

Discipline: Mathematics

Standard Category: Algebra and Functions

Lesson Focus: To model real life situations by means of linear functions

Suggested

Level:

High School

PA Math Standard(s):	Related TESOL Standard(s):
2.8.11Q: Represent functional relationships in tables, charts and graphs. 2.8.11R: Create and interpret functional models.	Goal 2: To use English to achieve academically in all content areas. Standard 2: Student will use English to obtain, process, construct, and provide subject matter information in spoken and written form.

Lesson Focus:

To model real life situations using linear functions

Teaching Strategies:

Whole group instruction

Peer work

Simplify language of problem

Assessment Strategies:

Question for understanding

Recall

Identify

Teacher observation

Evaluate math process, not language

Key Objectives in Accordance with TESOL Level:

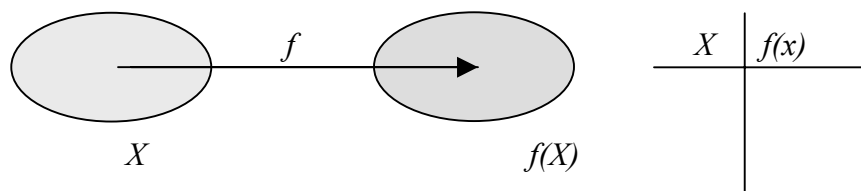
Pre-Conversational/ Beginning	Intermediate	Advanced
Students will be able to: • Identify and graph a linear equation.	Students will be able to: • Model a linear function, make a table of values and graph the function.	Students will be able to: • Model real life situations, analysis graph, and communicate observations.

Materials:

1. Paper
2. Pencil
3. Graphing calculator (optional)

Procedures: (ESL suggestions are written in italics)

1. Define terms through examples:
 - A. ORDERED PAIR – A pair of numbers used to locate points on a coordinate grid. The first number is the value of the x-coordinate, and the second number is the value of the y-coordinate. Written (X,Y)
 - B. FUNCTION– describes a dependent relationship between two quantities. For every value of X there is only one value of Y. (A set of ordered pair whose “X’s” are all different.)
 - C. LINEAR FUNCTION – a function with the form of $f(x) = mx + k$. The graphs of linear functions are straight lines or points on a line.
2. Introduce functions using a graphic organizer such as the following:



Examples: The value of the expression $3x - 5$ depends on the value of x , so we say that $3x - 5$ is a function of x and write $f(x) = 3x - 5$. The function notation is read “f of x”. We could make a table of values of the following function:

$f(x) = 3x - 5$	x <hr style="width: 100%;"/> 0 1 2	$f(x)$ <hr style="width: 100%;"/> -5 -2 1
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Assessment: (ELL suggestions are written in italics)

Provide students with examples of ordered pairs functions *making sure ESL students make that connection*. Questioning for understanding. *Simplify language of problem, example: Introduce a simpler problem.* Correctives (Remedial activities) Return to concrete examples, and re-teach areas unlearned.

Beginner

Which of the following are functions?

Example 1: (2,3), (3,4), (3,5), (4,6) (no, there are two ordered pair with the same “x” value)

Example 2: (4,6), (5,6), (6,6), (7, 6) (yes, every “x” value is different)

Once background knowledge has been established on what a function looks like, introduce graphing of a function on a coordinate grid.

(Although graphing should have been already covered, a quick review of graphing ordered pairs on a coordinate graph would benefit some students for ESL students not knowledgeable about graphing on a coordinate grid.)

Intermediate

Make a table of values and then graph the following linear functions

$f(x) = 3x - 2$

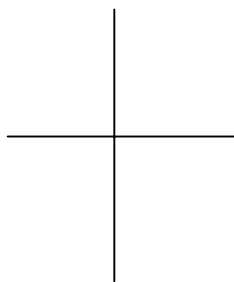
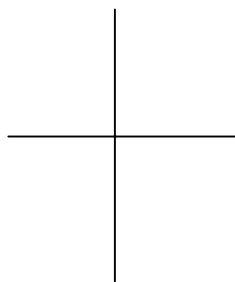
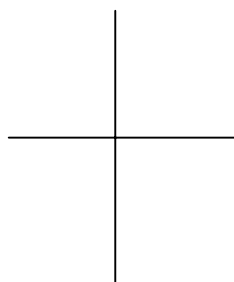
$f(x) = \frac{1}{2}x + 5$

$f(x) = -2x + 3$

x	$f(x)$
-3	
-2	
-1	
0	
1	
2	
3	

x	$f(x)$

x	$f(x)$



Verify the graphs by entering the linear functions on a graphics calculator in $y =$ and then graph them.

Advanced

Introduce problem solving, *depending on level of student and progress.*

Problem Solving Example:

The senior class has paid \$200 to rent a roller skating rink for a fund raising party. Tickets for the party are \$5.00 each.

- Express the net income as a function of the number of tickets sold. Set up an equation.
- Use $n =$ the number of tickets sold
Use $I(n) =$ the net income when n tickets are sold.
- Make a table of values and Graph the function.
- Identify the point at which the class begins to make a profit.

(NET INCOME – the amount of money remaining after expenses are deducted. ESL student might not know what net income means)

Pair an ESL student with a student who might be able to help him, either with primary language or through motions. Observe and guide students as they formulate the function.

Once function is correctly identified, guide in making a table of values, graphing and extrapolating information from their graphs.

Introduce different real life situations, which could be modeled with linear functions.

Example: Simple interest ($I = prt$)

Technology:

Introduce the graphing calculator. Demonstrate how to enter data in a data table or how to graph using “Y=” key. Demonstrate how to graph a linear function, and to use the trace see the “x” and “y” values.

Solution to problem solving:

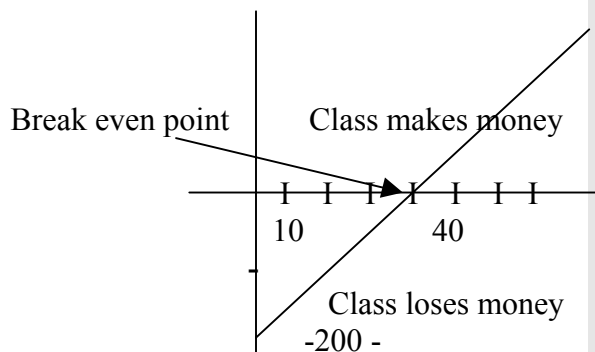
$I(n) = \$5 \times \text{the number of tickets sold} - \200 rental fee

$I(n) = 5n - 200$

Table of values:

n	I(n)
0	-200
20	-100
40	0
50	50

Graph



Notes:

Do not “water down” the context.

Use *simplified language*, and speaking slowly might bring your point across. *Even the simple words like “net income” might confuse the*

student. Remember he is working in a different language.

Try to connect real life situations to things he is familiar.

Do not ask individual student if he understands, but as students work in pairs, listen and observe as they work.

