Vocabulary Self-Awareness Chart: Systems of Equations

Word	+	☑	-	Example	Definition
System of equations					
Linear system					
Solution of a linear system					
Solving a system by substitution					
System of linear inequalities					
Solution of a system of linear inequalities					
Graph of a system of equations					
Graph of a system of inequalities					
Graph of a Boundary line					
Scatterplot					
Solving a system by linear combinations					
Matrix					
Matrix Dimension					

Graphing a System of Equations

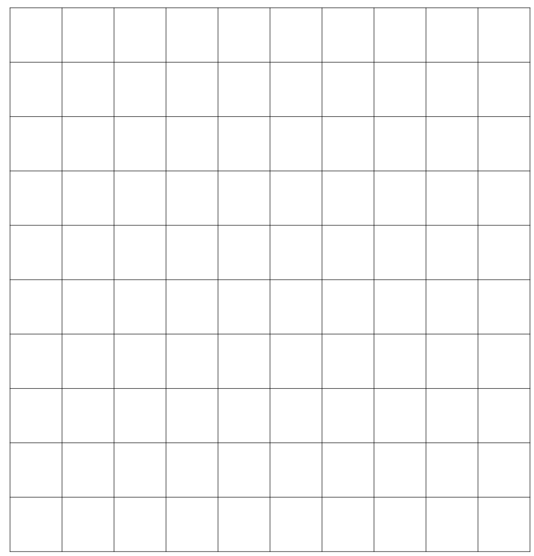
1) Sam left for work at 7:00 a.m. walking at a rate of 1.5 miles per hour. One hour later, his brother James noticed that Sam had forgotten his lunch. James leaves home walking at a rate of 2.5 miles per hour. When will James catch up with Sam to give him his lunch?

Let's graph each situation on the same graph.

Sam:
Table

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:



James:
Table:

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

This situation is an example of a system of equations.

Definition

System of equations:

A solution to a system of equations is the ordered pair that makes both equations true.

2) Solve each of the following systems of equations by graphing.

A. $y = -x + 1$
$y = x - 3$

B. $x + y = 3$
$x - y = -1$

3) Suppose James leaves his house one hour later but he walks at the same rate as Sam, 1.5 miles per hour. When will James catch up with Sam?

Sam:
Table

Time (x) (hours)	Miles (y)
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

James:
Table:

Time (x) (hours)	Miles (y)
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

When will a system of equations have no solution?

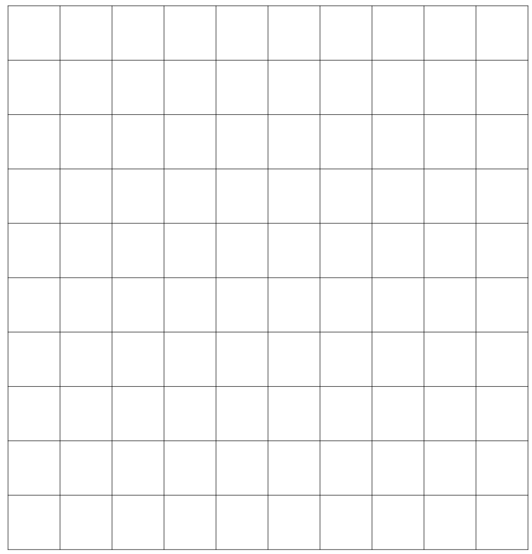
4) Suppose James leaves at the same time as Sam and walks at the same rate as Sam. Demonstrate what this would look like graphically.

Sam:

Table

Time (x) (hours)	Miles (y)
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:



James:

Table:

Time (x) (hours)	Miles (y)
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

When will a system of equations have an infinite number of solutions?

Graphing a System of Equations

1) Sam left for work at 7:00 a.m. walking at a rate of 1.5 miles per hour. One hour later, his brother James noticed that Sam had forgotten his lunch. James leaves home walking at a rate of 2.5 miles per hour. When will James catch up with Sam to give him his lunch?

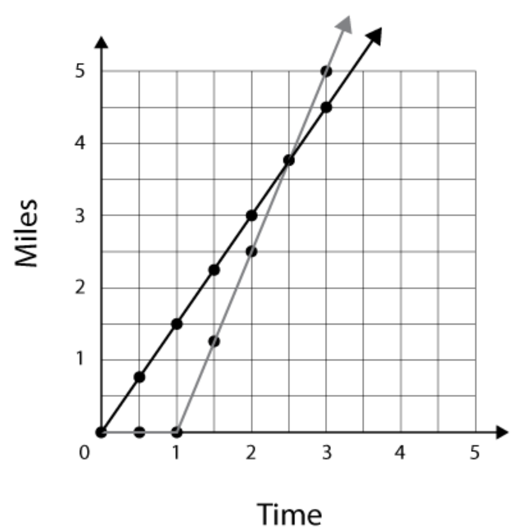
Let's graph each situation on the same graph.

Sam:
Table

Time (x) (hours)	Miles (y)
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

Equation:

$y = 1.5x$



James:
Table:

Time (x) (hours)	Miles (y)
0	*0*
0.5	*0*
1	*0*
1.5	*1.25*
2	*2.5*
2.5	*3.75*
3	*5*

Equation:

$y = 2.5(x - 1)$

This situation is an example of a system of equations.

Definition

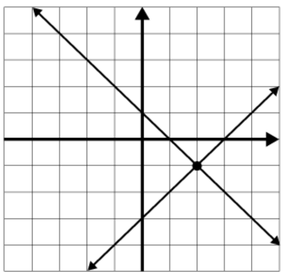
System of equations: *a set of two or more equations with two or more variables*

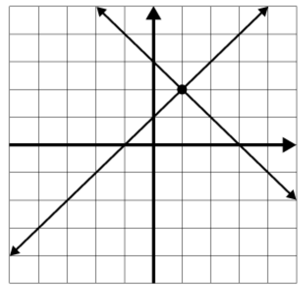
A solution to a system of equations is the ordered pair that makes both equations true.

2) Solve each of the following systems of equations by graphing.

A. $y = -x + 1$
$y = x - 3$ *Answer: (2 ,-1)*

B. x + y = 3
x – y = -1 *Answer:(1, 2)*



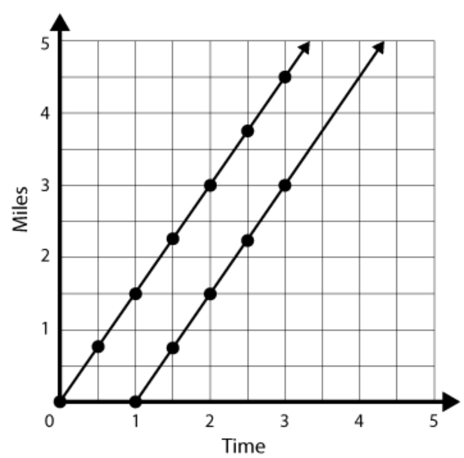


3) Suppose James leaves his house one hour later but he walks at the same rate as Sam, 1.5 miles per hour. When will James catch up with Sam? *never*

Sam:
Table

Equation: $y = 1.5x$

Time (x) (hours)	Miles (y)
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*



James:
Table:

Equation: $y = 1.5(x – 1)$

Time (x) (hours)	Miles (y)
0	*0*
0.5	*0*
1	*0*
1.5	*.75*
2	*1.5*
2.5	*2.25*
3	*3*

When will a system of equations have no solution? *When the slopes of the lines are the same and the y-intercepts are different (parallel lines the lines will never intersect so there will be no solution.)*

4) Suppose James leaves at the same time as Sam and walks at the same rate as Sam. Demonstrate what this would look like graphically.

Sam:
Table

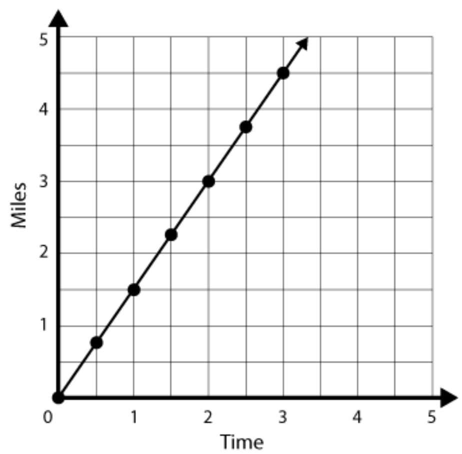
Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

Equation: $y = 1.5x$

James:
Table:

Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

Equation: $y = 1.5x$



When will a system of equations have an infinite number of solutions? *When the equations are equivalent.*

Unit 5, Activity 2, Battle of the Sexes

Have you ever wondered about the comparison of the athletic abilities of men and women? Mathematically, we can use the past performance of athletes to make that comparison.

Listed below you will find the winning times of men and women in the Olympic competition of the 100-meter freestyle in swimming. You will use this data and what you have learned about systems of equations to make comparisons between the men and women.

Men's 100-Meter Freestyle		**Women's 100-Meter Freestyle**	
Year	**Time (seconds)**	**Year**	**Time(seconds)**
1920	61.4	1920	73.6
1924	59	1924	72.4
1928	58.6	1928	71
1932	58.2	1932	66.8
1936	57.6	1936	65.9
1948	57.3	1948	66.3
1952	57.4	1952	66.8
1956	55.4	1956	62
1960	55.2	1960	61.2
1964	53.4	1964	59.5
1968	52.2	1968	60
1972	51.2	1972	58.6
1976	50	1976	55.7
1980	50.4	1980	54.8
1984	49.8	1984	55.9
1988	48.6	1988	54.9
1992	49	1992	54.6
1994	48.7	1994	54.5
1996	48.7	1996	54.5

Using your graphing calculator, enter the men’s times in L1 and L2, and enter the women’s times in L1 and L3. Then create two different scatter plots and find the linear regression equations.

Graphing calculator directions:

1) Press [Y=] arrow up and highlight Plot 1 → Press Enter
2) [STAT] →Edit→[ENTER]
3) In L1 type in the year starting with 20
   20, 24, 28….(pay attention to the last three years!)
4) In L2 type in the times for the men’s 100-meter Freestyle
5) In L3 type in the times for the women’s 100-meter Freestyle
6) Press STAT PLOT ([2nd] [Y=]) → [ENTER] →ON→Scatter Plot→L1→L2
   (Use Mark 1)

7) Press STAT PLOT (2nd Y=)→Arrow down to 2→ ENTER →ON→Scatter Plot→L1→L3 (Use Mark 3)
8) Zoom 9
9) STAT →CALC→ 4(Linear Regression)→L1, L2, VARS→Y-VARS→ ENTER → ENTER → ENTER → GRAPH
10) STAT →CALC→4(Linear Regression)→L1, L3, VARS→Y-VARS→ ENTER →Arrow down to Y2→ ENTER → ENTER →GRAPH
11) ZOOM 3 (Zoom Out)→ ENTER (Continue to Zoom out until you clearly see the intersection)
12) 2nd TRACE (Calc)→5 (Intersect)→ ENTER → ENTER → ENTER

Guiding Questions

1. Describe what the point of intersection on the graph tells you.

2. According to the graph, is there ever a year that women and men swim the 100- meter freestyle in the same time? If so, what year and what time will they swim?

3. Write the equation in slope-intercept form that describes the time it takes the men to swim the 100-meter freestyle in a given year. y = ______________________________

4. Write the equation in slope-intercept form that describe the time it takes the women to swim the 100-meter freestyle in a given year. y =______________________________

5. How much faster are the women and the men each year?

Unit 5, Activity 2, Battle of the Sexes with Answers

Have you ever wondered about the comparison of the athletic abilities of men and women? Mathematically, we can use the past performance of athletes to make that comparison.

Listed below you will find the winning times of men and women in the Olympic competition of the 100-meter freestyle in swimming. You will use this data and what you have learned about systems of equations to make comparisons between the men and women.

Men's 100-Meter Freestyle		**Women's 100-Meter Freestyle**	
Year	**Time (seconds)**	**Year**	**Time(seconds)**
1920	61.4	1920	73.6
1924	59	1924	72.4
1928	58.6	1928	71
1932	58.2	1932	66.8
1936	57.6	1936	65.9
1948	57.3	1948	66.3
1952	57.4	1952	66.8
1956	55.4	1956	62
1960	55.2	1960	61.2
1964	53.4	1964	59.5
1968	52.2	1968	60
1972	51.2	1972	58.6
1976	50	1976	55.7
1980	50.4	1980	54.8
1984	49.8	1984	55.9
1988	48.6	1988	54.9
1992	49	1992	54.6
1994	48.7	1994	54.5
1996	48.7	1996	54.5

Using your graphing calculator, enter the men’s times in L1 and L2 and enter the women’s times in L1 and L3. Then create two different scatter plots and find the linear regression equations.

Graphing calculator directions:

1) Press [Y=] arrow up and highlight Plot 1 → Press Enter
2) [STAT] →Edit→[ENTER]
3) In L1 type in the year starting with 20
   20, 24, 28….(pay attention to the last three years!)

4) In L2 type in the times for the men’s 100-meter Freestyle
5) In L3 type in the times for the women’s 100-meter Freestyle

6) Press STAT PLOT ([2nd] [Y=]) → [ENTER] →ON→Scatter Plot→L1→L2

Unit 5, Activity 2, Battle of the Sexes with Answers

(Use Mark 1)

7) Press STAT PLOT (2nd Y=)→Arrow down to 2→ ENTER →ON→Scatter Plot→L1→L3 (Use Mark 3)
8) Zoom 9

9) STAT →CALC→ 4(Linear Regression)→L1, L2, VARS→Y-VARS→ ENTER → ENTER → ENTER → GRAPH

10) STAT →CALC→4(Linear Regression)→L1, L3, VARS→Y-VARS→ ENTER →Arrow down to Y2→ ENTER → ENTER →GRAPH

11) ZOOM 3 (Zoom Out)→ ENTER (Continue to Zoom out until you clearly see the intersection)

12) 2nd TRACE (Calc)→5 (Intersect)→ ENTER → ENTER → ENTER

Guiding Questions

1. Describe what the point of intersection on the graph tells you.

   It is the year that men and women swim the 100-meter freestyle in the same amount of time.

2. According to the graph, is there ever a year that women and men swim the 100-meter freestyle in the same time? If so, what year and what time will they swim?

   They will swim the race in 39.1 seconds in the year 2049.

3. Write the equation in slope-intercept form that describes the time it takes the men to swim the 100-meter freestyle in a given year. _*y = -0.167x + 64.06*___________

4. Write the equation in slope-intercept form that describe the time it takes the women to swim the 100-meter freestyle in a given year. _*y = -0.255x+77.23*____________

5. How much faster are the women and the men each year? *The men are 0.167 seconds faster each year, and the women are 0.255 seconds faster each year.*

Unit 5, Activity 8, Introduction to Matrices

The following charts give the electronic sales of A Plus Electronics for two store locations.

Store A **Store B**

	Jan.	Feb.	Mar.		Jan.	Feb.	Mar.
Computers	55	26	42	Computers	30	22	35
DVD players	28	26	30	DVD players	12	24	15
Camcorders	32	25	20	Camcorders	20	21	15
TVs	34	45	37	TVs	32	33	14

<u>Definition</u>

Matrix –

1) Arrange the store sales in two separate matrices.

<u>Definition</u>

Dimensions of a matrix –

2) Identify each of the following matrices using its dimensions.

$$A = \begin{bmatrix} 2 & 6 \\ -7 & 0 \\ 3 & 8 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & -8 \\ 6 & 10 \end{bmatrix} \qquad C = \begin{bmatrix} 1 & -9 & 64 & 67 \end{bmatrix} \qquad D = \begin{bmatrix} -3 \\ 5 \\ 0 \\ -2 \end{bmatrix}$$

3) How could we use matrices to find the total amount of each type of electronic device sold at both stores for each month in the first quarter of the year?

4) How many more electronic devices did Store A sell than Store B?

5) When adding or subtracting matrices, ______________________________________

6) Add the following matrices:

$$\begin{bmatrix} 3 & 23 \\ -7 & -9 \end{bmatrix} + \begin{bmatrix} 2 \\ 8 \\ -2 \end{bmatrix} =$$

7) Two matrices can be added or subtracted if and only if ________________________

8) Guided Practice:

A) Add $\begin{bmatrix} 1 & 3 \\ -4 & 5 \end{bmatrix} + \begin{bmatrix} -7 & 4 \\ 0 & -2 \end{bmatrix} =$

B) Subtract $\begin{bmatrix} 2 & -5 & 4 \\ 4 & 0 & -6 \\ 7 & 9 & 12 \end{bmatrix} - \begin{bmatrix} -3 & 4 & -11 \\ -9 & 6 & 72 \\ 8 & -12 & 34 \end{bmatrix} =$

9) Another store, Store C, sold twice as many electronic devices as Store B. Use matrices to show how many devices were sold by Store C.

Definition

Scalar multiplication –

10) Multiply $-5\begin{bmatrix} 1.2 & 4 & 8 \\ \frac{1}{5} & 0 & -4 \end{bmatrix}$

Unit 5, Activity 7, Introduction to Matrices with Answers

The following charts give the electronic sales of A Plus Electronics for two store locations.

Store A				**Store B**			
	Jan.	**Feb.**	**Mar.**		**Jan.**	**Feb.**	**Mar.**
Computers	**55**	**26**	**42**	**Computers**	**30**	**22**	**35**
DVD players	**28**	**26**	**30**	**DVD players**	**12**	**24**	**15**
Camcorders	**32**	**25**	**20**	**Camcorders**	**20**	**21**	**15**
TVs	**34**	**45**	**37**	**TVs**	**32**	**33**	**14**

<u>Definition</u>

Matrix – *a rectangular array of numbers used to organize information*

Each item in a matrix is called an element.
The advantage of using a matrix is that the entire array can be used as a single item.

1) Arrange the store sales in two separate matrices.

$$A = \begin{bmatrix} 55 & 26 & 42 \\ 28 & 26 & 30 \\ 32 & 25 & 20 \\ 64 & 45 & 37 \end{bmatrix} \qquad B = \begin{bmatrix} 30 & 22 & 35 \\ 12 & 24 & 15 \\ 20 & 21 & 15 \\ 32 & 33 & 14 \end{bmatrix}$$

<u>Definition</u>

Dimensions of a matrix – *number of rows by number of columns*

$A_{4 \times 3}$ $B_{4 \times 3}$

2) Identify each of the following matrices using its dimensions.

$$A = \begin{bmatrix} 2 & 6 \\ -7 & 0 \\ 3 & 8 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & -8 \\ 6 & 10 \end{bmatrix} \qquad C = \begin{bmatrix} 1 & -9 & 64 & 67 \end{bmatrix} \qquad D = \begin{bmatrix} -3 \\ 5 \\ 0 \\ -2 \end{bmatrix}$$

$A_{3 \times 2}$ $B_{2 \times 2}$ $C_{1 \times 4}$ $D_{4 \times 1}$

3) How could we use matrices to find the total amount of each type of electronic device sold at both stores for each month in the first quarter of the year? *Add the two matrices together*

$$\begin{bmatrix} 55 & 26 & 42 \\ 28 & 26 & 30 \\ 32 & 25 & 20 \\ 64 & 45 & 37 \end{bmatrix} + \begin{bmatrix} 30 & 22 & 35 \\ 12 & 24 & 15 \\ 20 & 21 & 15 \\ 32 & 33 & 14 \end{bmatrix} = \begin{bmatrix} 85 & 48 & 77 \\ 40 & 50 & 45 \\ 52 & 46 & 35 \\ 96 & 78 & 51 \end{bmatrix}$$

4) How many more electronic devices did Store A sell than Store B?

$$\begin{bmatrix} 55 & 26 & 42 \\ 28 & 26 & 30 \\ 32 & 25 & 20 \\ 64 & 45 & 37 \end{bmatrix} - \begin{bmatrix} 30 & 22 & 35 \\ 12 & 24 & 15 \\ 20 & 21 & 15 \\ 32 & 33 & 14 \end{bmatrix} = \begin{bmatrix} 25 & 4 & 7 \\ 16 & 2 & 15 \\ 12 & 4 & 5 \\ 32 & 12 & 23 \end{bmatrix}$$

5) When adding or subtracting matrices, *add or subtract the corresponding elements.*

6) Add the following matrices:

$$\begin{bmatrix} 3 & 23 \\ -7 & -9 \end{bmatrix} + \begin{bmatrix} 2 \\ 8 \\ -2 \end{bmatrix} =$$ *can't be done because the dimensions are not the same*

7) Two matrices can be added or subtracted if and only if *the matrices have the same dimensions.*

8) Guided Practice:

A) Add $\begin{bmatrix} 1 & 3 \\ -4 & 5 \end{bmatrix} + \begin{bmatrix} -7 & 4 \\ 0 & -2 \end{bmatrix} = \begin{bmatrix} -6 & 7 \\ -4 & 3 \end{bmatrix}$

B) Subtract $\begin{bmatrix} 2 & -5 & 4 \\ 4 & 0 & -6 \\ 7 & 9 & 12 \end{bmatrix} - \begin{bmatrix} -3 & 4 & -11 \\ -9 & 6 & 72 \\ 8 & -12 & 34 \end{bmatrix} = \begin{bmatrix} 5 & -9 & 15 \\ 13 & -6 & -78 \\ -1 & 21 & -22 \end{bmatrix}$

9) Another store, Store C, sold twice as many electronic devices as Store B. Use matrices to show how many devices were sold by Store C.

$$2\begin{bmatrix} 30 & 22 & 35 \\ 12 & 24 & 15 \\ 20 & 21 & 15 \\ 32 & 33 & 14 \end{bmatrix} = \begin{bmatrix} 60 & 44 & 70 \\ 24 & 48 & 30 \\ 40 & 42 & 30 \\ 64 & 66 & 28 \end{bmatrix}$$

<u>Definition</u>

Scalar multiplication – *multiplying a matrix by a number*

10) Multiply $-5\begin{bmatrix} 1.2 & 4 & 8 \\ \frac{1}{5} & 0 & -4 \end{bmatrix} = \begin{bmatrix} -6 & -20 & -40 \\ -1 & 0 & 20 \end{bmatrix}$

Unit 5, Activity 9, Matrix Multiplication

The following chart shows t-shirt sales for a school fundraiser and the profit made on each shirt sold.

Number of shirts sold

	Small	**Medium**	**Large**
Art Club	**52**	**67**	**30**
Science Club	**60**	**77**	**25**
Math Club	**33**	**59**	**22**

Profit per shirt

	Profit
Small	**$5.00**
Medium	**$4.25**
Large	**$3.00**

1) Write a matrix for the number of shirts sold and a separate matrix for profit per shirt

2) Use matrix multiplication to find the total profit for each club.

3) Two matrices can be multiplied together if and only if ___________________________

Matrix Operations with the Graphing Calculator

To enter matrices into the calculator:

MATRIX, EDIT, Enter dimensions, Enter elements

To perform operations:
From home screen (2nd Quit), MATRIX, Enter matrix you are using to calculate, enter operation, MATRIX, Enter on second matrix you are calculating, Enter to get solution.

Perform the indicated operations using the given matrices:

$$A = \begin{bmatrix} 2 & 3 \\ 1 & -5 \\ 6 & 7 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & -5 \\ 4 & 0 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & -2 \\ 8 & -4 \end{bmatrix} \qquad D = \begin{bmatrix} 2 & 6 & 7 \end{bmatrix}$$

4) B – C =

5) 3A

6) AB

7) AD

Unit 5, Activity 9, Matrix Multiplication with Answers

The following chart shows T-shirt sales for a school fundraiser and the profit made on each shirt sold.

Number of shirts sold **Profit per shirt**

	Small	**Medium**	**Large**		**Profit**
Art Club	**52**	**67**	**30**	**Small**	**$5.00**
Science Club	**60**	**77**	**25**	**Medium**	**$4.25**
Math Club	**33**	**59**	**22**	**Large**	**$3.00**

1) Write a matrix for the number of shirts sold and a separate matrix for profit per shirt

Number of shirts sold

$$\begin{bmatrix} 52 & 67 & 30 \\ 60 & 77 & 25 \\ 33 & 59 & 22 \end{bmatrix}$$

Profit per shirt

$$\begin{bmatrix} 5 \\ 4.25 \\ 3 \end{bmatrix}$$

2) Use matrix multiplication to find the total profit for each club.

$$\begin{bmatrix} 52 & 67 & 30 \\ 60 & 77 & 25 \\ 33 & 59 & 22 \end{bmatrix} \bullet \begin{bmatrix} 5 \\ 4.25 \\ 3 \end{bmatrix} = \begin{bmatrix} 52(5)+67(4.25)+30(3) \\ 60(5)+77(4.25)+25(3) \\ 33(5)+59(4.25)+22(3) \end{bmatrix} = \begin{bmatrix} 634.75 \\ 702.25 \\ 481.75 \end{bmatrix}$$

3) Two matrices can be multiplied together if and only if _*their inner dimensions are equal.*

Matrix Operations with the Graphing Calculator

To enter matrices into the calculator:

[MATRIX], EDIT, Enter dimensions, Enter elements

To perform operations:
From home screen ([2nd] [Quit]), [MATRIX], Enter matrix you are using to calculate, enter operation, [MATRIX], Enter on second matrix you are calculating, Enter to get solution.

Unit 5, Activity 9, Matrix Multiplication with Answers

Perform the indicated operations using the given matrices:

$$A = \begin{bmatrix} 2 & 3 \\ 1 & -5 \\ 6 & 7 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & -5 \\ 4 & 0 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & -2 \\ 8 & -4 \end{bmatrix} \qquad D = \begin{bmatrix} 2 & 6 & 7 \end{bmatrix}$$

4) B – C = 5) 3A 6) AB 7) AD

Solutions:

4) $\begin{bmatrix} -1 & -3 \\ -4 & 4 \end{bmatrix}$ *5)* $\begin{bmatrix} 6 & 9 \\ 3 & -15 \\ 18 & 21 \end{bmatrix}$ *6)* $\begin{bmatrix} 16 & -10 \\ -18 & -5 \\ 40 & -30 \end{bmatrix}$

7) Can't be done; inner dimensions are not equal.

Unit 5, Activity 10, Solving Systems of Equations Using Matrices

Multiply the following two matrices by hand.

1) $\begin{bmatrix} -1 & 2 \\ 1 & 6 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} =$

2) $\begin{bmatrix} -3 & 7 \\ 4 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} =$

3) Given the following systems of equations, rewrite as a matrix multiplication equation.

$5x - 4y = 23$
$7x + 8y = 5$

This is what we have so far: $[A]x = [B]$

4) What would we do to solve for the unknown variable *x*?

Instead of division, we will use A^{-1}.

<u>To solve systems of equations using matrices</u>: $[A]^{-1}[B] = x$

5) Solve the systems of equation above using matrices.

Try these:

Solve using matrices. Write the matrices used.

6) $3x + 5y = 4$
$3x + 7y = 2$

7) $2x - 2y = 4$
$x + 3y = 1$

8) $x + y + z = 4$
$x - 2y - z = 1$
$2x - y - 2z = -1$

Unit 5, Activity 10, Solving Systems of Equations Using Matrices with Answers

Multiply the following two matrices by hand.

1) $\begin{bmatrix} -1 & 2 \\ 1 & 6 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{matrix} -x+2y \\ x+6y \end{matrix}$

2) $\begin{bmatrix} -3 & 7 \\ 4 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{matrix} -3x+7y \\ 4x+2y \end{matrix}$

3) Given the following systems of equations, rewrite it as a matrix multiplication equation.

Solution:

5x – 4y = 23
7x + 8y = 5

$\begin{bmatrix} 5 & -4 \\ 7 & 8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 23 \\ 5 \end{bmatrix}$

This is what we have so far: [A]*x* = [B]

4) What would we do to solve for the unknown variable *x*? *Divide by [A]*

Instead of division, we will use A^{-1}.

To solve systems of equations using matrices : $[A]^{-1}[B] = x$

5) Solve the systems of equation above using matrices. *x = 3, y = -2*

A = $\begin{bmatrix} 5 & -4 \\ 7 & 8 \end{bmatrix}$ $B = \begin{bmatrix} 23 \\ 5 \end{bmatrix}$ $[A]^{-1}[B] = x$

Try these:

Solve using matrices. Write the matrices used.

6) 3x + 5y = 4
3x + 7y = 2

x = 3, y = -1

7) 2x – 2y = 4
x + 3y = 1

x = 1.75, y = -.25

8) x + y + z = 4
x – 2y –z = 1
2x – y – 2z = -1

x = 2, y = -1, z = 3

Unit 5, Activity 10, Word Grid

Number of Solutions	**Graphing**	**Substitution**	**Elimination**	**Matrices**
0				
1				
Infinitely many				

Unit 5, Activity 10, Word Grid with Answers

Number of Solutions	**Graphing**	**Substitution**	**Elimination**	**Matrices**
0	Lines do not intersect (parallel)	All variables will cancel out and the result will be a false statement i.e., (3 = 4)	All variables will cancel out and the result will be a false statement i.e., (3 = 4)	Singular matrix error (use another method to determine number of solutions)
1	Lines intersect at a single point	Values can be found for both variables	Values can be found for both variables	Calculator gives answer in matrix form
Infinitely many	Lines are the same and lie on top of one another	All variables will cancel out and the result will be a true statement i.e., (0 = 0)	All variables will cancel out and the result will be a true statement i.e., (0 = 0)	Singular matrix error (use another method to determine number of solutions)