FUNCTION JUNCTION

Focus: Identification of algebraic rules that describe functions.

Objective: **Algebra I TEKS, Linear Functions #5**
The student understands that linear functions can be represented in different ways and translates among their various representations.

Algebra I TEKS, Quadratic Functions #11
The student understands understands that quadratic functions can be represented in different way and investigates quadratic functions in order to translate among their various representations.

Terms: Function notation, independent variable, dependent variable

Set-Up: Participants should be seated at tables in groups of four.

Materials: Transparencies #3, Activities #3-4, graphing calculators

Prerequisites: Operations of integers, table building features of graphing calculator

Procedure: **Transparency #3:   Function Junction**

Questions for Discussion:
• A dependent relationship exists between the input and output values. Describe the rule in words that the *function junction machine* is using. (Ans: Add three to twice each input value to get the output value)
• Describe the rule algebraically. (Ans: $2n+3$)
• Write the rule using standard mathematical notation for "y as a function of x" (Ans: $f(x)=2x+3$)
• Is the graph of $y=2x+3$ a straight line or a parabola? (Ans: straight line)
• Is the function a linear or quadratic function? (Ans: linear function)

Activity #3:   Function Junction

Give each group the Function Junction activity sheets. Students are to look for a *function junction pattern* in each table and describe in words the algebraic rule being used to produce each set of output values. Then they are to express each rule using function notation. Next, they are to use a graphing calculator to draw the graph of each relation and identify the curve as either linear or quadratic. Ask the groups to divide their graphs into 2 sets: Lines <u>or</u> Parabolas.

Answers:

time	rule	type of curve
1:00 am	$y = x$	straight line
2:00 am	$y = x + 1$	straight line
3:00 am	$y = 3x - 3$	straight line
4:00 am	$y = x^2$	parabola
5:00 am	$y = x^2 + 2$	parabola
6:00 am	$y = 4$	straight line
7:00 am	$y = 2x + 5$	straight line
8:00 am	$y = -x^2$	parabola
9:00 am	$y = 4x^2$	parabola

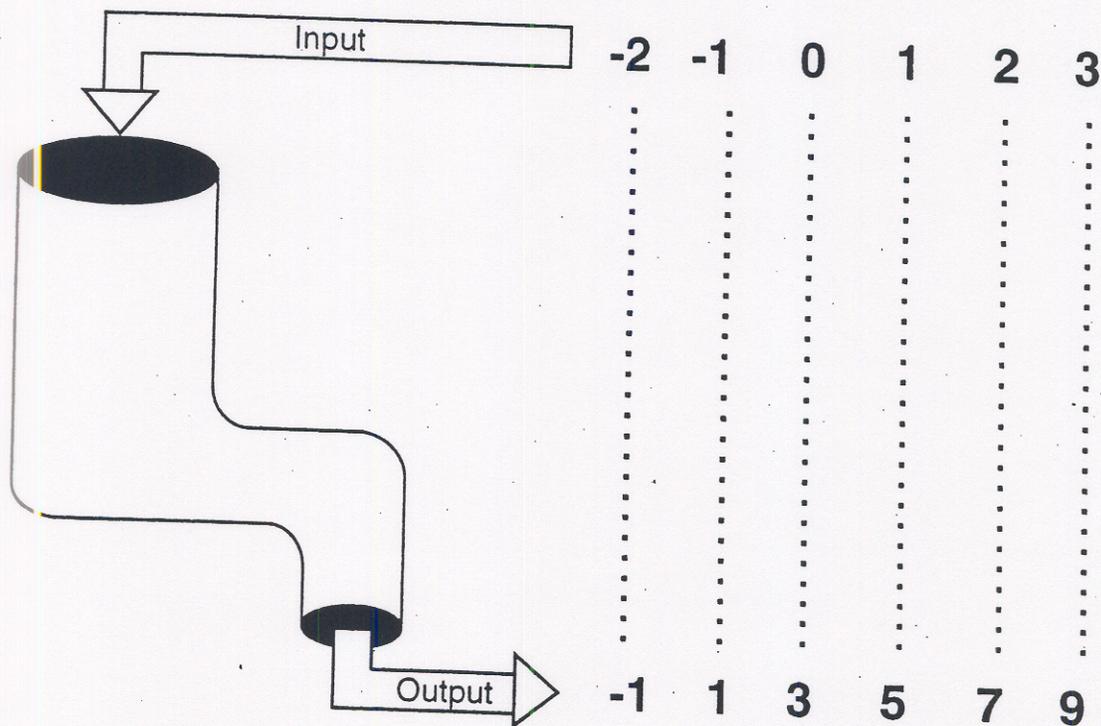## Activity #4:   Function Junction

Ask participants to create their own linear and quadratic rules for the *Function Junction Machine*. Using the rules, they are to fill in corresponding input and output values on the charts and allow group members to determine the rules.

