Instructional Accommodations and Curricular Modifications
Bringing Learning Within the Reach of Every Student

Algebraic Reasoning
Participant Materials
Introduction

4 Components

1. Linear Algebra
2. Rules of Algebra
3. Using Technology
4. Patterns of Change

Linear Algebra is used in what fields to show trends and make decisions?

ACTIVITY: Talk your Numbers

<table>
<thead>
<tr>
<th>Independent</th>
<th>Dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage Number</td>
<td>Number of Counters Used</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
</tr>
</tbody>
</table>

(x, y)
(0, 1)
(1, 3)
(2, 5)
(3, 7)
(4, 9)
(5, 11)

What trend or pattern do you see?

How many counters will it take to build the 7th stage in the pattern?
Complete the mathematical sentence below:

\[ y = \] ________________________________________________________________________

The \textit{slope} will describe:

The \textit{intercept} will describe:

A \textit{function} describes:

\textbf{QUIZ}

1. Felicity is saving for a summer trip that will cost $560. She had money in savings to make a $120 deposit. If she works for 5 hours a week for $8 an hour, how long will it take her to earn enough money to pay for the trip?

2. Before she begins work (x=0), Felicity paid a $120 deposit (y=120). The next week, x-1 and y=160 so plot the ordered pairs, (0, 120) and (1, 160) on the coordinate grid.

3. “Felicity began with a $120 deposit and added $40 each week,” is a good verbal description of the pattern.

4. Finally, write an equation that describes the pattern.

5. Choose the correct amounts below to show the total money in Felicity’s account.
Component 2: The Language of Algebra

NOTES ABOUT PEMDAS

What is the value of $\frac{1}{2} (2a - 3b)^2$ when $a=9$ and $b=4$:

Distributive Property:

Solve for $x$:

$x = 2(y + 2) + 2y$
Solve for \( x \):

\[ 5x + 3x(x + 4) = 28 \]

Solve for \( m \):

\[ \frac{1}{4}(12m + 16) = 10 - 3(m - 2) \]

QUIZ

Cinderella has $50 in her savings account and works to add an additional $5 each week. Her ugly stepsister inherited $170 but spends all she earns plus an additional $10 every week. How long will it be before Cinderella will have more money than her ugly stepsister?

Write an equation without using dollar signs:

At the end of 8 weeks, what will the result be?

How long will it be before Cinderella will have more money than her ugly stepsister?
Component 3: Using Technology to Picture Change

- Turn on your calculator and press the 2nd and + keys to access the memory
- Select, then enter 4 to clear all lists
- Push stat, select the edit option by pushing enter when it is highlighted and see lists on the screen
- Now use right arrow to move cursor to L2

<table>
<thead>
<tr>
<th>Dependent</th>
<th>Number of Counters Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

- Enter number of counters used for each stage number in L1 as shown in the patterns you see
- Next let’s see how your calculator graphs the ordered pairs from L1 and L2

- Push window to see the list of options
- The minimum x value we want to consider is 0; the maximum is 5
- The scale we want the calculator to use is 1, so set xscl to 1

Practice graphing and tracing your equations!
Cinderella

\[ m = 5 \]
\[ y = \text{the amount of money in her account} \]
\[ x = 0 \]

What is \( y \)?

Write Cinderella’s equation in slope-intercept form:

Component 3 Notes:

QUIZ

Match
slope of a line \[ y \text{-intercept} \]
\[ m \]
where the line crosses the \( y \)-axis \[ y = mx + b \]
slope intercept form \[ b \]
Component 4: Patterns of Change

What is Cinderella’s new equation?

What is Cinderella’s balance in 45 years?

What are the steps you used to calculate this on your TI-84?

Method 1

- Zoom
- Trace
- Enter

press 0 to graph
and arrow over to get as close as you can to \( y = 600 \)
\( x = 14 \)  \( y = 585.21 \)

Method 2

- 2nd
- Table
- Graph

then scroll to \( y < 600 \)
\( x = 14 \)  \( y = 585.21 \)
Post-Assessment

1. If I buy movie tickets for $7 each, which number in the ordered pair (1,7) represents the independent variable?

2. The multiple representations of linear data discussed in this component include what?

3. Use PEMDAS to find the value of y: y= (3+1) 2 ÷ 2 + 6

4. Evaluate the following expression for x = 2: 2x2 – x + 8

5. In many parades, flowers are used to decorate the floats. The table below shows the number of flowers used in each row of a parade float:

<table>
<thead>
<tr>
<th>Row Number (r)</th>
<th>Number of Flowers (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54</td>
</tr>
<tr>
<td>2</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>62</td>
</tr>
<tr>
<td>4</td>
<td>66</td>
</tr>
</tbody>
</table>

   What is the equation?

6. When working with a linear equation that is in slope-intercept form, the slope tells you the value of y when x is 0. True or False?

7. When working with a linear equation that is in slope-intercept form, the intercept tells you:

8. When using a graphing calculator to solve a system of equations (two or more equations with the same variables), the solution is the:

9. Growth is not constant, but accelerated by compounding interest called:

10. Use the formula \( y = C (1 + r) t \) where y= the amount of money in the account, C= the initial investment, r= rate of interest and t= tie in years to figure the amount of money you would have in your account if you invested $500 at a rate of 5% for 5 years: