graph is a **straight line**.

\[ M = 0.50d + 5 \]

---

d) Does this relationship represent a proportional relationship? Is the relationship equivalent? (Hint: Compare coordinate pairs as ratios.)

\[
\frac{\$2}{1 \text{ km}} = \frac{\$4}{2 \text{ km}}
\]

Now write your own. **LOOK!** at the table

\[
\frac{\text{ --------- }}{1 \text{ km}} = \frac{\text{ --------- }}{2 \text{ km}}
\]

Try it again!

\[
\frac{\text{ --------- }}{1 \text{ km}} = \frac{\text{ --------- }}{2 \text{ km}}
\]

Problem 1.3-2
B) 1. If each student walks 8 kilometers in the walkathon, how much money does each sponsor donate?

   Explain how you found your answer. (HINT: What is the equation for each plan? Look at A3.)

<table>
<thead>
<tr>
<th>Leanne walks 8 kilometers, how much money does each sponsor donate?</th>
<th>Leanne earns:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leanne earns only $10.</td>
<td>$10 only</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gilberto walks 8 kilometers how much money does each sponsor donate?</th>
<th>Gilberto earns:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gilberto earns $16.</td>
<td>M = 2d + 0</td>
</tr>
<tr>
<td></td>
<td>M = 2 * 8 + 0</td>
</tr>
<tr>
<td></td>
<td>M = 16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alana walks 8 kilometers how much money does each sponsor donate?</th>
<th>Alana earns:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alana earns $9.</td>
<td>M = 0.50 * 8 + 5</td>
</tr>
<tr>
<td></td>
<td>M = 4 + 5</td>
</tr>
<tr>
<td></td>
<td>M = 9</td>
</tr>
</tbody>
</table>

B) 2. If each student receives $10 from a sponsor, how many kilometers does each student walk? Explain.

<table>
<thead>
<tr>
<th>Leanne walked:</th>
<th>Gilberto walked:</th>
<th>Alana walked:</th>
</tr>
</thead>
</table>
| Leanne gets $10 no matter what. | If M = $10 then $10 = 2d + 0  
   $10 = 2d  
   10/2 = 2d/2  
   5 = d | If M = 10, then 10 = 0.5d + 5  
   so -5 -5  
   5 = 0.5d  
   5/0.5 = 0/0.5 d  
   10 = d |
| Gilberto walked _____ km. | Alana walked _____ km. |             |

B) 3. On which graph does the point (12, 11) lie? What information does this point represent?

Problem 1.3-2
The point \((12,11)\) lies on Alana’s graph.

Fill-in the blanks with the correct number 12 or 11:

This point represents that Alana walked _____ km and earned $_____.

B) 4. In Alana’s plan, how is the fixed $5 donation represented in:

But a box around the $5.00 in the table, graph and equation.

<table>
<thead>
<tr>
<th>Distance Walked (d)</th>
<th>Leanne’s Money Donated (M)</th>
<th>Gilberto’s Money Donated (M)</th>
<th>Alana’s Money Donated (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$10</td>
<td>$0</td>
<td>$5</td>
</tr>
<tr>
<td>1</td>
<td>$10</td>
<td>$2</td>
<td>$5.50</td>
</tr>
<tr>
<td>2</td>
<td>$10</td>
<td>$4</td>
<td>$6</td>
</tr>
<tr>
<td>3</td>
<td>$10</td>
<td>$6</td>
<td>$6.50</td>
</tr>
<tr>
<td>4</td>
<td>$10</td>
<td>$8</td>
<td>$7</td>
</tr>
<tr>
<td>6</td>
<td>$10</td>
<td>$10</td>
<td>$7.50</td>
</tr>
<tr>
<td>8</td>
<td>$10</td>
<td>$12</td>
<td>$8</td>
</tr>
</tbody>
</table>

\[ M = 0.50d + 5 \]
Modification Narrative for CMP3 Moving Straight Ahead Problem 1.3-2

I realized that lesson 1.3 was really too large to be one lesson so I divided it up into two.

Mainstream students have difficulty with the equation format and remembering which piece of information goes where so it is even more important to make the connection of the elements of the table, graph and equation more meaningful to aid ELLs, in fact all students to trigger memory devices.

Students will have made tables, graphs and plotted points on the coordinate plane but they have not worked yet at consciously connecting the two with a straight line and writing the equation of that line.

As with the first part of the lesson the original workbook text was dense and visually compact. I broke up and simplified the problem questions, focusing on the main concepts of this part of the lesson which were writing an equation and exploring the patterns of change on the table, graph and how that connects to the equation.

The modifications on the graphic organizer for levels 4, 3 are organizational with text simplified and some information provided. I created a reference page of the graph and information from part 1.3-1 that was meant for the level 1 & 2 but could be given to any student. I really broke out the questions even more basically for Level1 & 2 and included a lot of images from part one to refer to. I did include a less simplified version of the original question before I broke it down even more as I thought I should leave an example of the more complex question for students to see.

The warm-up of this lesson is to review the previous days’ work using the Frayer Model in 1.3-1 and reviewing a shared definition for the vocabulary words and the 1.3-1 graphic organizer with the hope that all students start this lesson with a shared understanding of the previous lesson about making the table and graph of each plan.
Lesson 3
Unit Selection Introduction

Unit Information

Lessons #1-3

Title of Unit: Moving Straight Ahead, Linear Relationships

Grade Level: 7th Grade Mathematics

Target Group: 7th Grade Sheltered Mathematics Class

Lesson Source: Stamford Public Schools Required Program -

Boston, MA: Pearson Prentice Hall.

1. I want my students to recognize the patterns in tables and graphs that connect to linear relationships.

2. I want my students to be able to construct tables, graphs and symbolic equations that represent linear relationships.

3. I want my students to convert information about a linear relationship presented in a verbal description, a table, a graph or an equation between one form to another.

4. I want my students to identify the slope, constant of proportionality, unit rate, rate of change, and the y-intercept in a verbal description, a graph, a table and an equation of a linear relationship.

5. I want my students to be able to solve linear equations.
## EL modifications for CMP3 Moving Straight Ahead Problem 2.4

**Jennifer Chichester**

<table>
<thead>
<tr>
<th>Content Objective</th>
<th>Language Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will be able to:</strong></td>
<td><strong>Students will be able to:</strong></td>
</tr>
<tr>
<td>1. Identify that pledge plans are represented by equations.</td>
<td>1. Working in small groups students will:</td>
</tr>
<tr>
<td></td>
<td>a. <em>discuss</em> and <em>conclude</em> what information each equation reveals about the pledge plan?</td>
</tr>
<tr>
<td></td>
<td>b. individually <em>create</em> a table for the data for each plan equation.</td>
</tr>
<tr>
<td></td>
<td>c. individually <em>create</em> graph for the data for each pledge plan in the problem then they will:</td>
</tr>
<tr>
<td></td>
<td>i. Discuss in domain specific language and label the parts of each graph that relates to the equation from that graph.</td>
</tr>
<tr>
<td>2. determine whether the graph of a linear relationship is increasing, decreasing, staying the same.</td>
<td>2. Working in small groups discuss and compare tables, graphs and equations, using domain specific language, and come to agreement on whether the three graphs are increasing, decreasing or staying the same.</td>
</tr>
<tr>
<td>3. Write equations that represent linear relationships given specific pieces of information, and describe what information the variables and numbers represent</td>
<td>3. Working in small groups students will <em>label the parts of the equation</em> and <em>explain</em> orally using domain specific language the terms in a linear equation.</td>
</tr>
<tr>
<td>4. Make connections among the points of a line, the pairs of data in a row on the table and the solution of an equation of the form ( y = mx + b ).</td>
<td>4. Working with a partner, students will use domain specific language to orally and in writing <em>describe</em> the the meaning of a set of point on the coordinate graph, on the table and where they are expressed in the equation and report back to the whole class what they determined.</td>
</tr>
<tr>
<td>Task/Domain</td>
<td>Level 5</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
</tr>
<tr>
<td>Task:</td>
<td>Working with MSA workbook and in small groups students will: <strong>discuss and conclude</strong> what information each equation reveals about the pledge plan.</td>
</tr>
<tr>
<td>Domain:</td>
<td>Identify that pledge plans are represented by equations.</td>
</tr>
<tr>
<td></td>
<td>Individually create a graph for the data of each pledge plan in the problem then they will discuss in domain specific language and label the parts of each graph that relates to the equation from that graph.</td>
</tr>
<tr>
<td></td>
<td><strong>Task:</strong> determine whether the graph of a linear relationship is increasing, decreasing, staying the same.</td>
</tr>
<tr>
<td>Task: Write equations that represent linear relationships given specific pieces of information, and describe what information the variables and numbers represent</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Domain:</strong> Speaking and Writing</td>
<td></td>
</tr>
<tr>
<td>Working in small groups: students will Write an equation that represents the linear relationship for each and label the parts of the equation orally using domain specific language the terms in a linear equation.</td>
<td></td>
</tr>
<tr>
<td>Working in small groups: students will label the parts of the equation using a word bank of domain specific language, and explain orally using domain specific language the terms in a linear equation.</td>
<td></td>
</tr>
<tr>
<td>Working in small groups: students will label the parts of the equation writing fill-in using a word bank of domain specific language and explain orally using domain specific language the terms in a linear equation.</td>
<td></td>
</tr>
<tr>
<td>Working in small groups: students will label the parts of the equation using a word or (picture) bank pick the correct images the terms in a linear equation, the table and graph. They will explain orally their choices.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task: Make connections among the points of a line, the pairs of data in a row on the table and the solution of an equation of the form ( y = mx + b ).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain:</strong> Speaking and Writing</td>
</tr>
<tr>
<td>Working with a partner, students will use domain specific language to orally and in writing describe the the meaning of point on the coordinate graph, where the same information is found on the table and where it is expressed in the equation. Students will report back to the whole class what they determined.</td>
</tr>
<tr>
<td>Working with a partner, a graphic organizer and a word bank, students will use domain specific language to orally and in writing describe the the meaning of point on the coordinate graph, where the same information is found on the table and where it is expressed in the equation. Students will report back to the whole class what they determined.</td>
</tr>
<tr>
<td>Working with a partner, a partially filled-in graphic organizer, sentence frames and a word bank, students will use domain specific language to orally and in writing describe the the meaning of point on the coordinate graph, where the same information is found on the table and where it is expressed in the equation. Students will report back to the whole class what they determined.</td>
</tr>
<tr>
<td>Working with a partner, a filled-in graphic organizer, sentence frames and a matching word bank, and color coding students will use domain specific language to orally (when able) and in writing match the the meaning of point on the coordinate graph, where the same information is found on the table and where it is expressed in the equation. Students will show the class what they determined.</td>
</tr>
</tbody>
</table>
Functional Notational Chart for CMP3 Moving Straight Ahead Problem 2.4

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Words</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking/ Writing</td>
<td>Identify information in a linear equation</td>
<td>For Plan 1: The <em><strong>1</strong></em> is the <em><strong>2</strong></em> in the equation. Plan 1 1. x, y, 5, -3 2. x-coordinate y-coordinate coefficient constant</td>
<td>Plan 1</td>
<td>Declarative sentences. Use of symbolic representation Prepositional Phrases Content Specific Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For Plan 2: The <em><strong>1</strong></em> is the <em><strong>2</strong></em> in the equation. Plan 2 1. x, y, -1, 6 2. x-coordinate y-coordinate coefficient constant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For Plan 3: The <em><strong>1</strong></em> is the <em><strong>2</strong></em> in the equation. Plan 3 1. x, y, 2 0 2. x-coordinate y-coordinate coefficient constant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The A student answer would be:
For Plan 1:
The x-coordinate is the ___x___ in the equation.
The y-coordinate is the ___y___ in the equation.
The coefficient is the ___5___ in the equation.
The constant is the ___-3___ in the equation.

For Plan 2:
The x-coordinate is the ___x___ in the equation.
The y-coordinate is the ___y___ in the equation.
The coefficient is the ___-1___ in the equation.
The constant is the ___6___ in the equation.
( note the b = (0,0) )

For Plan 3:
The x-coordinate is the ___x___ in the equation.
The y-coordinate is the ___y___ in the equation.
The coefficient is the ___2___ in the equation.
The constant is the ___0___ in the equation.

Speaking/Writing/Reading Analyze and Explain: determine whether the graph of a linear relationship is increasing, decreasing, staying the same.

The y-values ___1___ as the x-values increase on the graph of the equation, y = 5x – 3.
The y-values ___1___ as the x-values increase on the graph of the equation, y = -x + 6.
The y-values ___1___ as the x-values increase on the graph of the equation, y = 2.

1. increasing, decreasing, stay the same
2. increasing, decreasing, stay the same

The A student answer would be:
The y-values ___1___ as the x-values increase on the graph of the equation, y = 5x – 3.
The y-values ___1___ as the x-values increase on the graph of the equation, y = -x + 6.
The y-values ___1___ as the x-values increase on the graph of the equation, y = 2.

1. increasing, decreasing, stay the same

Problem 2.4
### Functional Notational Chart for CMP3 Moving Straight Ahead Problem 2.4

| Reading/Writing | Write equations that represent linear relationships given specific pieces of information, and describe what information the variables and numbers represent. | \[ _1 = _2 \times _3 + _4 \]  
|                 | ____1_____ = y (y-coordinate)  
|                 | ____2_____ = x (x-coordinate)  
|                 | ____3_____ = m (slope of the line OR the rate of change)  
|                 | ____4_____ = b (is the value of y when x = 0) | 1. Y-coordinate dependent variable,  
|                 | 2. x-coordinate independent variable,  
|                 | 3. m-slope (unit rate)  
|                 | 4. b- y-intercept (money donated at 0 km) | Adjectives  
|                 | Nouns  
|                 | Use of symbolic representation. |

**The A student answer would be:**
Dependent variable is equal to the independent times the rate of change plus the amount donated when the independent variable is equal to zero.

| Speaking/Writing | Make connections among the points of a line, the pairs of data in a row on the table and the solution of an equation of the form \( y = mx + b \). |  
|                 | The point (2,4) on the graph where ____1____ represents the x-coordinate, ____1____ represents the y-coordinate.  
|                 | On the table ____1____ is the x-value (in the x column) and ____1____ is the y value  
|                 | In the equation ____1____ is the x, ____1____ is the y,  
|                 | ____1____ is the coefficient before the x and b is the value of y when x = 0. | 1. 2, 4  
| Synthesize      | Declarative Sentences |

**The A student answer would be:** The point (2,4) on the graph where 2 represents the x-coordinate, 4 represents the y-coordinate. On the table, 2 is the x-value (in the x column) and 4 is the y value that results from evaluating the equation of the line with x = 2.
In the equation 2 is the x, 4 is the y 4/2 is the coefficient before the x and b is the value of y when x = 0.
Lesson Plan for:
Moving Straight Ahead Modified Problem 2.4 Connecting Tables, Graphs and Equations

This lesson is from the Connected Math Program 3 and a lesson plan format of the workshop model is used from the teacher’s guide.

Teacher: Jennifer Chichester

Grade Level and Subject: 7th Grade Sheltered Mathematics

Timing: Mid to end of school year.

Length of Period: 55 minutes

Expectation(s): Student will be familiar with simple tables, graphs and equations. Students will be familiar with how to place points on a coordinate plan and connect them.

Pre-lesson Notes:
• Use L1 in Frayer model for homework but students SHOULD NOT fill-in the definitions.

Resources/Materials: Graph paper for level 4/5, calculators, pencil, ruler, graphic organizers.

Activities:
Explanation of Slope:
Video - https://www.youtube.com/watch?v=8l_FlvL8TQA or Slope Dude - https://www.youtube.com/watch?v=ZcSriPiQvHQ both are good examples of the explanation of slope.

Frayer Model (Pages 15,16)

Word Wall Words (Pages 33-37). https://quizlet.com

Slope-Intercept Form – Print and laminate this page so students can use it repeatedly. (Page 14)

Teaching Strategies: Sheltered Modification for Levels 5-1

➢ Level 5 will be using Mainstream Workbook and Graph paper.
➢ Level 4-1 Modifications attached.

Pre-lesson exercise (5 mins):
➢ Students use the Frayer Model (Page 15, 16) and fill-in the models for the problem vocabulary. Students SHOULD NOT fill-in the definitions yet – The definitions will be agreed upon at the end of the lesson.

Warm-up (15 mins):
➢ Students watch a video on slope. Class will repeat key phrases in the video several times.

Problem Activity (25 mins):
➢ Teacher will review the steps of the problem and the work expectations.
➢ Teacher and students will read aloud problem the introduction using the workbook OR modified text provided. (Pages 23, 29).
➢ Teacher and Students will examine the three Plans and discuss what the information in each equation means.
➢ Teacher will model the explanation for the equation for Plan 1.
➢ In small groups students will answer question A1. Teacher will circulate and check for understanding.
➢ Teacher will review the steps of problem A2 and the work expectations.
➢ Teacher will start the first problem modeling the first few values in the table. (Pages 19, 25, 31)
➢ At this point student of different language levels will begin to work in small groups with students of similar language level on question A2 and A3. This lesson is similar to lesson 1.3 and student should be able to proceed independently.
➢ Teacher will circulate for understanding of the task and completion of the exercises.
➢ Teacher will the model for individuals when needed but students will be working through the problems in small groups at their own pace.
➢ Student will continue to work in small groups with students of similar language level on question B.
Teacher will check-in frequently with the following groups to check for understanding and completeness.
➢ In small groups Level 5&4 students will use textbook, graph paper and graphic organizers and proceed independently through the problem.
➢ In small groups Level 3 students will use graphic organizer to proceed at their own pace.
➢ In small groups Level 1&2 students will use graphic organizer and work with the teacher to proceed with the problem.
Wrap-up and Assessment (10 mins)-
➢ In a whole class group students and teacher will discuss the steps of the problem and how students completed them.
➢ Do they understand the connections between the table, the graph and the equation?

Homework:
Students can also practice vocabulary words on https://quizlet.com

Using their graphic organizer, Students will be expected to answer the following question:
How do you think you can use the graph to find the number of kilometers that Alana walked if each sponsored donated $17?

Students Level 1 &2 will be expected to color code page 13 as to what axis the red term is found and what axis the green term is found.
**Focus Question:** How are the solutions of an equation of the form \( y = mx + b \) related to the graph and the table for the same relationship.

<table>
<thead>
<tr>
<th>Original Text 5/4</th>
<th>Modified Text level 3</th>
<th>Modified Text level 2/1</th>
</tr>
</thead>
</table>
| **Problem 2.4 Problem Setup Text** | Alana’s pledge plan from Problem 1.3. = Alana’s sponsors will make a $5 donations plus $0.50 per kilometer. \[ A = \text{dollars earned} \]
\[ d = \text{kilometers walked.} \]
Then the equation = Alana’s pledge plan: \[ A = 5 + 0.50d \] | Alana’s pledge plan from Problem 1.3. = Alana’s sponsors will make a $5 donations plus $0.50 per kilometer. \[ A = \text{dollars earned} \]
\[ d = \text{kilometers walked.} \]
Then the equation = Alana’s pledge plan: \[ A = 5 + 0.50d \] |

Explain why the point (14, 12) is on the graph of Alana’s pledge plan.

![Alana’s Pledge Plan](image)

- The point (14, 12) is on the graph of Alana’s pledge plan.

Write a question you could answer by locating this point. (14, 12)

- How can you use the equation for Alana’s pledge plan to check the answer to the question you made up?

Write a question you could answer by locating this point. (14, 12)

- How far did Alana walk if sponsor donates 12 dollars?
- Or How much money would Alana earn if she walked 14 km?

Write a question ?? about the point (14, 12). Example:
- How far did Alana walk if sponsor donates 12 dollars?
- Or How much money would Alana earn if she walked 14 km?
How can you use a graph to find the number of kilometers that Alana walks if a sponsor pays her $17? How could you use an equation to answer this question?

In the next problem, you will investigate similar questions relating to pledge plans for a walkathon.

Problem Questions- in workbook or modified handout:

Consider the following pledge plans. In each equation, \( y \) is the amount pledged in dollars, and \( x \) is the number of kilometers walked.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
</tbody>
</table>

\[ y = \text{dollars earned} \]
\[ x = \text{kilometers walked.} \]

A) For each pledge plan:

1. What information does the equation give about the pledge plan? Does the plan make sense?

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
</tbody>
</table>

- \( y = y\)-coordinate
- \( x = x\)-coordinate
- \( 5 = \$5 \) unit rate
- \(-3 = \$3\) donation when km walked = 0

Yes subtract $3!

- \( 6 = \$6\) donation when km walked = 0

Yes subtract $3!
2. Make a table for values of x from -5 to 5.
3. Sketch a graph.
4. Do the y-values increase, decrease, or stay the same as the x-values increase?

- What does the equation tell about the pledge plan?
- Does the plan make sense?

2. Complete the table for x from -5 to 5.
3. Sketch a graph for each plan.
4. As the x-values increase,
   - do the y-values increase,
   - do the y-values decrease,
   - OR do the y-values stay the same?

2. Look at the table for x from -5 to 5.
3. Look at the graph.
4. x-values increase, \( \uparrow \)
   do y-values \( \uparrow \) increase,
   do y-values \( \downarrow \) decrease,
   OR do y-values stay the same? \( \equiv \)

Explain how you can use a graph, table, or equation to answer Question A, part (4).

As the x-values increase use the graph, table, and equation to explain how y-values increase, decrease, or stay the same.

As the x-values increase on the graph, the as the y-values ____________.

As the x-values increase on the table, the as the y-values ____________.

As the x-values increase in the equation, the as the y-values ____________.
C. 1.

2. How do the coordinates (2, 4) relate to the equation of the line?

   Which graph from Question A, part (3), can be traced to locate the point (2, 4)?

   To the corresponding table of data?

3. Write a question you could answer by locating this point.

   No C question for level 3 yet.

   No C questions for levels 1 & 2 yet.
Alana's Plan

\[ A = 0.5d + 5 \]
If \( M = y \) and \( d = x \) then write the equations in Slope-Intercept Form \( y = mx + b \).

Use the word bank below to make 1 equation.

The equation of the line for ______ is \( y = ___x + ___ \)

<table>
<thead>
<tr>
<th>Word Bank</th>
<th>Gilberto</th>
<th>Alana</th>
<th>Leanne</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.05</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Moving Straight Ahead
Problem 2.4 Pre-lesson Homework

Teacher Instructions:
Copy 3 pages of Frayer Model for each student.
Use the Frayer Model to have students pre-learn the problem vocabulary. Students should fill in the vocabulary word in the center, write a synonym or cognate for the word, give an example or draw a picture, list facts or characteristics they already know about the vocabulary word and create a non-example if they can. **Students should not write the definition in this pre-lesson activity**, we will discuss the terms during the exercise and come up with a definition together at the end of the lesson. Students can use the Moving Straight Ahead workbook glossary and are encouraged to use their L1. The purpose of this activity is to get the students thinking about the problem vocabulary.

Students can create a unit flipbook or interactive notebook pages.

Vocabulary List:

1. Slope
2. Rate of Change
3. Coefficient
4. Constant
5. y-intercept
6. Coordinate Pair
Moving Straight Ahead
Problem 2.4
Level 5 NOT Modified.

Students will use the CMP3 Moving Straight Ahead workbook and graph paper for the entire problem.

They will be grouped with level 4 students where appropriate.
Moving Straight Ahead
Problem 2.4
Modified Level 4

Students will use workbook for problem introduction text and use the following graphic organizer handout for the problem questions.
Moving Straight Ahead

Problem 2.4 – Connecting Tables, Graphs, and Equations

Focus Question: How are the solutions of an equation of the form \( y = mx + b \) related to the graph and the table for the same relationship.

Consider the following pledge plans. In each equation,
\( y \) is the amount of dollars earned.
\( x \) is the number of kilometers walked.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
</tbody>
</table>

A1. What information does the equation give about the pledge plan? Does the plan make sense?

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start at -3 (owe $3)</td>
<td>Start at_____</td>
<td>Start at_____</td>
</tr>
<tr>
<td>Earn $5 per km.</td>
<td>Earn_____</td>
<td>Earn_____</td>
</tr>
<tr>
<td>Not sure owing $$ makes sense.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Make a table for values of \( x \) from -5 to 5.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x )</td>
<td>( y )</td>
<td>( x )</td>
</tr>
<tr>
<td>-5</td>
<td></td>
<td>-5</td>
</tr>
<tr>
<td>-4</td>
<td></td>
<td>-4</td>
</tr>
<tr>
<td>-3</td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td>-2</td>
</tr>
<tr>
<td>-1</td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
3. Sketch a graph for each plan using the tables you created.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Graph for Plan 1" /></td>
<td><img src="image2.png" alt="Graph for Plan 2" /></td>
<td><img src="image3.png" alt="Graph for Plan 3" /></td>
</tr>
</tbody>
</table>

4. Examine each graph explain if the $y$-values increase, decrease, or stay the same as the $x$-values increase?

<table>
<thead>
<tr>
<th>Which graph: enter plan #1, 2, or 3</th>
<th>Explain:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases 🚀</td>
<td>The $y$-values ________ as the $x$-values ________ on the graph of the equation, $y = 5x - 3$</td>
</tr>
<tr>
<td>Decreases 🔽</td>
<td>The $y$-values ________ as the $x$-values ________ on the graph of the equation, $y = -x + 6$</td>
</tr>
<tr>
<td>Stays the same =</td>
<td>The $y$-values ________ as the $x$-values ________ on the graph of the equation, $y = 2$.</td>
</tr>
</tbody>
</table>
B) Answer the following questions based on part A.

1. Which line graphed from question A3 contains the point (2, 4) ?

2. How do the coordinates (2, 4) relate to the equation of the line? To the corresponding table of data?

3. Write a question you could answer by locating this point.

Example:

How far would you have to walk to earn $4 ?
Moving Straight Ahead
Problem 2.4
Modified Level 3

Students will use modified introduction text and the following graphic organizer handout for the problem questions.
2.4 Connecting Tables, Graphs, and Equations

Look again at Alana's pledge plan from Problem 1.3. Set the amount raised in dollars and \( d \) represents the distance walked in kilometers. You can express this plan with the equation:

\[
A = \text{dollars earned} \quad d = \text{kilometers walked.}
\]

The equation is Alana's pledge plan:

\[
A = 5 + 0.50d
\]

The point (14, 12) is on the graph of Alana's pledge plan.

Write a question you could answer by locating this point (14, 12).

Example:

- How far did Alana walk if a sponsor donates $12 dollars?
- Or How much money would Alana earn if she walked 14 km?

If dollars earned is $17 about how much are the kilometers walked?

Consider the following pledge plans. In each equation, \( y \) is the amount pledged in dollars by each sponsor, and \( x \) is the distance walked in kilometers.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
</tbody>
</table>

\( y = \text{dollars earned} \quad x = \text{number of kilometers walked.} \)
Focus Question: How are the solutions of an equation of the form $y = mx + b$ related to the graph and the table for the same relationship.

Consider the following pledge plans. In each equation:
- $y$ is the amount of dollars earned.
- $x$ is the number of kilometers walked.

A1. What information does the equation give about the pledge plan? Does the plan make sense?

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 5x - 3$</td>
<td>$y = -x + 6$</td>
<td>$y = 2$</td>
</tr>
<tr>
<td>$y$ = $y$-coordinate</td>
<td>$y$ =</td>
<td>$y$ =</td>
</tr>
<tr>
<td>$x$-coordinate</td>
<td>$x$ =</td>
<td>$x$ =</td>
</tr>
<tr>
<td>5 = $5 \text{ unit rate}$</td>
<td>-1 =</td>
<td>?</td>
</tr>
<tr>
<td>What does (-) mean?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-3 = $3 \text{ donation when km walked} = 0$</td>
<td>6 =</td>
<td>2 =</td>
</tr>
<tr>
<td>Yes subtract $3$!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. a) Make a table for values of \( x \) from -5 to 5.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
<tr>
<td>( x )</td>
<td>( y )</td>
<td>( x )</td>
</tr>
<tr>
<td>-5</td>
<td>5(-5) - 3 = -28</td>
<td>-5</td>
</tr>
<tr>
<td>-4</td>
<td></td>
<td>-4</td>
</tr>
<tr>
<td>-3</td>
<td>5(-5) - 3 =</td>
<td>-3</td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td>-2</td>
</tr>
<tr>
<td>-1</td>
<td>5(-5) - 3 =</td>
<td>-1</td>
</tr>
<tr>
<td>0</td>
<td>5(-5) - 3 =</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5(-5) - 3 =</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>5(-5) - 3 =</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
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<td>4</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
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<td>8</td>
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<td>9</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

b) How are the numbers in the table changing?

Plan 1

x changes by ____________

y changes by ____________

Plan 2

x changes by ____________

y changes by ____________

Plan 3

x changes by ____________

y changes by ____________

Problem 2.4
3. Sketch a graph for each plan using the tables you created.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Graph 1]</td>
<td>![Graph 2]</td>
<td>![Graph 3]</td>
</tr>
</tbody>
</table>

4. Examine each graph explain if the y-values increase, decrease, or stay the same as the x-values increase?

<table>
<thead>
<tr>
<th>Which graph: enter plan #1, 2, or 3</th>
<th>Explain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases</td>
<td>The y-values ___________ as the x-values ___________ on the graph of the equation, y = 5x – 3.</td>
</tr>
<tr>
<td>Decreases</td>
<td>The y-values ___________ as the x-values ___________ on the graph of the equation, y = -x + 6.</td>
</tr>
<tr>
<td>Stays the same</td>
<td>The y-values ___________ as the x-values ___________ on the graph of the equation, y = 2.</td>
</tr>
</tbody>
</table>
B) Answer the following questions based on part A.

1. Which line graphed from question A3 contains the point (2, 4)?

   Answer: Graph of Plan 2
   How do you know this is true? (Hint: use the equation of the plan $y = -x + 6$)

2. (Hint: use the equation of the plan $y = -x + 6$)
   a) How do the coordinates (2, 4) relate to the equation of the line?

   b) To the corresponding table of data?

   |   |   |
---|---|
-1 | -1(-1) + 6 = 7 |
0  | -1(0) + 6 = 6   |
1  | -1(1) + 6 = 5   |
2  | -1(2) + 6 = 4   |
3  | -1(3) + 6 = 3   |
4  | -1(4) + 6 = 2   |
5  | -1(5) + 6 = 1   |

3. Write a question you could answer by locating this point.

Example:

How far would you have to walk to earn $4$ ?.
Moving Straight Ahead
Problem 2.4
Modified Level 1 & 2

Students will use modified introduction text and the following graphic organizer handout for the problem questions.
2.4 Connecting Tables, Graphs, and Equations

Look again at Alana's pledge plan from Problem 1.3. $5 will make $12 donations plus $0.50 per kilometer. You can express this plan with the equation:

\[ A = \text{dollars earned} \]
\[ d = \text{kilometers walked} \]

Alana's pledge plan:

\[ A = 5 + 0.50d \]

The point (14, 12) is on the graph of Alana's pledge plan.

Write a question you could answer by locating this point.

(14, 12)

Example:

How far did Alana walk if a sponsor donates $17? How could you use an equation to answer this question?

In this Problem, you will investigate similar questions relating to pledge plans for a walkathon.

Problem 2.4

Consider the following pledge plans. In each equation, \( y \) is the amount in dollars by each sponsor, and \( x \) is the distance walked in kilometers.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
</tbody>
</table>

\( y = \text{dollars earned} \)

\( x = \text{number of kilometers walked} \)

\[
\begin{array}{|c|c|c|}
\hline
\text{Plan 1} & \text{Plan 2} & \text{Plan 3} \\
\hline
y = 5x - 3 & y = -x + 6 & y = 2 \\
\hline
\end{array}
\]
Consider the following pledge plans. In each equation,

- \( y \) is the amount of dollars earned.
- \( x \) is the number of kilometers walked.

A1. What information does the equation tell pledge plan? Does it make sense?

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = 5x - 3 )</td>
<td>( y = -x + 6 )</td>
<td>( y = 2 )</td>
</tr>
<tr>
<td>( y = y)-coordinate</td>
<td>( y = y)-coordinate</td>
<td>( y = 2 )</td>
</tr>
<tr>
<td>( x = x)-coordinate</td>
<td>( x = x)-coordinate</td>
<td>( x = 0 )</td>
</tr>
<tr>
<td>5 = $5 unit rate</td>
<td>-1 = -$1 unit rate</td>
<td>There is no increasing unit rate.</td>
</tr>
<tr>
<td>\textit{What does (−) mean?}</td>
<td>We take away $1 every time.</td>
<td></td>
</tr>
<tr>
<td>-3 = $3 earned when km walked = 0</td>
<td>6 = $6 earned when Km walked = 0</td>
<td>2 = $2</td>
</tr>
<tr>
<td>\textit{Yes, subtract $3!}</td>
<td>The plan starts out $3 in debt.</td>
<td>The plan only earns $2.</td>
</tr>
<tr>
<td>Owe $3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Make a table for values of $x$ from -5 to 5.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 5x - 3$</td>
<td>$y = -x + 6$</td>
<td>$y = 2$</td>
</tr>
<tr>
<td>$x$</td>
<td>$x$</td>
<td>$x$</td>
</tr>
<tr>
<td>-5</td>
<td>-5</td>
<td>-5</td>
</tr>
<tr>
<td>5(-5) - 3 = -28</td>
<td>-1(-5) + 6 = 11</td>
<td>2</td>
</tr>
<tr>
<td>-4</td>
<td>-4</td>
<td>-4</td>
</tr>
<tr>
<td>5(-4) - 3 = -23</td>
<td>-1(-4) + 6 = 10</td>
<td>2</td>
</tr>
<tr>
<td>-3</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>5(-3) - 3 = -18</td>
<td>-1(-3) + 6 = 9</td>
<td>2</td>
</tr>
<tr>
<td>-2</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>5(-2) - 3 = -13</td>
<td>-1(-2) + 6 = 8</td>
<td>2</td>
</tr>
<tr>
<td>-1</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>5(-1) - 3 = -8</td>
<td>-1(-1) + 6 = 7</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5(0) - 3 = -3</td>
<td>-1(0) + 6 = 6</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5(1) - 3 = 2</td>
<td>-1(1) + 6 = 5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5(2) - 3 = 7</td>
<td>-1(2) + 6 = 4</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5(3) - 3 = 12</td>
<td>-1(3) + 6 = 3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5(4) - 3 = 17</td>
<td>-1(4) + 6 = 2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5(5) - 3 = 22</td>
<td>-1(5) + 6 = 1</td>
<td>2</td>
</tr>
</tbody>
</table>

Look at the table above. How do the numbers change?

- Plan 1: $y = 5x - 3$
- Plan 2: $y = -x + 6$
- Plan 3: $y = 2$

Problem 2.4
3. Sketch a graph for each plan using the tables you created. Using a colored pencil:

- Put red dot ⬤ on the y-intercept.
- Mark the slope or rate of change with Blue.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 5x - 3$</td>
<td>$y = -x + 6$</td>
<td>$y = 2$</td>
</tr>
</tbody>
</table>

4. Examine each graph explain if the y-values increase, decrease, or stay the same as the x-values increase?

<table>
<thead>
<tr>
<th>Which graph: enter plan #1, 2, or 3</th>
<th>Explain: Fill-in the Bold word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases</td>
<td>The y-values ______ as the x-values increase on the graph of the equation, $y = 5x - 3$.</td>
</tr>
<tr>
<td>Decreases</td>
<td>The y-values ______ as the x-values increase on the graph of the equation, $y = -x + 6$.</td>
</tr>
<tr>
<td>Stays the same</td>
<td>The y-values ______ as the x-values increase on the graph of the equation, $y = 2$.</td>
</tr>
</tbody>
</table>
Coefficient

The number in front of a variable.

\[4x - 7 = 5\]
Coordinate Pair

3a

\((x, y)\)

Ordered Pair

An ordered pair of numbers that identifies a point on a coordinate plane.

3b

Problem 2.4
Constant

\[ 4x - 7 = 5 \]

A term that does not contain a variable.
Slope

The steepness of a line on a graph, equal to its vertical change divided by its horizontal change.

Problem 2.4
y - intercept

Where the line crosses the y-axis.
Modification Narrative for CMP3 Moving Straight Ahead Problem 2.4

This lesson gets even more weighty and abstract into algebraic thinking and connecting concepts. I needed to boil down to concepts to clear and concise lesson objectives. The activities also needed to be clarified as well. I decided to focus only on the first two question sections A & B as C, D, E deviate from the original data and story too quickly.

I picked this lesson because it reviews the skills that were taught in lesson 1.3-1 and 1.3-2, creating a table and a graph from problem information. However, this problem starts with the equation and focuses on extracting the information in the equations from the other elements- the table and the graph.

I modified the text on original introduction pages and included leveled scaffolds. I used the original pages and added modified text boxes so the students could see most of the original workbook pages.

Again I had to break up the text and add visual organization tools. I simplified the wording of the text and broke out the essential questions, scaffolding the level of support. I added a variety of exercises such as coloring, fill-in and word banks.

The lesson begins with an exercise (review) of the slope-intercept form (page 14). Using the equations from Problem 1.3-2, student will practice filling-in the pieces of information for the equations they have already written. My intent was to have this page laminated for use many times. Word Wall words were also added for student and classroom use.

I also included a few videos you may want to show the students as an introduction to this lesson and may well find that you want to show them more than once. I have used both of them and my students never forget Slope Dude! These are clear and concise videos with good visuals and well-paced audio. I tried to add more visual space for the level 1&2 even thought the lesson is long. This is a pretty complex problem and I hope my modifications aid ELs in accessing these difficult algebraic concepts.

Problem 2.4
Checklists
Write the page numbers and any other identifying features to identify those parts of your lessons that employ the following strategies.

<table>
<thead>
<tr>
<th>SHELTERED STRATEGIES</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Contextualize Lesson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.A. Build and Activate Background Knowledge</td>
<td>9, 10</td>
<td>5</td>
<td>13,14,15</td>
</tr>
<tr>
<td>I.B. Develop Vocabulary</td>
<td>11, 12</td>
<td>5</td>
<td>15,16</td>
</tr>
<tr>
<td>I.C. Use extensive Visuals, Realia, Manipulatives, &amp; Gestures</td>
<td>13</td>
<td>12</td>
<td>7,14, 15</td>
</tr>
<tr>
<td>I.D. Model (Instructions, Processes)</td>
<td>16,21,26</td>
<td>5,6</td>
<td>19,25,31</td>
</tr>
<tr>
<td>I.E. Create Opportunities To Negotiate Meaning</td>
<td>17,22,27</td>
<td>14,18,23</td>
<td>19,25,31</td>
</tr>
<tr>
<td>II. Make Text Comprehensible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.A. Intentional Use of Graphic Organizers</td>
<td>16-27</td>
<td>12-25</td>
<td>19-32</td>
</tr>
<tr>
<td>II.B. Modify Written Text</td>
<td>16-27</td>
<td>12-25</td>
<td>19-32</td>
</tr>
<tr>
<td>II.C. Amplify Number of Activities per Text</td>
<td>16,21,26</td>
<td>18-25</td>
<td>24-32</td>
</tr>
<tr>
<td>III. Make Talk Comprehensible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.A. Pace Teacher’s Speech</td>
<td>4,5</td>
<td>5,6</td>
<td>7,8</td>
</tr>
<tr>
<td>III.B. Use of Listening Guides</td>
<td>13</td>
<td>7,14</td>
<td></td>
</tr>
<tr>
<td>III.C. Use of Word Walls</td>
<td>9,10</td>
<td>From Lesson 1</td>
<td>15,16</td>
</tr>
<tr>
<td>III.D. Frame Main Ideas</td>
<td>16,21,26</td>
<td>12,16,20</td>
<td>19,24,30</td>
</tr>
<tr>
<td>III.E.. Check for Understanding</td>
<td>16-27</td>
<td>5,6</td>
<td>7,8</td>
</tr>
<tr>
<td>IV. Change Traditional Classroom Talk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV.A. Use Teacher Question and Response Strategies</td>
<td>9,12,13</td>
<td>5,6</td>
<td>7,8</td>
</tr>
<tr>
<td>IV.B. Practice Instructional Conversations</td>
<td>4,5</td>
<td>20</td>
<td>19,25,31</td>
</tr>
<tr>
<td>V. Engage at Appropriate Language Proficiency Levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.A. Vary Question Techniques based on Student’s Language Proficiency level— in conversations, activities, and assessments</td>
<td>4,5</td>
<td>5,6</td>
<td>7,8</td>
</tr>
<tr>
<td>VI. Give Students Voice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.A. Challenge students to produce extended academic talk</td>
<td>5</td>
<td>6,HW</td>
<td>HW</td>
</tr>
<tr>
<td>VI.B. Model Language for Oral and Written Production</td>
<td>5</td>
<td>16,17,18,24</td>
<td>20,26,32</td>
</tr>
<tr>
<td>VI.C. Use Group/Pr. Work to Elicit Student Talk; Students as Researchers</td>
<td>5</td>
<td>5,6</td>
<td>7,8</td>
</tr>
<tr>
<td>VI.D. Respond to Student’s Voice – Writing and Error Correction</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Grammar and Functions Check List

<table>
<thead>
<tr>
<th>Grammar</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declarative sentences.</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Noun phrase + b</td>
<td>1, 2</td>
</tr>
<tr>
<td>Use of symbolic representation</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Indicators of possession</td>
<td>1, 2</td>
</tr>
<tr>
<td>Capitalization of proper nouns</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Adjectives</td>
<td>2, 3</td>
</tr>
<tr>
<td>Nouns</td>
<td>2</td>
</tr>
<tr>
<td>Past tense</td>
<td>2</td>
</tr>
<tr>
<td>Use of proper nouns.</td>
<td>2</td>
</tr>
<tr>
<td>Prepositional phrases.</td>
<td>3</td>
</tr>
<tr>
<td>Adding –ing suffix or Present Participle</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functions</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Analyze</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Explain</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Synthesize</td>
<td>2, 3</td>
</tr>
</tbody>
</table>
Original
Lessons
Four other friends who are part of the walkathon made the following representations of their data. Could any of these relationships be linear relationships? Explain.

<table>
<thead>
<tr>
<th>George's Walking Rate</th>
<th>Elizabeth's Walking Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (seconds)</td>
<td>Distance (meters)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

Billie's Walking Rate
\[ D = 2.25t \]
\[ D \text{ represents distance} \]
\[ t \text{ represents time} \]

Bob's Walking Rate
\[ t = \frac{100}{r} \]
\[ t \text{ represents time} \]
\[ r \text{ represents walking rate} \]

Homework starts on page 16.

### 1.3 Raising Money Using Linear Relationships

In *Variables and Patterns*, you looked at situations that involved dependent and independent variables. In Problem 1.2, the distance walked depended on the time. This tells you that distance is the dependent variable and time is the independent variable. In this Problem, you will look at relationships between two other variables in a walkathon.

Each participant in the walkathon must find sponsors to pledge a certain amount of money for each kilometer the participant walks.
The students in Ms. Chang’s class are trying to estimate how much money they might be able to raise. Several questions come up in their discussions:

- What variables can affect the amount of money that is collected?
- How can you use these variables to estimate the amount of money each student will collect?
- Will the amount of money collected be the same for each walker?

Each student found sponsors who are willing to pledge money according to the following descriptions.

- Leanne’s sponsors will donate $10 regardless of how far she walks.
- Gilberto’s sponsors will donate $2 per kilometer (km).
- Alana’s sponsors will make a $5 donation plus 50¢ per kilometer.

The class refers to these as **pledge plans**.

Tables, graphs, and equations will help you predict how much money might be raised with each plan.

- What are the dependent and independent variables?

Who will raise the most money after \( d \) kilometers?

---

**Problem 1.3**

1. Make a table for each student’s pledge plan. Show the amount of money each of his or her sponsors would donate if he or she walked distances from 0 to 6 kilometers. What are the dependent and independent variables?

2. Graph the three pledge plans on the same coordinate axes. Use a different color for each plan.
3. For each pledge plan, write an equation that represents the relationship between the distance walked and the amount of money donated. Explain what information each number and variable in the equations represents.

4. For each plan:
   a. What pattern of change between the two variables do you observe in the table?
   b. How does this pattern appear in the graph? In the equation?
   c. How can you determine if a relationship is linear from a table, a graph, or an equation?
   d. Does this relationship represent a proportional relationship?

   1. Suppose each student walks 8 kilometers in the walkathon. How much money does each sponsor donate? Explain how you found your answer.
   2. Suppose each student raises $10 from a sponsor. How many kilometers does each student walk? Explain.
   3. On which graph does the point (12, 11) lie? What information does this point represent?
   4. In Alana’s plan, how is the fixed $5 donation represented in
      a. the table?
      b. the graph?
      c. the equation?

   Gilberto decides to give a T-shirt to each of his sponsors. Each shirt costs him $4.75. He plans to pay for each shirt with some of the money he raises from each sponsor.

   1. Write an equation that represents the amount of money Gilberto raises from each sponsor after he has paid for the T-shirt. Explain what information each number and variable represents.
   2. Graph the equation for distances from 0 to 5 kilometers. Compare this graph to the graph of Gilberto’s pledge plan in Question A, part (2).
   3. Is this relationship linear? Explain.

ACE Homework starts on page 16.
### Pledge Plans

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Amount of Money</th>
<th>Alana</th>
<th>Gilberto</th>
<th>Leanne</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
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</tr>
</tbody>
</table>

#### 2.

**Pledge Plans**

![Graph](#)
2.4 Connecting Tables, Graphs, and Equations

Look again at Alana's pledge plan from Problem 1.3. Suppose $A$ represents the amount raised in dollars and $d$ represents the distance walked in kilometers. You can express this plan with the equation $A = 5 + 0.5d$.

![Alana's Pledge Plan](Image)

- Explain why the point (14, 12) is on the graph of Alana’s pledge plan.
- Write a question you could answer by locating this point.
- How can you use the equation for Alana’s pledge plan to check the answer to the question you made up?
- How can you use a graph to find the number of kilometers that Alana walks if a sponsor donates $17? How could you use an equation to answer this question?

In this Problem, you will investigate similar questions relating to pledge plans for a walkathon.

**Problem 2.4**

Consider the following pledge plans. In each equation, $y$ is the amount pledged in dollars by each sponsor, and $x$ is the distance walked in kilometers.

<table>
<thead>
<tr>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 5x - 3$</td>
<td>$y = -x + 6$</td>
<td>$y = 2$</td>
</tr>
</tbody>
</table>

Moving Straight Ahead
For each pledge plan:

1. What information does the equation give about the pledge plan? Does the plan make sense?
2. Make a table of values of x from -5 to 5.
3. Sketch a graph of the relationship. What part of each graph is relevant to the situation?
4. Do the y-values increase, decrease, or stay the same as the x-values increase? Explain how you can find the answer using a table, a graph, or an equation.

B
1. Which graph from Question A, part (3) contains the point (2, 4)?
2. How do the coordinates (2, 4) relate to the equation of the line? To the corresponding table of data?
3. Write a question you could answer by locating this point.

C
1. Which relationship has a graph you can use to find the value of x that makes $8 = 5x - 3$ a true statement?
2. How does finding the value of x in $8 = 5x - 3$ help you find the coordinates for a point on the graph of the relationship?

D
The following three points all lie on the graph of the same plan:

$(-7, 13)$  $(1.2, \_\_\_\_)$  $(\_\_\_, -4)$

1. Two of the points have a missing coordinate. Find the missing coordinate. Explain how you found it.
2. Write a question you could answer by finding the missing coordinate.

E
1. Describe how a point on a graph is related to a table and an equation that represent the same relationship.
2. How can you use a table, a graph, or an equation that represents the relationship $y = 5x - 3$ to
   a. find the value of y when $x = 7$?
   b. find the value of $x$ when $y = 23$?

ACE Homework starts on page 38.
3.4 Solving Linear Equations

To maintain the equality of two expressions, you can add, subtract, multiply, or divide each side of the equality by the same number. These are called the **properties of equality**. In the last Problem, you applied properties of equality and numbers to find a solution to an equation.

So far in this Investigation, all of the situations have involved positive whole numbers.

- Does it make sense to think about negative numbers in a coin situation?
- Does it make sense to think about fractions in a coin situation?

What strategies do you have for solving an equation like $-2x + 10 = 15$?

You have used the properties of equality to solve equations involving pouches and coins. These properties are also useful in solving all linear equations.

**Problem 3.4**

For parts 1–3:
- Record each step you take to find your solution.
- Then, check your answer.

1. a. $5x + 10 = 20$      b. $5x - 10 = 20$      c. $5x + 10 = -20$
   d. $5x - 10 = -20$      e. $10 - 5x = 20$      f. $10 - 5x = -20$

2. a. $\frac{1}{3}x + 6 = 12$      b. $1\frac{1}{2} + 2x = 6\frac{1}{2}$      c. $\frac{3}{5} = -x + 1$
   d. $3.5x = 130 + 10x$      e. $15 - 4x = 10x + 45$

3. a. $3(x + 1) = 21$      b. $2 + 3(x + 1) = 6x$      c. $-2(2x - 3) = -2$
B Below are examples of students' solutions to the equations from Question A, part (3) above. Is each solution correct? If not, explain what the error is.

3(x + 1) = 21

Corry's Solution
3 times something in the parentheses must be 21.
So 3( ) = 21.
The something is 7.
So x + 1 = 7, and
x = 6.

2 + 3(x + 1) = 6x

Hadden's Solution
2 + 3(x + 1) is equivalent to 5(x + 1).
So I can rewrite the original equation as 5(x + 1) = 6x.
Using the Distributive Property, this is the same as
5x + 5 = 6x.
Subtracting 5x from each side, I get 5 = 1x.
So x = 5.

-2(2x - 3) = -2

Jackie's Solution
By using the Distributive Property on the left-hand
side of the equality, I get -4x - 6 = -2.
By adding 6 to each side, I get -4x = 4.
By dividing both sides by -4, I get x = -1.

C Describe the strategies you have used for solving linear equations. When might you use one over another?

Homework starts on page 69.
Throughout this Unit, you have learned several ways to model linear relationships. You have also learned ways to move back and forth between tables, graphs, and equations to solve problems. The next Problem pulls some of these ideas together.

Problem 4.4

Today is Chantal's birthday. Her grandfather gave her some money as a birthday gift. Chantal plans to put her birthday money in a safe place and add part of her allowance to it each week. Her sister, Chanice, wants to know how much their grandfather gave her and how much of her allowance she is planning to save each week. As usual, Chantal does not answer her sister directly. Instead, she wants her to figure out the answer for herself. She gives her these clues:

After five weeks, I will have saved a total of $175
After eight weeks, I will have saved $190.

1. How much of her allowance is Chantal planning to save each week?
2. How much birthday money did Chantal's grandfather give her?
3. Write an equation for the total amount of money A Chantal will have saved after \( n \) weeks. What information do the \( y \)-intercept and coefficient of \( n \) represent in this context?

continued on the next page >
In the United States, temperature is measured using the Fahrenheit scale. Some countries, such as Canada, use the Celsius temperature scale. In cities near the border of these two countries, weather forecasts present the temperature using both scales.

The relationship between degrees Fahrenheit and degrees Celsius is linear. Two important reference points for this relationship are:

- Water freezes at 0°C, which is 32°F.
- Water boils at 100°C, which is 212°F.

1. Use this information to write an equation relating degrees Fahrenheit and degrees Celsius.

2. How did you find the y-intercept? What does the y-intercept tell you about this situation?

3. A news Web site uses the image below to display the weather forecast. However, some of the temperatures are missing. Use your equation from part (1) to find the missing temperatures.

---

[Weather forecast image with temperatures and days of the week: Mon, Tues, Wed, Thurs, Fri. Temperature values include: 13°C, 14°C, 63°F, 70°F, 58°F, and missing values marked with question marks.]
Problem 4.4 continued

Square tiles were used to make the pattern below:

Figure 1  Figure 2  Figure 3

1. Write an equation that gives the perimeter $P$ of the $n$th figure.
2. Compare your equation with that of your classmates. Are the expressions for perimeter equivalent? Explain.
4. Hachi observed that there was an interesting pattern for the number of square tiles needed to build each figure.
   a. What pattern might she have observed?
   b. Write an equation that gives the number of square tiles $T$ in the $n$th figure.
   c. Is this relationship linear?

D 1. Look back to the equations you wrote in Question A, part (3); Question B, part (1); and Question C, part (1). Without graphing any of the equations, describe what the graph of each would look like. Which variable would be on the x-axis? Which variable would be on the y-axis? Would the line have a positive slope or a negative slope?
2. When it is helpful to represent a relationship as an equation? A table? A graph?

Homework starts on page 98.
WORD WALL WORDS
Constant

Coefficient

Coefficient Variable

$4x - 7 = 5$

Operator Constants

A term that does not contain a variable.

The number in front of a variable.
Decrease

going down
become or make smaller in size or amount

Coordinate Pair

(x, y)
Ordered Pair
An ordered pair of numbers that identifies a point on a coordinate plane.
Equation

\[ 3x + 2y = -12 \]
\[ x + y = -5 \]

A mathematical sentence that contains an equals sign.
Expression

$3x + 2$

The part of a number sentence that combines numbers and operations, but doesn't have an equal sign.

Increase

go up

become or make greater in size or amount.
Rate

Independent Variable

Rates and Unit Rates:

<table>
<thead>
<tr>
<th>60 miles</th>
<th>60 miles</th>
<th>20 miles/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 hours</td>
<td>1 hour</td>
<td>20 words</td>
</tr>
<tr>
<td>40 words</td>
<td>20 words</td>
<td>1 min.</td>
</tr>
</tbody>
</table>

A ratio of two numbers measured in different units.

A variable whose values are independent of changes in the values of other variables; x - variable.
Run

\[ y = \frac{y_2 - y_1}{x_2 - x_1} \]

The difference in the y-values of two points on a line.

Slope

The steepness of a line on a graph divided by its horizontal change.
50 mile.
1 hour

A rate that has a denominator of 1.

\[ y = \frac{mx + b}{2} \]

\[ \text{slope} \quad \text{y-intercept} \]

\[ y = \frac{3x - 5}{1} \]

\[ \text{slope} \quad \text{y-intercept} \]

A linear equation written in the form \( y = mx + b \) where \( m \) is the slope and \( b \) is the y-intercept of the equation's graph.
**x-axis**

The horizontal axis on a coordinate plane.

**Variable**

A letter or symbol used to represent an unknown number or value.

**Equation:**

\[4x - 7 = 5\]