Emphasize Alg I TEKS, Foundations for Functions #3
3.a.   Given situations, the student looks for patterns and represents generalizations algebraically.
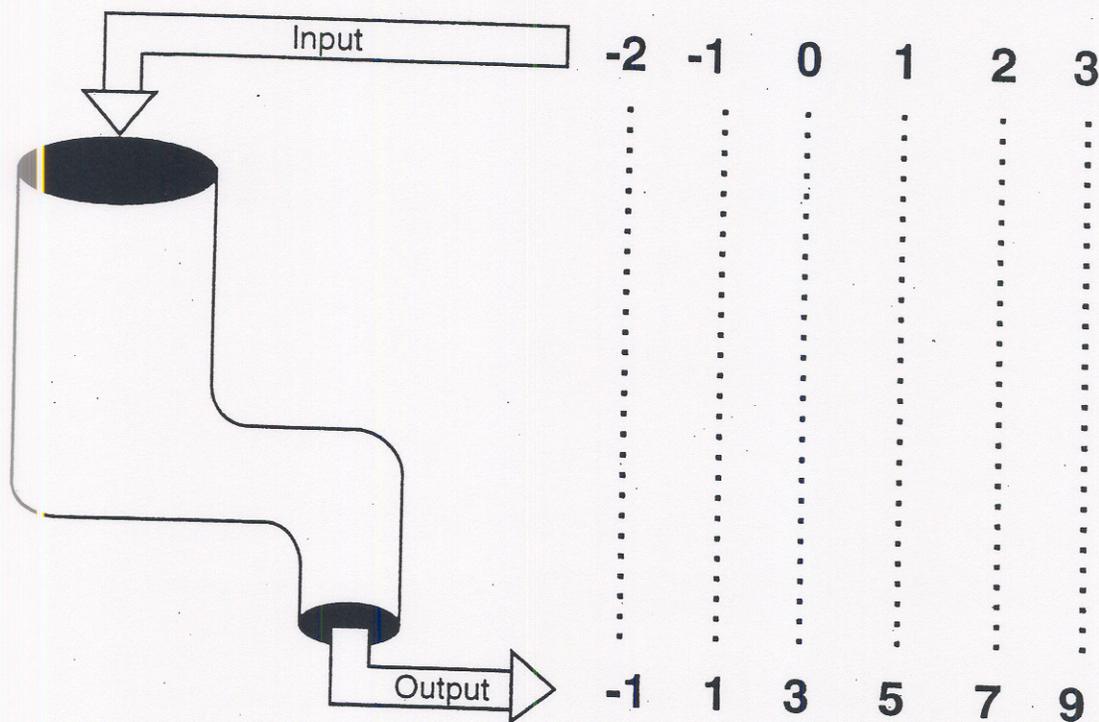
FUNCTION JUNCTION

The *Function Junction Machine* pictured below produces one output value for each input value. Example: If "-2" is an input, then "-1" is the output; if "3" is an input, then "9" in the output; if "1" is an input, then "5" is the output.

Input	-2	-1	0	1	2	3
Output	-1	1	3	5	7	9

1. Describe in words the rule that the *Function Junction Machine* is using to produce the output values.

2. Express the rule using function notation.

3. Graph the function and identify the type of curve that is formed (linear or quadratic).

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Function Junction

1:00 am

x	y
-3	-3
-2	-2
-1	-1
0	0
1	1
2	2
3	3

Rule:

Type of Curve:

2:00 am

x	y
-3	-2
-2	-1
-1	0
0	1
1	2
2	3
3	4

Rule:

Type of Curve:

3:00 am

x	y
-3	-12
-2	-9
-1	-6
0	-3
1	0
2	3
3	6

Rule:

Type of Curve:

4:00 am

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

Rule:

Type of Curve:

5:00 am

x	y
-3	11
-2	6
-1	3
0	2
1	3
2	6
3	11

Rule:

Type of Curve:

6:00 am

x	y
-3	4
-2	4
-1	4
0	4
1	4
2	4
3	4

Rule:

Type of Curve:

7:00 am

x	y
-3	-1
-2	1
-1	3
0	5
1	7
2	9
3	11

Rule:

Type of Curve:

8:00 am

x	y
-3	-9
-2	-4
-1	-1
0	0
1	-1
2	-4
3	-9

Rule:

Type of Curve:

9:00 am

x	y
-3	36
-2	16
-1	4
0	0
1	4
2	16
3	36

Rule:

Type of Curve: